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The care of older people with dementia in rural Australian hospitals – a case study

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KEY WORDS

Empathy; Health Resources; length of stay; risk management; workload

ABSTRACT

Objective
Investigate how nurses in rural hospitals care for people with dementia.

Design
A case study research design.

Setting
Three rural hospitals in one region of the state of New South Wales, Australia.

Subjects
A purposive sample of 21 nurses who were employed at the study sites.

Main outcome measure
Description of how nurses working in rural hospitals care for people with dementia.

Results
Nurses drew upon their community connectedness to creatively use limited resources to provide person-centred care for people with dementia. The physical environment of the hospital influenced rural nurses' practice, with chemical and physical restraint occasionally used when nurses' were concerned about workload and safety.

Conclusion
Rural nurses used their community connectedness to help them provide person-centred care for people with dementia, but at times, this care was limited by overriding concerns about risk management and patient safety.

INTRODUCTION

In 2015 it was estimated that, worldwide 46.8 million people had dementia and this number would double every 20 years, to 74.7 million in 2030 and 131.5 million in 2050 (Alzheimer's Disease International 2015). Against this background, increasing recognition is being given to the needs of people who have dementia by governments and non-government organisations internationally (Alzheimer's Disease International 2015). Rural areas are becoming increasingly populated by older people due to a combination of declining fertility rates, out-migration of younger people and in-migration of older people to these areas (Smailes et al 2014). As rural areas age, it is likely that the numbers of people with dementia will rise. An international systematic literature review reported the need for increased formal dementia services for people who live in rural areas (Morgan et al 2011). In Australia, rural hospitals are used for sub-acute care, including dementia care (Alzheimer's Australia 2007).

People with dementia are most commonly admitted to hospital for conditions unrelated to their dementia (Zuliani et al 2012). Hospitalised people with dementia have longer hospital stays than those who do not have dementia (Draper et al 2011; Mukadam and Sampson 2011). In hospital, people with dementia have higher rates of hospital-acquired complications of delirium, pressure injuries, urinary tract infection and pneumonia (Bail et al 2013), with significant costs to the health service (Bail et al 2015).

The hospital environment can increase confusion for people who have dementia (Dewing and Dijk 2016) leading to distress. Qualitative studies based in metropolitan hospital settings suggest that nurses may lack the skills necessary to care for people with dementia (Cowdell 2010), may be unclear on what constitutes a person-centred approach for people with dementia (Clisset et al 2013), and/or may be focussed on risk management rather than on the person (Moyle et al 2011). A person-centred approach encompasses respectful relationships between staff, the people they are caring for and those who are important to them and is enabled in workplaces where staff are empowered to develop their practice (McCormack and McCance 2016). The calm presence of staff has been found to have a positive impact on wellbeing for people who have dementia and are in hospital (Edvardsson et al 2012).

Working in a rural hospital is unique. Nurses are generalists rather than specialists (Mills et al 2010) and may care for people with different diseases or concerns, often on a single shift. The lack of specialist knowledge may negatively impact the way rural nurses are able to provide care for people with dementia (Robinson et al 2010). There are strong interconnections in rural communities, with many overlapping interactions between personal and professional lives, including nurses' lives (Baernholdt et al 2010; Robinson et al 2010). The nature of generalist practice and strong community interconnections are potential challenges for nurses to provide care for people with dementia in rural hospital settings. This study aimed to explore how nurses in rural hospitals cared for people with dementia.

METHOD/METHODOLOGY

In order to study events that were contemporary and outside the control of the researcher, an exploratory case study research design was selected (Yin 2009).

Setting

A purposive sample of three rural hospitals, each with 50 beds or less, was selected in one rural region of New South Wales. Rural hospitals of this size typically have a mix of acute services, as well as dedicated long-term aged care beds (New South Wales Health 2009).

Participants

Nurses who worked at one of the three hospitals were invited to participate in the study. Patient participants were included if they had a diagnosis of dementia and were in a general ward (exclude those in the emergency department or high dependency unit).

Ethical considerations

For the people with dementia, capacity to consent to have their care observed was not assumed. The nurses, who agreed to be observed, initially approached the patients and if necessary, their legal guardians, about the study. If they expressed interest, the researcher (first author) provided a participant information sheet and discussed the study with the patient and the legal guardian. The researcher included the patient in the process of consent however the legal guardian provided final consent for observation.

Ethical approval for the study was secured from the University of Canberra Committee for Ethics in Human Research (Project number 10-156) and the Greater Western NSW Area Health Service Human Research Ethics Committee (HREC/10/GWAHS/41).

Data collection

Two sources of data were collected. Observations of nurses caring for people with dementia were undertaken. Nurses were also invited to participate in a semi-structured interview. Additionally, a reflective journal was maintained to monitor the researcher's thoughts, impressions and feelings regarding the data throughout the data collection phase. Data were collected between June and August 2011. The details of data collected by site is described table 1.

Table 1: Data collection by site

Hospital	A	B	C	Total
Number of nurses interviewed	8	7	4	19
Number of nurses observed providing care	0	7	6	13
Number of patients whose care was observed	0	1	2	3

The first author observed nurses caring for three patients with dementia at two of the study sites. No observations were conducted at the first site visited, because there were no patients with dementia in the hospital at the times scheduled for data collection. At each of the other two sites, observation of practice took place over two days. At the second site the care of one patient participant was observed for seven hours in three periods ranging from 90 minutes to 210 minutes. At the third site the care of two patient participants was observed for five hours in one-hour periods. A total of twelve hours was spent observing care, with the researcher seated in day rooms or ward areas of the hospitals. Intimate care was not observed.

The semi-structured interviews were conducted using an interview guide. Questions focussed on ways of caring for people with dementia in their settings that worked well or didn't work well, important aspects of care for people with dementia, and the impact of rurality on the ways that care was enacted in their facilities. The first author conducted all interviews at the nurses' workplace with one exception, conducted by telephone. Interviews were recorded using a digital voice recorder. In one case, at the nurse participant's request, the interviewer did not record the interview and made detailed notes as soon as the interview was concluded. Interviews lasted between thirty and sixty minutes.

Data analysis

The nurse participant interview recordings, observation recordings and personal field notes were transcribed into word documents. The word documents were read and re-read, with immersion in the data, maintaining

notes of recurring concepts and constructs. Data analysis was an iterative process, carried out by the first author with validation provided by the second author. Concepts were inductively grouped into a hierarchy of categories and then themes, with the aim to capture the most important themes in the data (Franzosi 2004). Study credibility was ensured through data triangulation (Yin 2009). The three sources of evidence, participant interviews, participant observation and reflective field notes were constantly compared to arrive at the final themes.

FINDINGS

Twenty-one nurses participated in the study, with eight participating in the interviews only, eleven in interviews and observations and two in observations only. All of the nurses were female, with half in the 50 to 70 year age range. Basic demographic information of the 19 interviewed nurse participants is provided in table 2. Nurse participants have been given pseudonym names in order to protect their identities.

Table 2: Demographic profile of nurse participants

Qualifications		Age range					Average years of experience
		21-30	31-40	41-50	51-60	61-70	
RN	13	1	2	2	7	1	22.5
EN	5	1	2	-	1	1	18.4
AIN	1	-	-	-	1	-	2

aRegistered Nurse; bEnrolled Nurse; cAssistant in Nursing

Analysis of the data led to the development of three themes, entitled 'watchful wandering', 'risk versus restraint', and 'keeping people close to home'.

Watchful wandering

Wandering within a calm atmosphere was valued to decrease distress for people with dementia. Nurses valued ensuring people were safe, distress was minimised and people were cared for in ways that were respectful of their dignity and personhood. They found creative and simple ways of using the existing resources to safely care for people.

'Watchful wandering' consisted allowing people with dementia to move around the ward, while providing continuous supervision. Nurses were observed to invite people with dementia to accompany them to clean cupboards, prepare notes and write notes. Nurse participants acknowledged the ward environment was not ideal for wandering:

"We try and take them with us when we are working but you can't take them into every room, it depends on whether the other patients are happy for us to do that" (Margaret, EN).

To enhance continual observation during wandering, nurses would accommodate people with dementia in rooms near the nurses' station and put them in shared rooms:

"... if they're [person with dementia] wandering we try to put them in with someone else [who] might notify or ring the bell ... so they can say 'that patient's gone out the door or something" (Ellen, RN).

Observational data confirmed people with dementia were in rooms close to the nurse's station or in a communal sitting room, where staff could easily observe their movements.

Working collaboratively with family members was valued by nurse participants and often nurses would invite family members to stay with the person:

"...We like to have that relationship with the family where we can ring them and they'll come and sit with them and things like that" (Margaret, EN).

Nurses valued keeping the overall ward atmosphere calm and quiet. The interactions between nurses and people with dementia were observed to be calm and respectful. At one site in particular, nurses were observed to speak and act calmly, even during an emergency situation. Several nurses voiced the value of routine:

"Just to keep things routine is so important, basically" (Penny, RN).

"Once [people with dementia] are agitated, it becomes much more difficult to look after them, so if you can maintain calm throughout your shift it makes life much easier" (Mary, RN).

In summary, watchful wandering was achieved through continuous observation. Nurses were focussed on the person and their dignity, maintaining a calm atmosphere in the ward through routines and supporting the people with dementia to wander as much as possible.

Risk and restraint

Nurse participants in this study were very concerned with keeping patients safe and they were particularly concerned patients would fall or go outside the building.

"The layout of the hospital is difficult because of the stairs [leading outside] and you don't have the staffing to supervise them [in the way] you'd like to; it only seems to take a second and they're gone" (Liz, RN).

At each of the sites visited, nurses described the use of restraint, either physical or chemical, to keep people with dementia safe. The use of physical restraints appeared to be limited to those times when the person with dementia exhibited behavioural and psychological symptoms of dementia. The use of physical restraints was confirmed by observational data at one site. The use of restraint was described as being necessary when workloads were heavy and when the physical environment made keeping patients safe difficult. Nurse participants acknowledged these practices could lead to adverse outcomes for people with dementia.

"If we're short staffed or overworked, we have to chemically restrain [people with dementia]...very rarely physically unless it's just with a chair lockup... most people don't like doing that because it just aggravates some people" (Rachel, EN).

Nurses recognised it was preferable to use other ways of managing behaviours, such as trying to keep people with dementia busy with 'helping' tasks, because restraint increases the person's distress.

"If you keep her [person with dementia] occupied, she's quite amenable but [if] you try and restrain her and stop her from wandering, it makes it quite difficult... she gets quite [distressed]" (Ann, RN).

Another form of restraint was used at times, known in Australia as 'specialling'. This is the close supervision, usually confined to the patient room, to prevent wandering. Some nurses described the use of security staff to 'special' people with dementia who were likely to wander when they were busy due to increased workload:

"We get security if we're short staffed; they're very helpful and they'll watch [the person with dementia], especially through the night" (Carol, RN).

However, some nurses saw the use of security staff for close observation as exacerbating distress for the person with dementia. Having family members sit with the person was the preferred option, if this was possible:

"...and then you get the security, so you're bringing another frightening thing at them" (Karen, RN).

"Sometimes you have to get the family to come and sit with [the person with dementia] because you haven't got the time to [stay] and you're very reluctant to use chemical restraint" (Christine, RN).

In a busy ward, nurses may see physical restraint as necessary, but the safe management of restraint also required extra resources:

"Because we have other higher level care [patients]... it is very difficult because you can't go back and take [the person with dementia] out of their restraints every so often, it does make it very difficult" (Emma, EN).

Nurses spoke of the tension between their desire to care for people with dementia in ways that are more person-centred, for example allowing them to wander in order to 'use up' energy, and the need to ensure their safety in older hospital buildings that are not designed for people who are cognitively impaired. Observational data confirmed the physical environments at each site were not safe for unsupervised wandering, with exit doors opening to busy and dangerous roads or, in higher floors of the hospital, to stairwells where dangerous falls were possible:

"The door as you come out of the ward onto the main stairwell [cannot] be locked...if [people with dementia] are wanderers...you can't lock them in their room and it's very difficult ...because we are an acute [hospital setting], and people [with dementia] need to be able to wander...to use up their energy, but we can't actually keep them safe all day and that's my biggest dilemma" (Denise, RN).

Nurses justified the use of restraint on the grounds of potential injury:

"Restraints are probably a very interesting topic to get into, because you say that people have the right to choose, but busted bones [sic] are frowned upon" (Val, RN).

The same nurse participant spoke of the need for a balance between providing idealised care that facilitates freedom for the individual and managing the use of restraint safely:

"So it's always a toss-up... I know the idealists will say you know we shouldn't... restrain them, but the other thing is managing the restraint making sure that you're there to release it and making sure that they go for their walks and all that sort of stuff" (Val, RN).

In summary, nurses occasionally used physical and chemical restraint, as well as 'specialling' of people with dementia to manage perceived risks of injury.

Keeping people close to home

The local hospitals were an extension of the respective communities. The nurses often drew upon their personal knowledge of people with dementia from their local communities for application to their clinical practice. The nurses knew the histories of people with dementia in the community because they had been in hospital previously or were users of services affiliated with the hospital. The nurses also knew about people with dementia through personal networks in their communities. For example:

"...we've been aware of her [person with dementia] for the last couple of weeks. The husband's [has] got to the crisis point where he needs emergency respite" (Mary, RN).

The nurses recognised the importance of connections with family and community for people with dementia, with an established volunteer visiting program in one of the study sites. The local volunteers were observed informally visiting all of the long-term patients in the ward.

Older people with dementia can access government funded care services, either in their own homes or within residential aged care facilities, but must first have their level of care needs assessed by a multidisciplinary Aged Care Assessment Team (ACAT). However, given the rural setting, geographical distance was challenging. For example, one person with dementia lived around 80 kilometres from town, was considered too far for community based aged care services:

"We could have kept her at home a bit longer but you see [her town] is so isolated, there [are very few] services out there." (Ann, RN).

If the ACAT recommends an aged care facility placement, people with dementia would wait in the hospital for a placement. Often families preferred local aged care facility placement, although that was not always possible:

"We always go for their first choice and if that's not available, [we'll aim for] a bed as close as possible" (Rachel, EN).

"Sometimes the family put on a bit of pressure that they only want them to come into the local aged care facility, but if there's a bed [outside of town], they should be taking the bed and then when one comes available in the local facility, they can transfer across. I don't think the family understand that because [the distance is] difficult for family too" (Denise, RN).

As indicated in the previous theme, nurses sometimes know patients as members of their local communities, and can use this knowledge to support the person with dementia in hospital. Where possible nurses endeavoured to keep people with dementia in their local hospitals while they waited for an aged care service or placement and aimed to place people in aged care facilities located in the local community.

Limitations

The data from the three study sites were analysed and reported as a single case, due to concerns about participants and study sites being recognisable. However, this could be a limitation of the study because multiple case study design is acknowledged as a stronger design than single case study design (Yin 2009). The timeframe available for observations, the fact one site had no eligible patients at the time of the site visit, and the small sample size, are potential limitations of the study. The results of the study cannot be generalised to the wider population due to the small sample size and the study being conducted in one region in rural New South Wales.

DISCUSSION

Three themes emerged to describe how rural nurses work with people with dementia in hospital. In describing their practices, the physical hospital environment had an impact on the way that care was provided.

'Watchful wandering' was the preferred way that nurses maintained a calm environment, encouraging people with dementia to engage with their environment. However, like nurses in a metropolitan hospital study (Nilsson et al 2013), rural nurses were frustrated that increased workloads meant they could not provide this care. Keeping the ward atmosphere calm, speaking calmly, not using raised voices and not rushing, in order to avoid worsening confusion or agitation for people with dementia, is also consistent with metropolitan hospital practice (Hynninen et al 2015). However, keeping the atmosphere calm was sometimes challenging within the ambience of a hospital environment.

Nurses in the current study described the simple ways they occupied people when they have time. These interventions can prevent boredom, social isolation and associated agitation (Cohen-Mansfield et al 2010). The nurses were creative in their strategies to engage people with dementia. Other authors have recommended interventions such as art therapy (Peisah et al 2011), exercise such as walking with volunteers (Bateman 2010) and animal-assisted therapies (Bernabei et al 2013) for keeping hospital people who have dementia socially and cognitively engaged.

The majority of nurse participants spoke of patient safety being one of their main concerns when they are nursing people who have dementia. Considerations about the environment influenced nurses' focus on patient safety. Previous researchers have also found that nurses are concerned safety of people with dementia in hospital settings (Dewing and Dijk 2016; Moyle et al 2011). In this study, the nurses used close supervision or 'specials' and physical and chemical restraint when they judged this was necessary to enhance patient safety. The use of 'specials' for supervision of people who are cognitively impaired is well established in hospitals (Kerr et al 2013; Moyle et al 2011; Wilkes et al 2010).

While they preferred continued observation, restraint was used when the ward was busy and continuous observation could not be sustained. The nurses who discussed restraint use did not clearly state an ethical dilemma but this was implied in their descriptions of practice. The use of restraint was justified on the grounds of inadequate resources (staff time) for watchful wandering and the dangers inherent in the hospital environment. While nurse participants in the current study recognised restraint had adverse consequences for patients, they chose the risks associated with restraint over the risks of injury related to falls or absconding.

This finding is disturbing in that restraint reduces mobility and can lead to preventable complications such as urinary tract infection, pressure injuries and pneumonia (Bail and Grealish, 2016). There is also emerging evidence that for people with cognitive impairment, reduced use of restraint is associated with reduced length of stay (Gerace et al 2013; Kwok et al 2012). How rural communities access and enact evidence-based practice in the area of restraint requires urgent attention.

People who live and work in rural communities are often connected in overlapping ways. Lauder et al (2006) use the term "community embeddedness" to describe this interconnectedness (p.75-76). The nurses valued their relationships in the local community; it was easy for them to invite family members to assist with a person with dementia who was distressed in the hospital environment. In contrast a study in a large metropolitan hospital found that the nurses infrequently requested family members be involved in the care of people with dementia in hospital (Moyle et al 2011). The interconnectedness in rural communities can enhance the ability of nurses to provide high quality care (Baernholdt et al 2010), with relationships enhanced and patient care improved (Pesut et al 2012).

Nurses in this study recognised older people needed to remain in their local communities to enable the continuation of lifelong connections. Having to move outside of their own communities to accept an aged care bed has been likened by older rural people to being exiled (Bernoth et al 2012). Nurses in this study worked to reduce separation of the older person with dementia from their community.

CONCLUSIONS

This study has found that despite unsuitable physical environments and multiple competing demands on the time of the nurses, rural nurses found simple ways to maintain person-centred care. Maintaining a calm atmosphere required creativity and thoughtfulness, and drew upon the nurses' personal connections with their rural community. However, when the ward was busier and resources were scarce, there was an increased focus on risk management, often with significant clinical implications for the person with dementia. There is a need for further discussion and clarification between nurses and health care managers about the meaning of risk, and clarifying whose interests are being protected when chemical and physical restraint are used. Contesting the idea of risk of injury for people with dementia in the rural hospital contexts is worthy of further research.

The nurses recognised the value of the community-based relationships with the family members of people with dementia and with other service providers and used the information gathered through these relationships to provide better care for people with dementia. Working collaboratively with family members is a strategy that could be adopted by nurses in urban and rural hospitals in Australia and globally in order to improve care for people with dementia who are hospitalised.

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Does studying postgraduate palliative care have an impact on student's ability to effect change in practice?

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KEY WORDS

Alumni, survey, higher education, impact of learning, practice change

ABSTRACT

Objective
To find out from alumni whether their postgraduate course in palliative care had an impact on their ability to change practice

Setting
Palliative & Supportive Services, Flinders University has delivered postgraduate palliative care courses via the online learning mode of delivery since 2004

Subjects
An online survey was administered to alumni asking about such issues as: the impact of learning for practice, and their ability to influence change (Flinders University ethics no: 7154). Seventy-six alumni responded to the survey, and were mostly older female nurses, which is not only a reflection of our student cohort but also of clinical practice.

Primary argument
In this study, we are examining the relevance of our courses to practice, specifically how alumni report the impact of postgraduate study on both their individual clinical practice and organisational systems. Evidence based practice is the cornerstone of nursing and of education programs globally and while our students are learning best practice they report that they cannot easily translate their new knowledge into practice.

Conclusion
Clinicians with postgraduate qualifications can be empowered to expand their clinical skills and more, for example, their leadership capabilities, to critically challenge health care systems and act as a role model for others. However, if we are to truly build the capacity of our students and alumni to implement changes in the workplace then we need to also engage them in evidence to practice strategies and change management theory and practice.

INTRODUCTION

Palliative care has been described as "an approach that improves the quality of life of patients and their families facing the problems associated with life-threatening illness" (World Health Organization, 2015). Ongoing changes in palliative care that include both service delivery and an increasingly competitive education marketplace (Luckett et al 2014) demand that higher education providers take proactive approaches to the future with strategic plans for education provision.

Palliative care higher education providers need to equip clinicians with the knowledge and ability to become life-long learners and critical thinkers in a rapidly changing environment, via the delivery of a wide range of clinically significant topics (Jones et al 2018). At the interface between education and the workplace, each individual is expected to acquire the knowledge, skills and competencies to become an effective employee (Alias et al 2013), which includes the ability to mobilise knowledge (Jones et al 2018). These are the skills students are expected to acquire and demonstrate when studying; envisaging that this then translates into the work environment.

We decided to investigate whether the courses we offer are building the capacity of those who study palliative care at Flinders University. To do this we turned to our alumni, who Johnson et al (2014) describe as being important to evaluation in higher education as they can provide, from their unique perspective, context specific information on whether their learning has had an impact on their practice. In this paper, we will focus on this latter aspect in relation to practice change.

BACKGROUND

Palliative & Supportive Services at Flinders University, South Australia, offers post-graduate courses in Palliative Care and Palliative Care in Aged Care, both of which have been offered by distance education since 1995, converting to eLearning in 2004. Students work mainly as healthcare clinicians, often with the expectation they will study at Masters Level particularly when working in specialist palliative care (Kember et al 2014). Courses leverage from the multidisciplinary studentship by directing students to work together virtually and collaboratively as they would in practice (Head et al 2016).

Within our teaching program we have been aware over the last few years of a change in our student cohort, which increasingly includes those who are younger and are working in much more diverse areas. This includes aged care, acute hospitals, chronic disease and areas where end of life care issues arise and a palliative approach (Mitchell et al 2013) is deemed appropriate. The changing nature of our student cohort also reflects the slowly changing nature of the health care workforce with older staff reducing their hours or retiring (Sherman et al 2013).

Students may be working in lead clinical positions (eg, as a physician or specialist palliative care nurse), they may be working in generalist health care settings, or they may be looking to bring the principles of good palliative care to their own practice in oncology, aged care or in renal units. International students study either internally or online, and will take what they have learned and adapt the principles, implementing changes in their own country.

Despite both internal and external regulatory processes to ensure quality in our courses, it was felt that to add rigour we should look to the relevance of our courses to practice, and to their impact, not only at the individual level but potentially at the organisational level as well. In their study of alumni, Johnson et al (2014) found participants reporting positive impacts of two certificate programs (human performance technology and online instructional development) not only on their professional career but also on their own self-improvement. In

particular, there was an improvement in knowledge, skills and confidence, so we have taken these concepts as a starting point to see if our courses are equally having an effect.

METHODS

Survey Administration

Criterion sampling (Palinkas et al 2015) was used to administer a one-time online survey to alumni who had the experience of studying postgraduate palliative care within the department. The survey was informed by work undertaken on dementia courses by Innes et al (2012). It was thought a retrospective survey would also elicit longer-term effects that may only have become evident years later (Rogers 2009). The University alumni office provided a list of 721 alumni from their records of students who had studied with us (although in hindsight this did not include an earlier Master of Public Health, Palliative Care pathway). An administration assistant de-duplicated those who had studied more than one course and checked how many had provided an email address.

The survey was subsequently administered to 426 alumni. In order to increase response rates, information regarding the surveys was also provided via e-newsletters relevant to the sector, and which were distributed by: Palliative Care Nurses Australia, CareSearch (a palliative care website that administers four newsletters), the Australian and New Zealand Society of Palliative Medicine and Australian Allied Health in Palliative Care. The survey was open for an eleven-week period (01/02/2016 to 21/04/2016) allowing dissemination of the survey via the newsletters and therefore as we had multiple avenues by which to invite alumni to participate, calculating a response rate was problematic.

An email was sent from an administrative email address with an invitation to participate in the online survey. Once the students clicked on the link they had access to the participant information sheet, and consent was implied by clicking into the survey, which was held on a password protected research data management platform not dissimilar to survey monkey (CareSearch 2017). No staff member is aware of who completed the survey and who did not. Ethics approval was received from Flinders University Social and Behavioural Research Ethics Committee (Project: 7154).

RESULTS

A total of 76 responses were received. Only 15.8% of respondents (n=12) were under the age of 40, with the majority (71.1%) falling between the ages of 40 and 59 (n=54). A further 13.2% (n=10) were over the age of 60. Of 76 respondents 94.7% (n=72) identified as female and 5.3% (n=4) as male.

Course taken and when

Respondents provided information on what they studied and were able to provide more than one answer as some will have progressed through from a Graduate Certificate to Masters and will have recorded each. Results show that 35 studied a Graduate Certificate, 21 a Graduate Diploma, 29 a Masters and 1 a PhD. Time since they studied (n=72) also varied, with the majority (76.4%) studying in the past 5 years, which may speak to the accuracy of our contact details or that the course is still fresh in their mind. Sixty-three respondents gave the time since their undergraduate studies, with the earliest studying initially in 1973, and the rest in the 43 years since. Of 74 respondents, the time taken to complete their course with us ranged from 10 months to 11 years. Of 73 respondents, 34 (46.6%) worked part-time while studying and 39 (53.4%) full-time, indicating a huge commitment to ongoing professional development on the part of the students.

Changing practice

Respondents were asked the question: Do you think that the course you studied has had a long-term impact on your practice and your ability to affect change? Of 76 respondents: 86.8% (n=66) agreed yes and 13.2% (n=10) said no.

To the question, "Which areas of your practice have changed the most since your study?" respondents were able to tick all statements that applied and included here are the three items that relate to changing practice. Table 1 highlights that 92% (n=68) agree or somewhat agree that their course has provided them with the confidence to disseminate knowledge to others, with 93% (n=71) having developed, influenced or participated in decision making within their team and 80% (n=61) having developed, influenced or participated in decision making within their workplace or organisation.

Table 1: Impact of Learning for Practice

	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree	Don't Know or Not Sure
My course/study has helped me to recognise areas for improvement or change at my workplace (n=72)	44 (61.1%)	21 (29.2%)	7 (9.7%)			
My course/study has helped me to effect changes in my work environment (n=74)	32 (43.2%)	24 (32.4%)	12 (16.2%)	3 (4.1%)	1 (1.3%)	2 (2.7%)
My course/study has provided me with the confidence to disseminate knowledge to others (n=74)	50 (67.6%)	18 (24.3%)	6 (8.1%)			

In our small study, relative to practice change (n=55) we see that even though they hold postgraduate qualifications in palliative care, nine respondents (16%) feel they are not in a position to propose changes and 18 (33%) do not feel they have a voice in the organisation. We also found that 23 respondents (42%) feel the organisational culture is not receptive to change. The result of this is that 50 former students (91%) do not feel enabled to go ahead and implement change as a result of further studies.

Motivation to implement change following study

It is important to consider whether the length of time the respondents studied with us (such as very part-time study or the difference in undertaking a Graduate Certificate or Masters) has an impact on this as well, with longer time in study shown as having more transfer (into practice) potential (Parsons et al 2012).

Does the time since you undertook your studies have an effect on your motivation to change practice? Seventy-six respondents provided answers with a demonstrable decline in motivation the further away they were from study (table 2).

Table 2: Motivation to implement change following study

	Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Disagree
I felt motivated to implement practice changes while I was studying (n=76)	43 (56.6%)	27 (35.5%)	2 (2.6%)	4 (5.26%)	
I felt motivated to implement practice changes immediately following my study (n=76)	41 (53.9%)	27 (35.5%)	6 (7.9%)	2 (2.6%)	
I felt motivated to implement practice changes much later after my study (n=75)	28 (37.3%)	20 (26.7%)	13 (17.3%)	11 (14.7%)	3 (4.0%)

Respondents were asked the following question: Do you think that the course you studied has had a long-term impact on your practice and your ability to affect change? All respondents (n=76) answered yes (n=66) or no (n=10), and the following comments are representative of views provided. Comments are often quite positive despite participants finding barriers in the workplace:

"It has clarified many practice issues for me, meaning I can see where opportunities to improve exist."

"Despite the organisations unwillingness to change practices and its culture of disciplinary towers, I am more confident in my communication skills and feel I have the credibility with a masters degree to speak out more across the disciplines."

"I am now in a position to influence organisational change as a result of my study. As a result I am more confident and my opinions are valued by peers, colleagues & my employer."

"developing knowledge and skills assisted in building assertiveness to speak to those in a position to assist with change and provided me with skills to support an argumument (sic) and provide evidence for best practice."

"Change is a long term goal that may be years away!"

"It allowed me to progress to a CNC position where I can and do affect change."

"The course provides a platform to increase my critical thinking skill and confidence to voice my opinion though my opinion has not always been seriously listened to. It is important not to give up and keep trying."

"have the confidence to persevere with trying to affect change."

DISCUSSION

Impact of course

A cohort of Flemish researchers involved in important research with teachers on the effectiveness of faculty training courses (Stes et al 2007) found individual learning and behavioural changes, as well as a willingness to take on more responsibility and our study supports this. It was also interesting to note that respondents felt empowered to participate more in discussions with colleagues, and attempted to exert influence at the organisational level, with many of these changes impacting long-term. We do often read examples of student reported practice changes in the topics as a result of what has been read in the literature or learned from tutors and colleagues. These results are encouraging even with the small number of participants, in that the courses they are studying are having an impact at the individual, service and organisational level and ultimately helping to improve end of life care in Australia and overseas.

Ability to Change Practice

One of the central questions of this survey was whether our alumni perceive their studies increased their ability to change practice – either the way in which they themselves work, or by influencing organisational changes. Despite our findings that individuals report a significant increase in knowledge, a similar increase in ability to change practice is not evidenced. When looking to change practice in the workplace, in what context dissemination of knowledge occurs and whether the students were actually influencing decision-making or participating remains unclear.

Change has been acknowledged as complex and multifaceted, and there is much to take into account such as personal, cultural, organisational, social, financial and structural factors any of which could be barriers or enablers to the process. Rogers (1983) diffusion of innovation theory has been articulated in this context by Zhang et al (2015) in considering whether changes are adopted. This includes the complexity and nature of the change or required behaviour required, the communication style adopted (face to face is more effective), the social context (such as hierarchical structures or a culture of creativity and innovation) and how decisions are made (Alvarez 2016). Change at the organisational level requires the support of management and the commitment of workers, but can be hindered by constraints (resource, organisational structure) (Kogan et al 2017).

Motivation to change practice and ability to change practice are closely interwoven (Gegenfurtner 2011) and we found that motivation to implement change dropped slightly as time passes and the student or alumni is further removed from their course/study. Further, Gegenfurtner (2011) looked at the various factors that can influence whether a student is motivated to implement change following study. This author citied the culture of the organisation (whereby responsiveness to suggestions in the organisation may mean the student is not motivated to change practice even before they start study); the students personal attributes (the student is not in a position to propose changes or doesn't feel they have a voice); their opinions of the courses (again speaks to the design of the course); and in the midst of study they feel inspired to change but this does not carry forward to practice (Gegenfurtner 2011). We could look at distance from study and cross reference with the students change ability but there are many confounding factors that we would also need to consider, such as whether this is actually influenced by who they are in the organisation or the level of study they undertook.

Students' learn about evidence-based practice, but it is not sufficient to simply notify colleagues or managers of exemplary practice that could or should be introduced into the workplace. The ability to know how to decide if changing current practice is appropriate, possible or even welcome requires a different skillset. (Shaffer et al 2013). Individual students or alumni will not necessarily be drivers of change, but can become empowered through postgraduate study to identify areas where practice is not based on evidence or where it can be improved and highlighted within the team.

The further that alumni are from graduating from their course is an indication of their motivation to change practice, and the impetus lessens, as they are immersed back in the workplace and not formally studying. This demonstrates the need for good quality evidence based continuing professional development activities (Ross et al 2013) that build on the foundations of their learning. We see this in some people who are life-long learners and proceed from a Graduate Certificate to a PhD over a number of years. We can look at whether there are implications for us in these findings and consider building on previous work in the discipline on supporting service change in relation to evidence to practice (Tieman et al, 2014).

The Way Forward

The discipline has a commitment to strategically plan to ensure future students receive appropriate and quality higher education. We can help to empower students in delivering care at the end of life and to hopefully foster a desire to influence their colleagues to go ahead with postgraduate study by acting as role models (Mannix et al 2013). However, from this study we see there is also the imperative to look to the knowledge translation and implementation literature (such as Scott and Glaszlou 2012) to ensure students are also equipped with the knowledge and skills to translate evidence into their palliative care practice (van Riet Paap et al 2015).

This study is timely in that our inquiry has provided information on how to improve the experience and learning of students. This has required a degree of critical reflection: examining our previous assumptions; ensuring engagement and participation of alumni; and made us think of how we initiate change, based on good pedagogy (Le Fevre 2014). Instigating a feedback loop will ensure that alumni view us as responsive and proactive, (Manswell Butty et al 2015) and the results of this study will be disseminated in much the same way the survey was. It will also inform policy, contribute to course reviews, potentially drive future topic development and contribute to marketing (Rogers 2009). Teaching and learning in the discipline has a focus on enhancing the students' learning experience (Stes et al 2007), which arguably is something that we have been doing for some while and will strive to continue.

This context-specific impact evaluation aimed to provide a more comprehensive picture of the usefulness of our courses in real word settings (Onwuegbuzie and Hitchcock 2017). It is an imperative that we offer courses that are uncommonly taught in the mainstream, not just in Australia, but across the world. In this context, impact can be far reaching, and arguably, from studying with us, students' changes in knowledge and skills will impact on those requiring end of life care (Song et al 2015; El-Nagar and Lawend 2013).

Strengths and Limitations

Numbers are relatively low in this study as we were unable to reach the entire alumni, so our ability to draw conclusions is somewhat inhibited. Representativeness is also a consideration in all surveys and we must consider that non-respondents will be different from responders, those that do not receive the survey and those who choose not to respond.

CONCLUSION

Many of those working in palliative care or related areas will pursue higher education to further their knowledge and skills. Despite further study, often to Masters level, students encounter personal, institutional or systems barriers in implementing what they have learned into the clinical setting. The need to critically reflect in multiple ways is crucial to maintain and improve quality higher education, and in incorporating study findings, we need to incorporate change management theory and practice to continue to improve systematic practice change of end of life and palliative care in our health care sector.

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Factor analysis to validate a survey evaluating cultural competence in maternity care for Indigenous women

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KEY WORDS

instrument development, cultural competence, Indigenous women

ABSTRACT

Objective
This research set out to develop and validate a tool to assess the self-reported progress of Australian publicly funded maternity services towards the goal of culturally competent maternity care for Indigenous women. The tool aimed to measure the degree to which these services had incorporated actions towards achieving 14 identified characteristics into the current fabric of their organisation.

Design
An online exploratory survey was distributed to consenting respondents nationally.

Setting
Public maternity services in each State and Territory of Australia.

Subjects
The survey was distributed to 149 public maternity organisations, with 85 organisational consents and 44 respondents completing the survey.

Main outcome measure
Construct validity of a survey designed to describe progress in working towards organisational cultural competence in maternity services was assessed by principal factor analysis and varimax with Kaiser rotation.

Results
The results support the two subscales identified as appropriate groups of questions to address 1) assessment of cultural competence and 2) assessment of the survey. Reliability was assessed by Cronbach's reliability and results established evidence of a reliable survey.

Conclusion
The results of this study show that the survey assessing and identifying organisational cultural competence in public maternity care for Indigenous women demonstrated acceptable reliability and validity for a newly developed instrument. Responses to the survey provided participants of this study with a baseline for assessing further progress. Upon further testing and refinement, the survey can provide a validated tool to guide both national and local activity to improve the maternity experiences of Indigenous women.

INTRODUCTION

Aboriginal and Torres Strait Islander mothers and babies experience higher rates of mortality and morbidity compared to non-Indigenous women and babies. In 2010, the Australian Health Minister's Advisory Council (AHMAC) commissioned research to identify the characteristics of culturally competent maternity care for Aboriginal and Torres Strait Islander people (Kruske, 2012) as an action under the National Maternity Services Plan (NMSP) (AHMAC 2011). Using a literature review and stakeholder consultations, Kruske identified 14 characteristics of effective culturally competent care in maternity services including:

1. Physical environment and infrastructure
2. Specific Aboriginal and/or Torres Strait Islander programs
3. Aboriginal and Torres Strait Islander workforce
4. Continuity of care and carer
5. Collaborating with Aboriginal Community Controlled Health Organisations and other agencies
6. Communication, information technology and transfer of care
7. Staff attitudes and respect
8. Cultural education programs
9. Relationships
10. Informed choice and right of refusal
11. Tools to measure cultural competence
12. Culture specific guidelines
13. Culturally appropriate and effective health promotion and behaviour change activities
14. Engaging consumers and clinical governance.

Kruske's (2012) research emphasised that the indicators identified were preliminary in nature, requiring future development and testing in line with 'middle year' activities of the five year NMSP. Developing a tool based on the 14 identified characteristics and using this tool to conduct a national survey to assess organisational cultural competency was subsequently endorsed by AHMAC for fulfilling the middle years activity of conducting a national stocktake of access to culturally competent maternity care for Aboriginal and Torres Strait Islander women.

Although population data identifies that the highest concentration of Indigenous people is in urban eastern Australia, the percentage of Aboriginal and Torres Strait Islander people within individual populations rises with increasing remoteness. With the highest proportion of people within its population who identify as Aboriginal and Torres Strait Islander people (30% compared to 1 – 3% in other Australian jurisdictions), improving the experiences of Aboriginal women is a key priority for the Northern Territory Department of Health. This jurisdiction volunteered to facilitate the research on behalf of all AHMAC members. The approach taken to tool development recognised that examining the systems that underpin organisational cultural competence is an essential component of improving the provision of health care to Aboriginal women. At the same time it was recognised that such a tool can only be successfully applied and reliably used if it has validity for the intended purpose.

Literature

The 14 characteristics of culturally competent maternity care identified by Kruske (2012) were not provided as measurable indicators, nor did Kruske recommend a tool for assessing organisational cultural competency. Although there is much written about individual health practitioner competency and patient experiences of health care, there are however, limited data available for measuring the incidence of institutional racism (Paradies et al 2014; Paradies and Cunningham 2009) or evaluating cultural competence of health services (Suarez-Balcazar et al 2011). More generally, such tools are valuable for enhancing organisational accountability for workplace practices, and to act as a driver to improve the quality of health service provision (Australian Council of Safety and Quality Standards in Health Care, ACSQHC 2017). When used specifically to assess organisational performance in relation to cultural competence, Trenerry et al (2010) argue that auditing and assessment approaches are of significant value for supporting resource development, role-modelling, adoption of positive behaviours and reducing discrimination.

A number of approaches and tools to assess cultural competence have been developed in the last decade; most draw upon earlier work from the United States of America; and most have opted for the self-assessment mode of audit (Kruske 2012; Multicultural Mental Health Australia (MMHA) 2010; Axelby and Rigney 2006a; 2006b). Areas that are audited in these tools include: the presence or absence of a policy framework that acknowledges and recognises cultural diversity and the need for cultural competence, access to tailored and specific services, engagement with culturally diverse populations, employment of people from within a culturally specific population, recognition of cultural diversity within policies, services, recruitment and staff training, and consumer input into services (Bainbridge et al 2015; Cherner et al 2014).

Organisational level self-assessment tools developed for the Australian context include:

1. National Cultural Competency Tool (NCCT) for Mental Health Services, developed for culturally and linguistically diverse (CALD) backgrounds (MMHA 2010);
2. Aboriginal Cultural Competency Self-Assessment Instrument developed for South Australian public sector agencies (Axelby et al 2006a and 2006b);
3. Cultural Competence Assessment Tool Kit developed to measure access/ utilisation of antenatal services by Western Australian Indigenous women (Walker 2010; 2011);
4. Aboriginal Cultural Inclusion Checklist for New South Wales Maternity Services (Office of Kids and Families NSW Health 2016).

Although these cultural competency tools provide an excellent basis for tool development, they are either for contexts broader than the maternity service context (1 and 2), or do not entirely capture the 14 characteristics of organisational cultural competency (3 and 4). Nor has information on interventions to address cultural competency in maternity services been captured at a national level.

Norbeck (1985) suggested that developing a new tool should assess at least one type of content validity, one type of construct validity and two types of reliability. Other researchers (Johnson et al 2014) have used retrospective validation and previous literature as a basis for developing a tool that can be used by clinicians. One study (Mbuagbaw et al 2014) used content validity, construct validity and test-retest reliability in development of a tool to assess health competence as a measurement of the public's health and recommends further validation of their tool by using the tool in many populations and settings.

METHODS

The tool developed in this study for assessing organisational cultural competence set out to address each of the criteria identified by Norbeck (1985), and incorporated the experiences of Johnson et al (2014) and Mbuagbaw et al (2014). This process was guided by an expert reference group of midwives and Aboriginal and Torres Strait Islander spokespersons respected in each Australian jurisdiction for their ability to contribute an Indigenous voice to health policy. This group provided professional and Indigenous governance respectively for the entire project providing input into tool development, advising on data collection, and reviewing and advising on the interpretation and reporting of results.

The survey was structured in three sections. Section one was designed to obtain demographic information to describe the population and settings where the tool was used and also as potential variables influencing progress towards achieving the identified characteristics. Section two included questions relating to a self-assessment of the degree to which health service delivery reflects the characteristics of culturally competent maternity care. Section three consisted of questions relating to the length, format and perceived consistency, clarity, and benefit of the self-assessment tool.

Section two development began with formulating questions that measured practical progress against the 14 characteristics that Kruske (2012) had suggested were suitable for future use within a cyclical tool for assessing organisational cultural competence. The research also took the approach that cultural competence, along with its contributory elements of cultural security and cultural responsiveness are one way to create a culturally safe environment for Aboriginal and Torres Strait Islander women and that cultural competence is a developmental process that evolves over an extended period. Accordingly, it was hypothesized that organisations would be at various levels of awareness, knowledge and skills along the cultural competence continuum. Survey questions were framed with this continuum in mind, using a four point Likert scale for participants to record responses that included: no progress or yet to begin achieving this goal; some progress towards this goal; almost fully achieving this goal; successful in achieving this goal. Five open ended questions were also included to probe more deeply the criteria organisations used for identifying cultural competence of actual and potential employees; the engagement, employment, and support for Aboriginal and Torres Strait Islander people in their workforce overall and cultural competence training and service design and delivery specifically.

Four options were used in section three to evaluate usability of the tool; asking respondents to rate design elements as extremely good, good, adequate, and less than adequate.

The tool was piloted to test reliability in two maternity services (one in Northern Australia and one in Southern Australia) that were not eligible to participate in the national sample. As the survey was newly developed for this particular project, reliability was assessed using test-retest reliability and Cronbach's alpha. With a correlation of 1.0 and statistically significant ($p<0.01$) for test-retest and Cronbach's reliability being a coefficient alpha of 0.94, the pilot scores showed good reliability. Face validity was verified by distribution to expert stakeholders from three states of Australia including a specific Aboriginal Health and Wellbeing unit.

The research was approved by multiple Human Research Ethics Committees with shared and individual authorities under the national network covering all Australian States and Territories. Also included in this network were Aboriginal and Torres Strait Islander sub-committees, research governance committees at health network and health service levels, and site specific assessments. This process did not result in any further amendments to the survey. Likert tool items for sections two and three suitable for statistical validation are presented in tables 1 and 2. Open ended questions are not discussed in this paper.

Table 1: Cultural competency subscale

Cultural Competence	No progress	Some progress	Almost fully achieving	Successful
1. Does your organisation actively recruit Aboriginal and / or Torres Strait Islander employees?				
2. Does your organisation specify cultural competence and compliance with cultural competence / policy guidelines as selection criteria for employee recruitment?				
3. Does your organisation have guidelines and policies specific to Aboriginal and / or Torres Strait Islander maternity care and / or support culturally competent care for Aboriginal and / or Torres Strait Islander people?				
4. Does your organisation provide educational resources designed specifically for Aboriginal and Torres Strait Islander women?				
5. Does your organisation display the Aboriginal or Torres Strait Islander artwork and / or flags?				
6. Does your organisation provide antenatal records through to discharge summaries to all relevant stakeholders including Aboriginal and / or Torres Strait Islander women?				
7. Does your organisation collect data on which services Aboriginal and /or Torres Strait Islander women use within your maternity services?				
8. Does your organisation report on evaluation of maternity outcomes for Aboriginal and / or Torres Strait Islander women as a specific cohort?				
9. Overall, how culturally competent would you rate your maternity services in relation to Aboriginal and / or Torres Strait Islander people?				
10. Does your service encourage family members to accompany and support Aboriginal and / or Torres Strait Islander women?	Never	Proportion of staff sometimes	Proportion of staff all times	All staff all times
11. Does your organisation involve Aboriginal and / or Torres Strait Islander women in design and implementation of health promotion activities and programs, for example, cessation or reduction of smoking in pregnancy?	No progress	Some progress	Almost fully achieving this goal	Successful

Table 2: Assessment of survey subscale

Assessment of tool	Extremely good	Good	Adequate	Less than adequate
12. How would you rate the format of this survey in terms of ease of use?				
13. How would you rate the clarity of these questions in this survey?				
14. How would you rate the consistency of the questions posed in this survey with the aim of this project?				
15. How would you rate the benefit of completing this survey as a self-assessment tool?				

Maternity services were defined for this project as services that provide care including any or all elements across the continuum of antenatal, intrapartum (birthing) and postnatal periods. Public sector maternity services for populations greater than 1,000 people were eligible to participate. Excluding services providing care to populations less than 1,000 people was based on minimizing the possibility of identification of an individual service and the likelihood that the number of Aboriginal and Torres Strait Islander women receiving care in these services is low and intermittent. Such a profile was considered likely to negatively affect the validity and reliability of self-assessment.

Recruitment of participants was a three step process. Without a national database of maternity services, a convenience sample of 149 eligible organisations and relevant executive contact persons were identified by senior government midwifery advisors in each jurisdiction. Executives provided organisational consent and delegated responsibility to complete the survey to a person best equipped to respond on behalf of the health service. Consenting organisational representatives were emailed a web link to access, complete and submit the survey anonymously. The survey could also be downloaded immediately after completion and used internally as feedback on progress and as a tool to guide immediate initiatives for service improvement.

Analysis was a stepped process that was calculated in Statistical Package for Social Sciences (SPSS), Version 24. The Bartlett test was used to determine if factor analysis is an appropriate analysis for this specific sample. The Kaiser-Meyer Olkin method and communalities determined the adequacy of the sample size.

Principal component analysis to extract factors was used in the first instance. Principal component analysis is related to the sample collected. Generally speaking, generalisation of results can only be achieved if using different samples that reveal the same factor structure. Principal component analysis is at best a common factor analysis that decomposes an original data set into a set of linear variates that are less complex than factor analysis that composes a mathematical model (Field 2013). Principal component scores are actual scores whereas factor scores are estimates of underlying latent constructs (Suhr 2005). Factor loadings are identified by groupings of the questions relating to a particular theme. The final decision about what questions belong to which group or theme is made by the researcher, being guided by this factor loading output of principal component analysis.

As factors were deemed independent, orthogonal varimax with Kaiser rotation was used to improve interpretability of the factors and further refine the groupings of questions. The final step revealed the eigenvalues that identify those factors that are most substantially important. Factor analysis enables identification of common underlying dimensions and in this way common variance is established and factors explain this variance by using eigenvalues (Field 2013).

FINDINGS

Organisational consent to participate in the study was received from 85 of the 149 eligible health services, representing a response rate of 57%, and included representation from all jurisdictions. Of the 85 maternity services who agreed to participate, 44 surveys were completed by nominated representatives, representing a response rate of 51.8% compared to organisational consent, and an overall response rate of 29.5%.

In the main study, principal component analysis was conducted to assess construct validity of specific questions for the two subscales (cultural competence and assessment of survey) to determine the appropriate domains and constructs so that the survey can be used for future cyclical use. Means and standard deviations are presented in table 3. The mean scores report a composite score for each individual on a particular factor and one of the simplest ways to estimate factor scores for each respondent involves totalling raw scores corresponding to all questions loading on a factor and additionally, summed factor scores preserve variation in the original data (DiStefano et al 2009).

Table 3: Survey Item Means and Standard Deviations

Survey Item Means and Standard Deviations				
No.	**Question**	***n***	***M***	***SD***
1	Recruitment of Aboriginal and / or Torres Strait Islander employees	42	2.31	.95
2	Specification of cultural competence in policies as selection criteria for employee recruitment	42	2.33	1.1
3	Guidelines and policies specific to Aboriginal and / or Torres Strait Islander maternity care and / or support culturally competent care	42	2.26	1.1
4	Providing educational resources	42	2.55	.97
5	Display Aboriginal and/or Torres Strait Islander artwork and / or flags	42	3.36	.98
6	Provide antenatal records through to discharge summaries to all relevant stakeholders	42	3.36	.85
7	Encourage family members to accompany and support Aboriginal and / or Torres Strait Islander women	42	3.6	.63
8	Involve Aboriginal and / or Torres Strait Islander women in design and implementation of health promotion activities and programs	42	2.02	1.1
9	Collect data on which services Aboriginal and /or Torres Strait Islander women use within your maternity services	42	2.38	1.2
10	Report on evaluation of maternity outcomes for Aboriginal and /or Torres Strait Islander women as a specific cohort	42	2.45	1.2
11	Rating of cultural competence of maternity service	42	2.43	.70
12	Rating of format of survey	43	2.28	.59
13	Clarity of questions in survey	43	2.33	.61
14	Consistency of questions in survey	43	2.23	.53
15	Benefit of questions in survey	44	2.07	.66

Factor analysis can only work if there are some relationships between variables and the Bartlett method was used to assess this (Field 2013). A significant Bartlett test ($p < 0.05$) demonstrates that factor analysis is therefore appropriate (Field 2013), and this was demonstrated by the two subscales in the survey, respectively, 190.16, 59.97, $p < 0.001$. The Bartlett test also assesses sampling adequacy (Field, 2013), and demonstrated further evidence of sufficient sampling for this study. Communalities were assessed for the first subscale with all communalities being above 0.6, for this small sample (less than 100) and measured as adequate for sample size (see table 4).

Measures of sampling adequacy (MSA's) were evaluated for the second subscale, with values being greater than 0.7, indicating adequacy and suitability for retaining items in the analysis (see table 5). Using the Kaiser-Meyer-Olkin method of assessment, the sample was deemed adequate for sample size, both subscales measuring 0.79 and 0.75 overall respectively (Field 2013).

Table 4: Communalities for Cultural Competency subscale

No	Question	Extraction
1	Recruitment of Aboriginal and / or Torres Strait Islander employees	.754
2	Specification of cultural competence in policies as selection criteria for employee recruitment	.752
3	Guidelines and policies specific to Aboriginal and / or Torres Strait Islander maternity care and / or support culturally competent care	.728
4	Providing educational resources	.714
5	Display Aboriginal and/or Torres Strait Islander artwork and / or flags	.775
6	Provide antenatal records through to discharge summaries to all relevant stakeholders	.828
7	Encourage family members to accompany and support Aboriginal and / or Torres Strait Islander women	.803
8	Involve Aboriginal and / or Torres Strait Islander women in design and implementation of health promotion activities and programs	.660
9	Collect data on which services Aboriginal and /or Torres Strait Islander women use within your maternity services	.780
10	Report on evaluation of maternity outcomes for Aboriginal and /or Torres Strait Islander women as a specific cohort	.803
11	Rating of cultural competence of maternity service	.843

Table 5: Measure of sampling adequacy factor loadings for assessment of survey subscale

No	Question	MSA
12	Rating of format of survey	.736
13	Clarity of questions in survey	.718
14	Consistency of questions in survey	.768
15	Benefit of questions in survey	.794

A Likert scale assessed the level of progress made in working towards achieving cultural competence and assessment of the tool was provided as four options with rating the clarity, benefit, consistency and format. The majority of respondents answered that they believed the survey was good in all of these areas, with remaining respondents answering adequate and extremely good. Of significance, approximately 80% of respondents ranked the benefit of the survey as good or extremely good. Minimal respondents ranked the survey as less than adequate. These results highlight that organisations value the need for future work in this area. Almost two-thirds (61.4%) of respondents completed the survey between 15 to 30 minutes, almost a quarter (22.7%) in less than 15 minutes and a small proportion (15.9%) took longer than 30 minutes to complete.

Principal component analysis to extract factors was used in the first instance (table 6). The majority of the questions loaded onto the first factor that promoted cultural competence. The second factor identified two questions related to actively acknowledging women's Aboriginal and Torres Strait Islander heritage / identity. The third factor specifically identified questions relating to supporting Aboriginal and Torres Strait Islander women during their childbearing journey. The fourth factor identified two questions that related to reporting and collecting data on Aboriginal women's outcomes, with one question on recruitment.

Table 6: Factor loadings for subscales for Principle Component Analysis for all questions

Cultural competence Questions	Factor 1 Promotion of cultural competence	Factor 2 Actively acknowledging heritage / identity	Factor 3 Supporting women	Factor 4 Development and reporting about Aboriginal women
1	.502			.630
2	.694	-.491		
3	.794			
4	.794			
5	.424	.691		
6			.812	
7			.815	
8	.729			
9	.677			-.563
10	.613	.446		-.477
11	.874			
Assessment Questions	**Factor 1**			
12	.818			
13	.846			
14	.805			
15	.770			

Orthogonal varimax with Kaiser rotation was used to improve interpretability of the factors and further refined the groupings of questions (table 7). The first factor only identified six questions related to cultural competence as compared with the previous table that identified nine questions. The second subscale identified only one question from the previous table with two new questions specifically acknowledging women's identity as Aboriginal and / or Torres Strait Islander people, as opposed to the other two questions which were broader and related to reporting and selection criteria. Therefore, rotation has further refined this factor and the relevance of the questions. The third factor identified the same factor, only the loadings were higher in this rotation. The fourth factor identified two of the same questions from the previous table related to development and reporting, and one new question, relating to liaising with Aboriginal and / or Torres Strait islander stakeholders about the effectiveness of services. The factor loadings were also higher than those in the previous table, confirming greater suitability of this factor. As the second subscale revealed only one factor, this could not be rotated.

Eigenvalues exceeding a value of one identify those factors that are most substantially important (Field 2013). The first subscale revealed a factor solution of four factors with eigenvalues of over one. The first factor explains 40.6% of variance, the second, 14.3% of variance, the third, 11.5% and the fourth, 10.3% (76.7% total variance). The second subscale identified only one factor with an eigenvalue over one and for this reason, could not be rotated. This factor explains 65.6% of the variance. Eigenvalues are displayed in table 8.

Table 7: Factor loadings for subscale Cultural Competence for Orthogonal Varimax with Kaiser Rotation

Cultural competence Questions	Factor 1 Promotion of cultural competence	Factor 2 Actively targeting Aboriginal and Torres Strait Islander people	Factor 3 Supporting women	Factor 4 Development and reporting cultural competence
1		.742		
2	.854			
3	.767			
4	.758			
5		.741		.416
6			.899	
7			.858	
8	.447	.562		
9	.427			.753
10				.846
11	.856			

Table 8: Eigenvalues for both subscales

Cultural competence subscale	Factor 1 Promotion of cultural competence	Factor 2 Displaying artwork or flags	Factor 3 Supporting women	Factor 4 Development and reporting cultural competence
	4.47	1.57	1.26	1.13
Assessment subscale				
Factor 1	2.62			

Internal consistency for the scales was evaluated by Cronbach's alpha reliability with a coefficient alpha of 0.70 being acceptable for a new survey (DeVon et al 2007). A Cronbach's alpha reliability of 0.835 was achieved for the cultural competence subscale and 0.750 for the assessment subscale, establishing evidence of a reliable survey. These results demonstrate construct validity and reliability and the capability of the tool being used for cyclical use, not only in maternity care organisations but for other health professions' assessment of cultural competence in the work place.

DISCUSSION

The statistical analysis of the responses from respondents confirms validity and reliability. The results strongly suggest that with some minor revision to the tool, the research aim of developing an instrument suitable for cyclic use has been achieved. These findings concur with other researchers (Mbuagbaw et al 2014) who also used content validity, construct validity and test-retest reliability in development of their tool, and who suggest that further distribution to different populations in different settings could provide further validation. In this case, both distribution to different populations and further refinement within the existing populations surveyed is recommended in order to achieve the research aim of evaluating organisational cultural competence to improve the experiences of Aboriginal women. This could be achieved through using the tool as a component of mandatory reporting requirements in all public maternity services. Such use would both provide the opportunity for greater refinement and obtain a more accurate assessment of progress towards adopting organisational characteristics of cultural competence than was achieved with only a small number of services participating in this research.

There is also current momentum for such work more broadly than within maternity services. West et al (2017) have validated a survey to measure midwifery student's capability against the Aboriginal and Torres Strait Islander Health Curriculum Framework (Department of Health 2014). Culturally safe and respectful practice is included in the updated Nursing and Midwifery Board of Australia Code of Conduct for Nurses and Midwives (NMBA 2018). The Australian Council of Safety and Quality Standards in Health Care (ACSQHC 2017) have included six specific actions in their requirements for health services to meet the needs of Aboriginal and Torres Strait Islander people. Together these initiatives support expanding the application of this current research to the broader health care population to develop appropriate tools for a cycle of evidence informed initiatives and evaluation in health services nationally. Adapting the validated questions from this tool for incorporation in patient experience questionnaires would also contribute to this endeavour.

LIMITATIONS

The small sample size may have contributed to the reliability of the survey, and repeating the research to include a larger number and wider range of maternity services will assist in further refining the tool, and greater generalizability of findings.

Another limitation is that employees were not asked to identify their Indigenous status. Therefore, the results may not reflect the views of Aboriginal and/or Torres Strait Islander staff. Moreover, research by McBain-Rigg and Veitch (2011) identifies that the perceptions of non-Indigenous staff and Indigenous patients differed in what they considered culturally sensitive care. Accordingly, as suggested above, considering how this survey may be developed to also gain the perspective of Aboriginal and Torres Strait Islander women is indicated.

Such development and any further refinement of the tool would benefit from a more decolonizing approach than was used to develop the current survey. Although Aboriginal and Torres Strait Islander people participated in the reference group the limited Indigenous knowledge and governance this offered could be improved upon by incorporating local governance by First Nations people in the future to refine the national tool for local level application. Work by West et al (2017) provides one such model.

CONCLUSION

This research has presented a snapshot of how organisations are working to improve access to culturally competent maternity care in public maternity services, and that with further development, following distribution over some years and inclusion of community governance and community validation measures, the tool used for this research will provide a mechanism for ongoing evaluation of progress. This research also suggests that with further work, the tool may be suitable for adaptation for use beyond maternity services and across a wider range of health service areas.

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An integrative review: adherence barriers to a low-salt diet in culturally diverse heart failure adults

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ABSTRACT

Objective
A sodium restricted diet (SRD) is generally included in chronic heart failure (HF) management. The objective of this review is to explore and synthesise the research findings of the adherence barriers to a SRD in adults from culturally and linguistically diverse (CALD) backgrounds with HF.

Setting
The principle research question addressed in this review is:

what are the adherence barriers to a SRD for chronic heart failure management in adults from CALD backgrounds?

Primary argument
Patient education plays an important role in health decision-making but it is only one of the many factors in dietary sodium restriction adherence. In order to promote the adherence behaviours among the adults with HF, nurses should develop a tailored approach to overcome individuals' perceived barriers and circumstances especially adults from CALD backgrounds.

Results
The literature search was undertaken in PubMed, CINAHL and MEDLINE. After eliminating duplicates and applying the selection criteria, eleven titles were included in the review.

Conclusion
This review found three major perceived barriers for adults living with HF to adhere to a SRD from CALD backgrounds: 1) lack of sufficient, appropriate provision of patient education; 2) the levels of interference with social and family life; and 3) the availability and affordability of healthier food alternatives. These barriers are critical to the design of nursing interventions for promoting adherence behaviours. Lack of published research in adults from CALD ethnic minority groups living with HF in Western countries limited the ability to explore all of the barriers identified in this review.

INTRODUCTION

Heart failure (HF) is defined as a clinical syndrome that results from structural or functional abnormalities causing the heart to be unable to maintain adequate cardiac output to meet metabolic needs (National Heart Foundation of Australia and The Cardiac Society of Australia and New Zealand 2011). It is a chronic and irreversible medical condition that affects more than 23 million around the globe and 5.8 million people in the United States of America (USA) (Moe and Tu 2010; Lip et al 2004). It is estimated the total spending on HF management in the USA will increase from $20.9 billion in 2015 to $53.1 billion by 2030 (Ziaeian and Fonarow 2016). In Australia, approximately 480,000 people are living with HF (Atherton et al 2018) and more than 173,000 hospitalisations were associated with heart failure in 2015-2016 (Atherton et al 2018). From a public health point of view, chronic HF can be managed through a combination of medical and surgical treatments, promoting self-care behaviours, education and counselling (National Heart Foundation of Australia and The Cardiac Society of Australia and New Zealand 2011). In general, a sodium restricted diet (SRD) is one of the popular chronic HF management strategies.

The role of dietary sodium restriction in HF management

Dietary sodium restriction is a common self-care strategy for HF management (Wessler et al 2014; Welsh et al 2013; Hummel et al 2009). Evidence shows that following a SRD may prevent fluid retention and associated symptoms in adults living with chronic HF (Welsh et al 2013). However high sodium (salt) intake is a worldwide health problem in this century. According to the World Health Organization (2016), many people in the world routinely consume 9 to 12 grams of salt every day. This is almost two to three times higher than the recommended amount of salt intake (5 grams per day) (World Health Organization 2012). In general, high dietary sodium intake does not only increase the risk of fluid retention and exacerbate the associated symptoms in adults with chronic HF, but it also reduces the therapeutic effects of angiotensin-converting-enzyme inhibitors (Suckling and Swift 2015). Angiotensin-converting-enzyme inhibitors are medications which are commonly prescribed for HF treatment. Therefore, adults with HF are often advised to restrict their sodium intake to 2 to 3 grams a day (World Health Organization 2012; National Heart Foundation of Australia and The Cardiac Society of Australia and New Zealand 2011; Neily et al 2002).

Potential barriers to follow a sodium restricted diet

Salt (sodium) plays an important role in the sensory properties of foods (Liem et al 2011). It enhances the food flavour by increasing the sense of saltiness and sweetness, and suppresses bitterness (Liem et al 2011). Therefore, a reduction of salt in foods would reduce the overall appetitive responses to foods, thus increasing the perceived intensity of a bitter taste. As a consequence, following a SRD is often difficult to maintain in many culturally and linguistically diverse (CALD) adults especially older ones who may also suffer from taste disorders (dysgeusias) (Syed et al 2016). Overall, the adherence rate of a SRD among adults with chronic HF is approximately 25 to 28% (Lennie et al 2008; Chung et al 2006).

We know that dietary practices often represent an individual's cultural background and ethnic identity (Kenny 2015). This creates a challenge to the nurses in the delivery of care to the adults living with HF from different CALD backgrounds. Each individual may have their own cultural belief and expectations to their health. In most cases, adults are likely to sustain a health behavioural change if they perceive the health benefits are greater than the barriers and are capable of making the change (Rosenstock et al 1988). A CALD adult's perception of the barriers plays an important role in health-related behaviour changes. Therefore, there is a need to gain a better understanding of their perceived barriers to dietary sodium restriction adherence so that nurses can ensure the recommended interventional strategies are clinically and culturally appropriate to them.

This review will explore and synthesise the current available research findings of the barriers to adherence to a SRD in adults from CALD backgrounds with HF.

METHODS

Review method

The integrative review method was selected to conduct this review. This facilitates combining experimental and non-experimental studies into integrated results and conclusions to summarise known factors across cultures and studies to synthesise a fresh perspective (Whittemore and Knafl 2005). This review uses the steps outlined by Whittemore and Knafl (2005) as a framework to guide the review process.

Problem identification

Changing an adult's health-related behaviour is a complex process and there are many barriers influencing the adherence behaviours for a medical condition. This review examined the evidence from studies focusing on the perceived barriers to adherence of a recommended SRD for HF management in CALD adults around the globe, including the role of culture and ethnic origin in SRD adherence. It aimed to answer the question, "what are the barriers to adherence of a sodium restricted diet for chronic heart failure management in adults from CALD backgrounds?"

Literature search

The search was undertaken in three electronic databases; PubMed, CINAHL and MEDLINE using the years 2006 to 2017 as limiters. This time frame was chosen to ensure the literature review reflects the most recent clinical practice in this area. The combinations of search terms, culturally and linguistically diverse people, CALD, minority populations, immigrants, refugees, cardiac failure, heart failure, congestive heart failure, salt, sodium, salt restriction, sodium restriction and barrier(s) aimed to capture the articles in relation to the barriers to adults who were advised to restrict their dietary sodium intake for the management of heart failure around the world (table 1).

Table 1: Article search results

As at 14 January 2017	The number of articles		
Keywords used:	**CINAHL**	**MEDLINE**	**PubMed**
Group 1- populations: 1a: (CALD OR Culturally and linguistically diverse people OR minority populations OR immigrants OR refugees)	15,539	17,457	26,227
1b: (heart failure OR cardiac failure OR congestive heart failure)	32,613	89,045	111,673
Groups 1a AND 1b	36	54	142
AND			
Group 2 – Sodium restriction (Salt OR Sodium OR Salt restriction OR Sodium restriction)	19,896	201,027	599,167
Group 3 – Barriers (barrier*)	37,094	139,528	141,773
Results:			
Groups 1a AND 1b AND 2	0	0	2
Groups 1b AND 2 AND 3	17	37	43

Study selection

Studies (articles) to be included in the literature review had to meet all the inclusion criteria and did not fall under the exclusion criteria. The inclusion and exclusion criteria for this review are detailed in table 2. These criteria were set to ensure:

1. the same approach was taken in the study selection; and
2. only the current primary studies in adults living with HF and the barriers that they experienced were included in the review.

It is important to note, non-English language publications and postgraduate theses were not excluded in the search. Articles exclusively exploring the barriers of dietary sodium restriction in hypertension and renal failure management were excluded.

Table 2: Inclusion and exclusion criteria

Inclusion criteria
• Peered reviewed, • primary research studies/empirical studies, • published in between 2006 and 2017, • the participants were at least 18 years of age with a confirmed diagnosis of HF, and • provided a discussion of the barriers to a SRD in chronic HF management.
Exclusion criteria
• Articles were not related to dietary sodium restriction in chronic HF management, • grey literature, • government reports, and • clinical guidelines and position statement.

Data evaluation

The Crowe critical appraisal tool (CCAT) was used to evaluate the quality of the selected studies. CCAT was selected because it can be used to appraise all research designs in health science research. Intraclass correlation coefficient is a common statistical test to measure reliability and consistency of the measurements between different types of research. The intraclass correlation coefficient of CCAT in appraising the descriptive, exploratory and observational research ranges from 0.91 to 0.64 (Crowe et al 2012). The absolute agreement value is 1.0 therefore a higher total or total percentage score indicates a higher level of credibility (Crowe and Sheppard 2011). The CCAT has a high level of consistency and reliability across a wide range of research designs. None of the included studies were excluded based on the results of this data evaluation rating system. Overall, the quality scores of the included studies ranged from 70 to 88% that indicated acceptable level of credibility. The scores of the included studies are presented in table 3.

Data analysis

The data analysis consisted of two phases. In phase 1, each article's content was analysed to identify and summarise the (1) HF stages, (2) sample size and location, (3) research designs, (4) tools used, (5) major findings and (6) limitations. In phase 2, the summarised major findings were categorised using the frequency distribution to identify three key barriers to SRD adherence for HF management in adults from CALD backgrounds.

Table 3: CCAT appraisal results

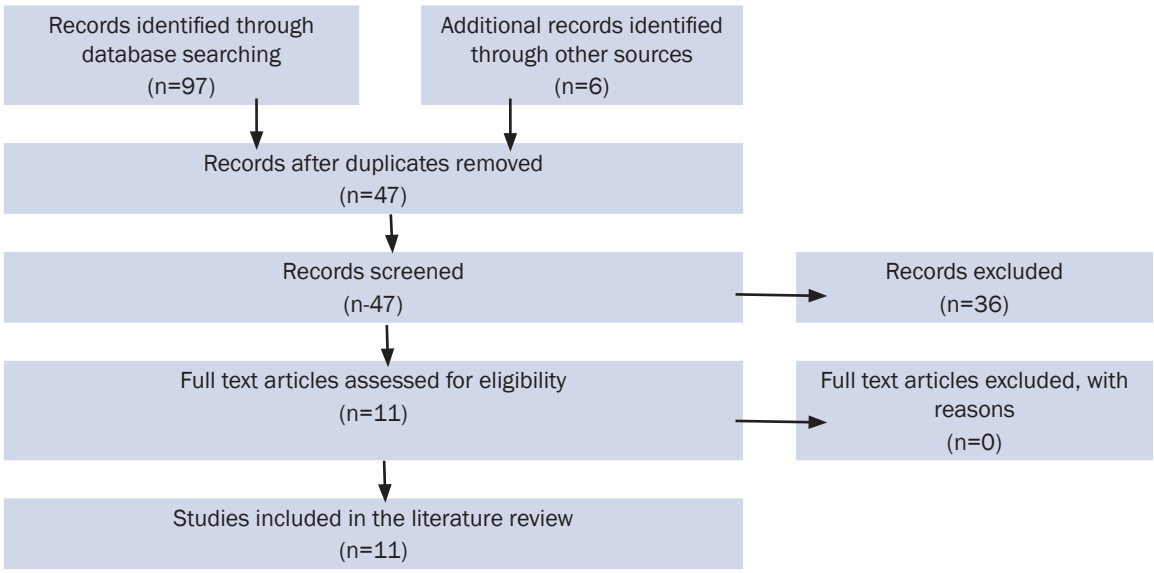
Assessment of studies included in the review	Discipline	Country	Score (%)
Hoe et al (2015)	Nursing	USA	88%
Sethares et al (2014)	Nursing	USA	80%
Jiang et al (2013)	Nursing	Taiwan	75%
Pretorius et al (2012)	Medical	South Africa	80%
van der Wal et al (2010)	Nursing	The Netherlands	87%
Lennie et al (2008)	Nursing	USA & Australia	80%
Sheahan and Fields (2008)	Nursing	USA	88%
van der Wal et al (2007)	Nursing	The Netherlands	88%
Bentley et al (2006)	Nursing	USA	88%
Chung et al (2006)	Nursing	USA & Australia	73%
Kollipara et al (2006)	Allied health	USA	83%

RESULTS

The search results showed there were 142 articles available in PubMed, 54 in MEDLINE and 36 in CINAHL databases when the authors combined the keywords in the population groups – people from CALD backgrounds (1a) and heart failure (1b). The number of articles reduced to 2 in PubMed and 0 in MEDLINE and CINAHL (table 1, result-A) when the authors combined the population groups (1a and 1b) with the search keywords related to salt or sodium restriction (group 2). Consequently, as a result of the limited availability of the articles (n=2) on the people from CALD backgrounds, therefore this literature review placed more focus on the heart failure, sodium restriction and barriers (groups 1b, 2 and 3).

The search using the search terms related to heart failure, sodium restriction and barriers led to a total of 97 titles; 43 titles from PubMed, 17 from CINAHL and 37 from MEDLINE (table 1, result-B). A further 6 titles retrieved were from the reference list of the reviewed papers. After eliminating duplicates and applying the inclusion and exclusion criteria, 11 titles met the selection criteria and were included in the review (figure 1).

Figure 1: Flow chart of identified records



Of the 11 included articles, four used the qualitative approach and seven used the quantitative approach. Of these, four studies used the same data collection tool, the Dietary Sodium Restriction Questionnaire (DSRO) that was developed based on the Theory of Planned Behaviour. Additionally, the research design of the other three studies were based on the health belief model. Convenience sampling was used in all included studies.

Phase 1 Analysis

Most participants were diagnosed with New York Heart Association (NYHA) functional classes II, III and IV [NYHA functional class is a subjective estimate of a HF patient's functional capacity (American Heart Association 2015)] in the included studies. The studies conducted by Sheahan and Fields (2008) and Jiang et al (2013) did not include a cardiac function requirement in their sample recruitment criteria. The sample size varied according to the research design, it ranged from 12 to 33 in the included qualitative studies and 60 to 954 in the quantitative studies. The ethnocultural groups included American (n = 4), African American (n =1), American and Australian (n = 2), Dutch (n = 2), South African (n = 1) and Taiwanese (n = 1). The methodology of the included studies are presented in table 4.

Table 4: The methodology of the included studies

Author/Date	HF stages	Sample	Design
Hoe et al (2015)	NYHA Classes I to IV	N = 232 USA	Quantitative; convenience sampling
Sethares et al (2014)	NYHA Classes II to IV	N = 78 USA	Quantitative; convenience sampling
Jiang et al (2013)	Medical records	N = 12 Taiwan	Qualitative; convenience sampling
Pretorius et al (2012)	NYHA Classes II, III & IV	N = 50 South Africa	Quantitative; convenience sampling
van der Wal et al (2010)	Hospitalised for symptomatic HF with structural changes	N = 15 The Netherlands	Qualitative; convenience sampling
Lennie et al (2008)	NYHA Classes II, III & IV	N = 246 Australia and USA	Quantitative; convenience sampling
Sheahan and Fields (2008)	Self-reported HT or HF	N = 33 USA	Qualitative; convenience sampling
van der Wal et al (2007)	NYHA Classes II to IV	N = 954 The Netherlands	Quantitative; convenience sampling
Bentley (2006)	NYHA Classes I, II & III	N = 20 USA	Qualitative; convenience sampling
Chung et al (2006)	NYHA Classes II, III & IV	N = 68 USA & Australia	Quantitative; convenience sampling
Kollipara et al (2006)	NYHA Classes III & IV	N = 219 USA	Quantitative; convenience sampling

Phase 2 Barriers of following a SRD

Two authors (A.C., M.K.) reviewed the summarised findings of the included studies and used the categorical frequency distribution method to identify three key barrier categories. They were:

1. lack of patient education (Jiang et al 2013; Pretorius et al 2012; van der Wal et al 2010; Lennie et al 2008; Sheahan and Fields 2008; van der Wal et al 2007; Bentley 2006; Chung et al 2006);
2. interference with socialisation (Pretorius et al 2012; Lennie et al 2008; Sheahan and Fields 2008; Bentley 2006; Chung et al 2006); and
3. food preferences and non-affordability of a low sodium diet (Sethares et al 2014; Jiang et al 2013; Pretorius et al 2012; van der Wal et al 2010; Sheahan and Fields 2008; van der Wal et al 2007; Bentley 2006).

More specific details will be discussed in the following section.

DISCUSSION

This review identifies three key perceived barriers of adherence to the recommended SRD (adherence behaviours) for HF management. Adults are likely to change their dietary practices (a health-related behaviour) if they perceive the benefits are greater than the barriers and are capable of making the change (Rosenstock et al 1988). So in order to minimise nonadherence to a SRD, nurses and other health care providers should take their clients' perceived barriers to the changes of dietary practice into account when providing care and treatment to this population group (Bentley et al 2005). More specific studies that explore the barriers to dietary modifications in adults from CALD backgrounds are needed. Based on the above results in phase 2, the three key barrier categories are used as a context for this review.

Lack of patient education

Evidence shows that patient education not only improves adults' knowledge about heart failure and their recommended regimens, but also promotes self-management and adherence to the recommended SRD (Lennie et al 2008; Sheahan and Fields 2008; Bentley 2006; van der Wal et al 2007; Chung et al 2006). A semi-structured interview approach was utilised in these studies. Overall, participants' attitudes, barriers and knowledge in relation to SRD in heart failure management were measured in the data collection. Four included studies (Heo et al 2015; Lennie et al 2008; Bentley 2006; Chung et al 2006;) utilised the dietary sodium restriction questionnaire (DSRQ) that was initially developed by Bentley et al (2009) based on the Theory of Planned Behaviour in the interviews.

Accordingly, adults with HF prefer to receive both verbal and written SRD information from their health care providers (Bentley 2006). However not all adults with HF received the same level of education from their health care providers. Sheahan and Fields (2008) found that 58% of the participants received medical advice to restrict their dietary sodium intake but of those, only 24% received written information or instructions about SDR. Another study conducted in the USA and Australia also found that 20% of the participants did not receive formal medical advice to follow a SRD (Lennie et al 2008). Lack of sufficient patient education and formal advice by the health care providers may have a negative impact on the adherence. In addition, adults with less than adequate health literacy skills in acute care settings are often less prepared for self-management of the associated chronic conditions and therefore have poorer health outcomes (Lennie et al 2008). They are more at risk of misinterpreting the health-related information and may have ineffective communication with their health care providers. In most cases, low level of health literacy is often associated with poor information retention and SRD knowledge (Jiang et al 2013).

In many cases, adults with HF are told to avoid adding salt to the cooking and to remove salt from the dining table (Lennie et al 2008). The focus of the SRD education is often on identifying the high-sodium (salt) foods. As a result, many adults may not be aware of foods that contain low sodium when they shop in stores or order their meals in restaurants (Lennie et al 2008; Bentley 2006; Chung et al 2006). Further, this generic high sodium food information may mislead adults from CALD backgrounds because they may believe their cultural foods are low in sodium. Due to the possibility of language, age and/or cultural practices, these adults often have low functional health literacy skills, poor knowledge about the hidden salt in processed foods and the healthy affordable alternatives (Jiang et al 2013; Pretorius et al 2012). Jiang et al (2013) and van der Wal et al (2010) found their participants diluted the salty foods with water and perceived that to be an effective strategy in controlling sodium intake. This could be associated with low literacy skills resulting in lack of knowledge about or misunderstanding of SRD. For instance, none of the participants in the Taiwanese study could read and understand the food labels written in their own language (Jiang et al 2013). They relied purely on their sense of taste to control the sodium intake. Although the potential benefit of patient education about SRD in HF management is well established, health disparities do exist and result in adults from ethnic minority groups not receiving the culturally appropriate patient education. The study conducted by Kollipara et al (2006) found that four out of the eight frequently consumed high sodium foods by urban African Americans were not the core foods in Caucasian Americans and this cultural variation was not considered in the HF education in Dallas, USA. So, the minority ethnic populations may not accept and adapt to the SRD education designed for the mainstream population leading to a low adherence to the recommended health behaviour change (sodium restriction). Of note, adults with less experience/knowledge about the HF management often perceived more barriers and negative beliefs to the adherence of a SRD (van der Wal et al 2007). This will have a significant impact on the nurses when educating their clients from ethnic minority groups about sodium restriction.

Interference with socialisation

The interference of socialisation with family and friends is another key barrier to adherence of a SRD in all communities regardless of the ethnic, cultural and socio-economic backgrounds (Chung et al 2006; Lennie et al 2008; Pretorius et al 2012; Sheahan and Fields 2008; Bentley 2006). Food is not only the basic human need for growth, but also an important social tool/media across all cultures (Cotugna and Wolpert 2011). Many adults on a SRD experience being excluded from family and friends' gatherings or perceived that their special dietary requirements limited their social opportunities. It is because they cannot share the same type of foods with friends resulting in less conversation topics in the event (Lennie et al 2008; Bentley 2006). Also, this may have a significant impact on the cultural value and food practices among adults from CALD backgrounds (Wu and Barker 2008). On the other hand, some family members may not understand and respect their medical needs. As a consequence, adults may feel alone or that they are being excluded from their immediate family members who continue to eat high sodium foods in the same household (Bentley 2006). This will have a significant impact on their health behaviours and adherence to a SRD in the long term. For this reason, nurses should encourage the immediate family members to participate in the care planning process. This does not only increase the self-efficacy of the adults, but also assists the family members to notice the barriers their loved ones are experiencing in dietary behavioural changes for HF management.

Further, lack of social interaction and loneliness during mealtimes may affect the adherence behaviours in adults with HF. Sheahan and Fields (2008) found that single older participants resided in group homes and had a lack of motivation to cook meals for themselves. Only two out of the 33 participants had the desire to cook. They tended to consume commercial or meals provided by the group homes, which were often high in sodium. Overall, very few studies have been undertaken to investigate the effects of social interference on

dietary behavioural changes. Study on the SRD among elderly or older adults living with HF in the communities or institutional facilities is a less explored topic and the current available literature may not fully reflect on their dietary practices.

Food preferences and non-affordability of a low sodium diet

The perceptions of health/illness and adherence to the recommended SRD treatment for HF are often affected by individuals' food routines, cultural food practices, and beliefs about what makes foods look good and tasty. The study conducted by Sheahan and Fields (2008) found that both African American and Caucasian American participants who were raised with highly salted foods such as bacon and sausage in the south-eastern USA continued to consume high sodium foods even though they were given medical advice to follow a SRD regimen. Possibly, some adults may perceive meals without salt are tasteless and therefore this is a barrier to maintaining the sodium restrictions (Pretorius et al 2012; Sheahan and Fields 2008; van der Wal et al 2007). Their health decision-making about the dietary sodium restriction may not be based on the education or the social/family support they have received. In fact, their decision-making process may incorporate their daily routine, cultural food practices and life experience including the HF symptoms they are suffering. In a Dutch study conducted by van der Wal et al (2010) it was found there was a close relationship between the adults' daily routine and their adherence to a SRD. In other words, if the adults can establish a daily routine in restricting the amount of sodium in their diet, they are more likely to adhere to the sodium restriction. In practice, nurses may encourage adults to set up a series of small manageable goals in their care plan (Sheahan and Fields 2008). This may assist them to establish their routines that incorporate their own cultural food practices and beliefs in order to promote their adherence to the regime.

In most cases, dining out is often a challenge to the adults who are on a SRD. This is because the commercial foods in restaurants are mostly prepared and cooked with excessive salt and seasonings to enhance the taste and appeal of foods. It is estimated over 70% of adults' dietary sodium intake is from commercial foods, so-called hidden salt (Lennie et al 2008). This results in a lack of food choices for the adults living with HF when dining out (Sethares et al 2014; van der Wal et al 2007). Apart from the reduced food selections, the affordability of healthy foods such as fresh fruits and vegetables is another key barrier to the adherence of SRD (Pretorius et al 2012; van der Wal et al 2010). This is a particularly important issue to the adults living in developing countries or from the low socioeconomic backgrounds. The high prices of healthier foods may further limit some adults' food selections. For example, evidence showed that adults with HF in Soweto would have to spend approximately 40% of their social security/disability benefits on foods if they adhered to the recommended SRD in 2008 (Pretorius et al 2012). Given these points, nurses should assess and tailor the health interventional designs according to individuals' food affordability and financial circumstances.

Further, eating a meal is not only essential for humans to maintain their lives, individuals' food selections and practices may also "reflect their attitudes toward health, spiritual beliefs, cultural norms and life experiences" (Kenny 2015). Therefore, the effects of food selections and practices on personal identity and group membership should not be overlooked or underestimated. This is particularly important to some members of ethnic and racial minorities. Giving up their cultural food patterns and food choices may be considered the same as losing their own identity (Parasecoli 2014). In addition, hidden salt in the traditional foods such as salt-cured meats and pickled vegetables is a health concern (Jiang et al 2013). In most cases, the influence of culture on dietary practices may not be adequately addressed in the educational interventions for the mainstream populations. Therefore, if possible, nurses must incorporate the cultural contexts of individuals' dietary practice in order to create culturally appropriate measures. An infusion of culturally appropriate healthier alternatives in their traditional dietary patterns may enhance the adherence behaviours in adults from CALD backgrounds (Mukherjea et al 2013).

CONCLUSIONS AND RECOMMENDATIONS

This review revealed the key barriers to adherence of a sodium restricted diet (SRD) for chronic heart failure (HF) management in CALD adults including: 1) lack of sufficient appropriate patient education; 2) the levels of interference with social and family life; and 3) the availability and affordability of healthier food alternatives. In general, the adults' health decision-making about restricting sodium intake and changing their health behaviours may not be solely based on the education that they have received and their levels of understanding. Although patient education plays an important role in health decision-making, it is only one of the key factors in dietary sodium restriction adherence. In order to promote the adherence behaviours among the CALD adults with HF, nurses should routinely assess their individual needs and perceived barriers to sustain the dietary change for their medical conditions. Lack of sufficient appropriate education may result in adults being less prepared for self-management of their conditions and non-adherence to the SRD. This is a particularly important factor in dietary sodium restriction adherence among the adults from CALD backgrounds living with HF. These adults may not adhere to the recommended diet if the education and interventions are not culturally appropriate to their social and cultural life or incorporate into their traditional dietary patterns. Therefore, nurses should:

- tailor the SRD education that is designed for the mainstream population to adapt to meet the needs of adults from CALD backgrounds;
- encourage the adults and their immediate family members to participate in the care planning process in order to increase their self-efficacy in adhering to a recommended SRD at home; and
- provide culturally appropriate healthier food alternatives to promote their adherence behaviours.

Published research in adults from ethnic minority groups living with HF in western countries is scarce (table 1). Future research is needed to explore and address how to tailor the nursing interventions to meet the individual's needs, health literacy level, cultural practice and lifestyle in order to improve the adherence behaviours regarding SRD in these population groups.

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Complexities of the Australian perioperative nurse entrepreneur

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KEY WORDS

nurse entrepreneur, nurse practitioner, surgical assistant

ABSTRACT

Objective
This paper articulates a need for the nurse entrepreneur working as a surgical assistant. Negatively impacting on the role are the complex factors of:

- lack of professional support from the Nursing and Midwifery Board of Australia;
- lack of a process for remuneration through the Medical Benefits Schedule; and a
- lack of guidance to navigate the bureaucratic system.

Setting
Australian healthcare system.

Subjects
Clinicians who are a registered nurse or nurse practitioner surgical assistant in the Australian healthcare system private sector.

Primary Arguments
- A need exists for the perioperative nurse entrepreneur working in the private sector for specialty surgical assisting skills; adding a dimension of cost saving; and enhancing patient safety.
- The same mechanism for remuneration to medical practitioners, as surgical assistants, via the Medical Benefits Schedule is not available to nurse surgical assistants undertaking the same role. A contributor to this is the lack of support by the Nursing Midwifery Board of Australia.
- Lack of remuneration through Medicare exposes the patient to out of pocket expenses.

Conclusion
Absence of recognition of nurses (including Nurse Practitioners) as surgical assistants by the Nursing and Midwifery Board of Australia is not conducive to recognition of these roles by other government entities such as Medicare. Specialty advanced practice roles like that of the nurse surgical assistant enhance patient safety. While support for these specialty roles from the medical profession is applauded, it is an indictment on the peak Australian regulatory body for the nursing profession that support for the nurse surgical assistant including the nurse practitioner surgical assistant is not yet evident.

INTRODUCTION

Nurse entrepreneur role in the Australian healthcare system

A nurse entrepreneur is a business owner offering nursing services in the context of preventative care, rehabilitation, education, research, administration or clinical specialty direct patient care (International Council of Nurses 2004). The progression of nurses' roles into private practice serves to address gaps and unmet needs in the healthcare sector (Hong 2017). In Australia, this diversified role has generated debate within the nursing profession; the wider healthcare community; and the political and economic facets of the administration of healthcare (Lowe et al 2016; Wilson and Jarman 2002).

The role of nurse entrepreneur requires more complex knowledge and skills to that of the employed nurse. The nurse entrepreneur utilises a mixture of advanced nursing practice and corporate skills to meet client needs (Wilson 2003). These nurses are not salaried and must navigate the lack of a Medicare remuneration pathway and lack of recognition by consumers and stakeholders (Adams et al 2017). Other constraints on practice include varying levels of regulation through professional nursing bodies and clinical site accreditation issues that exist within the often inflexible bureaucracy of the healthcare system to provide their services. Motivation for nurses undertaking the nurse entrepreneur role include professional evolution, job satisfaction, regaining a sense of autonomy regarding work/life balance while filling areas of deficit within the healthcare system (Hong 2017; Wilson 2003).

In the Australian perioperative setting, clinical specialty direct patient care is delivered by the nurse entrepreneur working as a nurse practitioner surgical assistant or perioperative nurse surgeon's assistant (PNSA). These roles are under the umbrella of the internationally described non-medical surgical assistant (NMSA) (Hains et al 2017c). These clinicians may provide care in the pre-operative, intra-operative and post-operative phases of the perioperative journey (Hains et al 2016).

From a practice audit survey administered in 2015, 32% of nurse surgical assistants in Australia were working as employees of a surgeon or surgical practice, 16% were not working and the remaining 52% were working as perioperative nurse entrepreneurs either invoicing predominately the patient; or the surgeon or the healthcare facility for their services. Overall 76% of perioperative nurse entrepreneurs' workload was in the private healthcare sector. Nurse practitioner surgical assistants accounted for 14% of respondents (Hains et al 2016). From the practice audit survey it is noted that task divergence exists between nurse surgical assistants and nurse practitioner surgical assistants. This is related to the inability of the nurse surgical assistant to prescribe medications (or fluids), order investigations and refer to other healthcare professionals.

In addition to the Nursing Midwifery Board of Australia (NMBA), the peak professional body for nurse practitioner surgical assistants is the Australian College of Nurse Practitioners (ACNP). The peak professional body representing the perioperative nurse entrepreneur (including nurse practitioners and registered nurses) in Australia is the Australian Association of Nurse Surgical Assistants (AANSA).

DISCUSSION

Nurse surgical assistant or medical surgical assistant

Medical surgical assistants are medical practitioners who assist surgeons during surgical procedures. They may undertake this role as their only form of professional work or they may work in the role on a part-time basis undertaking other professional tasks as a medical practitioner.

It is not always possible for a surgeon to obtain a medical surgical assistant for procedures in the private healthcare sector. This is not the case in the public healthcare sector as surgeons have access to training medical personnel requiring learning experiences.

A survey of Australian surgeons was conducted by the authors in 2015-2016. A total of 445 surveys were submitted, not all respondents answered all questions. (Hains et al 2018) From this survey 27.5% (n=85) of surgeons revealed they had postponed or cancelled cases as an appropriate surgical assistant could not be found. Of the surgeons who responded to this question, 22.71% (n=62) expressed it was difficult or very difficult to secure a surgical assistant for urgent/emergent private sector cases. In the private healthcare sector, when a medical surgical assistant is not available, the instrument nurse may be required to simultaneously act as the surgical assistant in addition to performing their own role which requires completion of surgical counts. From the surgeon survey it was revealed that 22.22% (n=70) operate; once a month or more frequently; without a surgical assistant or, use hospital employed scrub/scout staff; without formal training for the surgical assistant role; to assist for cases that would routinely require a dedicated assistant.

Some surgeons may choose to use a perioperative nurse entrepreneur due to the specialised nature of certain surgery. Some examples of this are robotic surgery, cardiac surgery or surgery requiring operating through a microscope all which requires the surgical assistant to have highly developed specialty skills (Hains et al 2016). In these types of surgeries, if an appropriately skilled surgical assistant cannot be located, surgery may be postponed or cancelled.

It is important to highlight here that use of a perioperative nurse entrepreneur does not translate to duplication of services or payments. A surgeon uses the skills of a medical surgical assistant OR a perioperative nurse entrepreneur, not both.

Lack of professional support from the Nursing and Midwifery Board of Australia

Advanced Practice Nursing (APN) is described by the NMBA as follows:-

> *"APN is a continuum along which nurses develop their professional knowledge, clinical reasoning and judgement, skills and behaviours to higher levels of capability. Nurses practising at an advanced level incorporate professional leadership, education and research into their clinically based practice" (Nursing and Midwifery Board of Australia 2016).*

The competencies in this statement align with the strong model of advanced practice that includes direct comprehensive care, support of systems, education, research and professional leadership (Mick and Ackerman 2000, Norsen et al 1997).

In an Australian paper, Gardner et al (2016) expand on the domains of the strong model of advanced practice highlighting tasks such as:

> *"focusing on specific needs, including procedures, provision of physical care, promoting innovative patient care, activities that involve enhancement of students, activities that support a culture of practice that challenges the norm and activities that allow for sharing and dissemination of knowledge beyond the individual's institutional setting" (Gardner et al 2016).*

A practice audit of nurse surgical assistants in Australia revealed that all of the activities listed above are currently carried out by the perioperative nurse entrepreneur. AANSA also supports the research component of APN by offering an annual research award. Many perioperative nurse entrepreneurs are experienced theatre nurses and are able to add a dimension of education and supervision to medical/nursing students and novice nurses working in the perioperative environment. The Perioperative nurse entrepreneur also adds valuable experience during urgent and emergency situations (Hains et al 2016).

Lack of a process for remuneration via the Medical Benefits Schedule

While the Medical Benefits Schedule (MBS) provides remuneration for medical surgical assistants under

the "Assistance at Operations" TN.9.1 Item Numbers 51300-51318, these numbers are only available to medical practitioners (Australian Government 2018). As the MBS does not recognise the perioperative nurse entrepreneur for remuneration of surgical assisting services, neither do other healthcare entities such as the Department of Veteran's Affairs and the private health funds. Nurse practitioner surgical assistants have access to the MBS for consultation with patients but are unable to access "Assistance at Operations" TN.9.1 Item Numbers 51300-51318. The lack of an MBS mechanism for remuneration of the perioperative nurse entrepreneur exposes private patients to an out of pocket expense when a perioperative nurse entrepreneur assists for their surgical procedure. Since their inception AANSA has been proactive in a resolution for the out of pocket expenses patients incur through the use of a perioperative nurse entrepreneur.

In 2013 AANSA brokered an agreement with WorkCover Queensland to gain a WorkCover Queensland provider number and access to payment through WorkCover Queensland for surgical services for the nurse surgical assistant related to WorkCover Queensland patients. This resulted in a cost saving for WorkCover Queensland as the agreement for remuneration of the nurse surgical assistant was 15% of the surgeon's fee compared to 20% of the surgeon's fee for Medical surgical assistants (Hains et al 2017d)

AANSA is currently on a pathway to formal credentialing of the nurse surgical assistant role in Australia. The credentialing process aims to standardise educational and professional requirements for roles which aspire to be recognised as APN. Nurse Practitioners already have a mechanism for standardised competencies/ education and professional requirements administered by the NMBA. There is a robust body of literature that the nurse practitioner improves patient outcomes, is acknowledged by patients as an alternative healthcare professional and increases access to healthcare (Adams et al 2017) yet the nurse practitioner as an APN role endorsed by the NMBA is not able to access Medical Benefits Schedule remuneration for surgical assisting services. Given this, it is hard to imagine that credentialing which is not sanctioned by the NMBA will attract access to the MBS for non-nurse practitioner nurse surgical assistants.

Lack of guidance from government agencies to navigate the bureaucratic system

In 2012 AANSA submitted an application to the Medical Services Advisory Committee (MSAC) to gain access to the MBS for the perioperative nurse entrepreneur for surgical assisting services. This application failed to proceed past the Health Technology Assessment (HTA) group as it was identified that the perioperative nurse entrepreneur was not a new service but a new group providing existing surgical assisting services. No further guidance was given to the AANSA on how to progress the application to access the MBS.

In 2015 AANSA executive met with MBS Representatives from the Medicare Finance and Listings Branch and the Medicare Reviews Unit. AANSA was set three tasks:

1. obtain endorsement for the Nurse surgical assistant role from the Nursing and Midwifery Board of Australia;
2. obtain a letter of support from Royal Australasian College of Surgeons (RACS); and
3. demonstrate the need for the Nurse surgical assistant role.

In 2016 AANSA submitted an application to the MBS Taskforce Review for access to MBS remuneration for surgical assisting services. The MBS Taskforce Review is tasked with aligning the MBS with contemporary clinical evidence and practice (Australian Government 2015). The MBS has not been reviewed since its inception approximately 43 years ago. AANSA's application included a submission to the Principles and Rules Committee of the MBS Taskforce to change the rule limiting access to 'Assisting at Operation' item numbers to medical practitioner. On 27 March 2018 AANSA received correspondence from the Australian Government - Department of Health outlining:

"The MSAC pathway is the most appropriate pathway to gain access to the MBS."

In July 2018, in a teleconference between an MSAC representative and the president of AANSA, it was outlined by the MSAC representative that MSAC was not the correct pathway.

Tasks from the MBS representatives meeting in 2015

1. Obtain endorsement for the nurse surgical assistant role from the Nursing and Midwifery Board of Australia.

In 2010 the NMBA considered the endorsement of a range of nursing specialties in preparation for the transition to the National Registration and Accreditation Scheme (NRAS). It was identified that:

- *"A variety of mechanisms are employed internationally to recognise and regulate specialty practice, including licensure, endorsement, credentialing, validation and certification*
- *Formally regulating specialty groups for purpose of registration did not reduce the risk to the public*
- *There was lack of significant evidence that regulation of specialty practice improves patient/client outcomes" (Nursing and Midwifery Board of Australia 2016).*

In a recent survey of perioperative staff in Australia 124 surveys was submitted. Of the respondents 22% indicated that the instrument nurses in their healthcare facility were required to simultaneously perform the role of surgical assistant and instrument nurse on a daily basis when a designated surgical assistant could not be located. (Hains et al 2017a) This is in breach of the Australian College of Perioperative Nurses (ACORN) standards which state the instrument nurse may not perform a dual role as the surgical assistant. In this situation patient safety is compromised. In addition to compromising patient safety, untrained operating theatre staff acting as an impromptu surgical assistant expose themselves to organisational and medico-legal ramifications should complications arise in the intra-operative or post-operative period.(Hains et al 2017a)

Aside from compromising patient safety; other factors such as role evolution within the nursing platform should be considered. (Hains et al 2017b) In a recent Australian surgeon survey an equal number of surgeons thought governance of the nurse surgical assistant role should be by the Nursing and Midwifery Board of Australia 43% (n=140) or via the Medical Board of Australia 41% (n=133) (Hains et al 2017d).

While the NMBA resists the calls from many advanced specialty practice nursing groups to recognise and assist with sanctioned regulation, support for the Perioperative nurse entrepreneur continues from the medical profession.

2. Obtain a letter of support from Royal Australasian College of Surgeons (RACS).

AANSA has corresponded with the RACS and has received a letter of support for the role of the nurse surgical assistant. This letter states that RACS is supportive, of the role within the MBS definition of T.9.1. Assistance at Operations - (Items 51300 TO 51318) provided the clinician meet minimum entry requirements. These are:

"1. Must obtain an appropriate qualification

2. Must continue to be credentialed at each hospital in which they work

3. Must continue to have a surgeon mentor at each hospital in which they work

4. Must hold the appropriate indemnity insurance" (Perry 2017)

3. Demonstrate the need for the nurse surgical assistant role.

A need has been demonstrated as the perioperative nurse entrepreneur fills a deficit in the private sector which alleviates the instrument nurse from performing a dual role and impacting on patient safety. The perioperative nurse entrepreneur additionally helps avoid surgical procedures being cancelled or postponed when a surgical assistant with appropriate skills is not available.

The perioperative nurse entrepreneur also enhances the surgical process. Some nurse surgical assistants work with patients in the pre-operative period so they have in-depth knowledge of the equipment needed for the patient's surgical procedure. The most common reasons for delays in operating lists relate to 'In Theatre Preparation Time' where inadequate staffing/planning issues impact on theatre utilisation (Orchard et al 2010) The tasks undertaken by the Perioperative nurse entrepreneur correlate to 'In Theatre Preparation Time'. By contributing to these tasks, the Perioperative nurse entrepreneur supports cost saving by avoiding cancellations and delayed theatre lists. Additionally, skilled surgical assistance can also support a reduction in operative time. (Hains et al 2016, McWinnie 2005)

The perioperative nurse entrepreneur role although not (as yet) fully evaluated, has shown a trend towards a cost benefit within the Australian healthcare system (Hains et al 2017d; Hains et al 2016) This is illustrated by:

- the perioperative nurse entrepreneur undertakes intra-operative tasks directly related to 'In Theatre Preparation Time' that facilitates the operating list, therefore avoiding delays and cancellation of procedures;
- WorkCover Queensland remunerates the perioperative nurse entrepreneur at a rate of 15% of the surgeon's fee compared with a 20% rate for the medical assistant for 'Assisting at Operation' on WorkCover Queensland patients (Hains et al 2017d); and
- a contract between a corporate healthcare provider and Queensland Health contracts the Perioperative nurse entrepreneur to operate on public patients in the private sector. This agreement has been in place since 2013. In this case the perioperative nurse entrepreneur better suited the needs of the contract (Smith et al 2016).

If the perioperative nurse entrepreneur role attracted remuneration from the MBS there is the prospect of further cost saving within the Australian healthcare system.

Out of pocket expenses

Highly topical at the moment is the high out of pocket expenses private patients incur for which there have been recent senate enquiries. Out of pocket expenses are cost shifting from the private health funds to the private patient. Out of pocket expenses coupled with the private health insurance costs increasing by 3.95% on average in 2018 is forcing the population into the public sector thus increasing the workload on an already struggling public healthcare system (Graham 2018).

A remuneration option for the perioperative nurse entrepreneur through the MBS would assist to alleviate the burden the patient incurs with out of pocket expenses. This out of pocket expense may come directly from the perioperative nurse entrepreneur, or it may come from the surgeon who pays the perioperative nurse entrepreneur. Surgeons should have the choice of working with the surgical assistant they are most comfortable with and who possess the necessary specialty surgical skills, without the patient being financially disadvantaged.

CONCLUSION

As has been clearly demonstrated here, there is a need in the Australian healthcare system for the perioperative nurse entrepreneur.

It is more than eight years since the investigation into regulation of advanced specialty nursing roles was undertaken by the NMBA. During this time unsanctioned evolution of these roles has continued with specialty nursing organisations resorting to self-credentialing of their members to validate their roles. While this maintains a minimum standard of education and professional development, there is no mediation or unification across the different nursing specialties.

As is evident by the fact the perioperative nurse entrepreneur has a significant caseload, there is a deficit of medical surgical assistants in the private sector. The perioperative nurse entrepreneur fills this deficit. However, with the current lack of formal remuneration through the MBS, and as a follow on the private health funds and DVA, the role of the perioperative nurse entrepreneur is unsustainable to many clinicians. Lack of formal remuneration is partly due to the lack of input by the NMBA. As demonstrated by WorkCover Queensland, payment to the perioperative nurse entrepreneur could translate a cost saving to the Australian healthcare system.

The role of the Perioperative nurse entrepreneur has a positive effect on patient safety. Is it time to re-visit the necessity for recognition of other advanced practice nursing roles beside the midwife and nurse practitioner? If the NMBA does not wish to regulate APN roles other than the midwife and nurse practitioner then support of the nurse practitioner role to receive remuneration for surgical assisting services would incentivise perioperative nurse entrepreneurs to obtain this qualification.

At present there is no enticement to become a nurse practitioner as this qualification does not attract remuneration for surgical assisting clinical services.

It is a condemnation on the nursing profession that the most significant professional support given to the Perioperative nurse entrepreneur comes from the medical profession.

RECOMMENDATIONS

- Formal regulation/goverance of specialty advanced practice nursing roles by the Nursing and Midwifery Board of Australia would assist with validation by other government agencies. In the absence of this, support for the nurse practitioner surgical assistant from the Nursing Midwifery Board of Australia.
- A mechanism for remuneration through the Medical Benefits Schedule for the perioperative nurse entrepreneur would facilitate savings to the Australian healthcare system.
- Assistance from government agencies to negotiate the bureaucratic system would help the Perioperative nurse entrepreneur gain access to remuneration.

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Preserving families psychological and psychosocial health in PICU: a review on the health professionals role

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ABSTRACT

Ojective
The aim of this review was to examine the health professional's role in preserving the psychological and psychosocial health of family units of paediatric intensive care patients, and to identify strategies used to reduce this risk long term.

Setting
Paediatric Intensive Care Units.

Subjects
Family units of paediatric intensive care unit patients.

Primary Argument
For the family of a child admitted to the paediatric intensive care setting, the psychological and psychosocial impacts are varied, and in many cases detrimental to the family unit itself. Health professionals, in particular nurses, perform a vital role in identifying the risks posed to these families.

Conclusion
The family unit becomes at great risk of poor psychological and psychosocial health when a child member is admitted to an intensive care unit. Nurses play a pivotal role in promoting and implementing strategies to reduce the negative impacts often experienced by these family units. Health professionals must have a thorough understanding of this risk, to be able to adequately screen and assist in preserving the health of these family units.

INTRODUCTION

"Friends and relatives could never come close to understanding what we were going through" (Koenig 2009). At the age of 12 years, Cheryl Koenig's talented son Jonathan was involved in a horrific car accident leaving him clinging to life. After months in a paediatric intensive care unit (PICU) doctors predicted he would never walk, talk or eat again. Cheryl refused to accept this prognosis and set out on a relentless quest to save her son.

Very few health professionals can truly understand the disruption a child's admission to an intensive care unit can have on a family unit's health. If friends and relatives can't come close to understanding, to what extent can health professionals? Cheryl Koenig's (2009) book Paper Cranes demonstrates the enormity and longevity of psychological and psychosocial unrest parents face whilst having a child in intensive care. This book is a must read for nurses who care for critically ill children and their families. As health care professionals looking after these families for sometimes months on end, it is imperative that health professionals acknowledge the psychological and psychosocial impacts on the family unit. Once acknowledgement is made, health professionals can help identify at risk families. Furthermore, health professionals can promote and implement interventions and strategies to protect and support the personal health of the family unit, and their journey back to optimal health.

DISCUSSION

The Paediatric Intensive Care Unit is a specialist section in a hospital where the highest level of medical care can be given (Torres 2015). PICU is where children go who require intensive therapies such as intubation, ventilation and drugs such as inotropes that can only be given under close medical and nursing supervision. These children are usually critically unwell or are at greater risk of becoming critically unwell (Torres 2015). The PICU can be a very intimidating and frightening environment for families. Most parents feel a loss of control and 'feelings of utter helplessness' whilst having a child in PICU (Merk and Merk 2013).

Acknowledgement of parental helplessness can allow health professionals; in particular, paediatric nurses to implement and promote strategies to assist in the rebalancing of the wellness state of the family (Malik 2013). Strategies such as empowerment and information sharing can improve patient and family outcomes, short term and long term (Bronner et al 2009).

The wellness of a family unit often deteriorates whilst a child is in an intensive care unit (Hardicre 2003). The psychological and psychosocial effects are often worse and longer lasting than their physical counterparts (Balluffi et al 2004). Four themes of nonphysical health have been identified by a number of studies in the area of emotional unrest in families while in the 'waiting room' of intensive care units. These themes were described as shock, fear, loneliness and helplessness (McKiernan and McCarthy 2010).

Shock and trying to make sense of what is happening is one of the largest and most intense emotions families describe initially when a child is admitted to an intensive care unit (McKiernan and McCarthy 2010). Usually the admission happens quickly and families don't always have time to comprehend what, and why, this is happening to their loved one. Keeping the family informed is one of the most important roles a nurse can play at this time to decrease feelings of shock (Bronner et al 2009). Another vital role the paediatric intensive care nurse can play to improve long term health outcomes of patients and their families, is to improve the detection of poor mental health and raise awareness of mental health issues (Bronner et al 2009). The risk of mental health compromise in children and their carers is increased after a paediatric intensive care unit admission (Balluffi et al 2004). Furthermore, parental post-traumatic stress disorder is associated with poorer psychological recovery in the child (Gledhill et al 2014). Early detection and support during this time can help protect the family unit's mental health and preserve their competence as caregivers. This in turn can

improve the health of the sick child (Gledhill et al 2014). Therefore, it is imperative that health professionals are able to identify family units at risk and provide psychological support from an early stage to minimise poor long-term health outcomes. A formal family assessment is a great strategy to reduce poor health outcomes (Rausch 2002).

Family coping styles have been proved to be a great predictor of psychological and behavioural outcomes rather than amount of/and long-term exposure to stress when caring for a child with a chronic condition (Rausch 2002). Some studies suggest that follow up contact from the intensive care unit staff to families following an admission may decrease long term distress in traumatised families (Coleville 2010).

Fear and loneliness are two other intense emotions felt by families while a child is in an intensive care unit (McKiernan and McCarthy 2010). These emotions can manifest and impact greatly on the family unit's health. Paediatric nurses care for children, however according to the family systems theory, this care directly affects the whole family (Malik 2013). To reduce the manifestation and enormity of these emotions on families and reduce the risk of poor personal health long term, nurses need to focus on holistic, family centred and developmentally supportive care (Obeidat et al 2009). For example, an interactive formal assessment of the family to create an appropriate plan of care can also assist in decreasing feelings of fear in the family unit (McKiernan and McCarthy 2010).

Paediatric intensive care nurses are highly skilled in meeting 'highly technological' and 'unstable physical' health needs of their paediatric clients (McKiernan and McCarthy 2010). The time allocated to meeting these needs often means time spent with families is greatly reduced (McKiernan and McCarthy 2010). Interventions that promote timely information sharing and open communication channels will greatly benefit the nurse and the family (Malik 2013). By improving nurses' understanding of the family's experience in the 'waiting room,' paediatric nurses are more likely to play a greater role in empowering and interacting with families (Malik 2013). This will assist in reducing the burden of stress that these emotions have on the family and improve the family unit's overall wellness (Malik 2013, Plowfield 1999).

The physical health of the caregiver is often thought of by paediatric nurses, however it is most often overlooked by family units engulfed by crisis. Paediatric nurses know that sleep deprivation and shock reduces one's ability to be involved in appropriate decision making and adequate care giving (Keilty et al 2015). The most common physical themes identified by families in the waiting room include, eating and sleeping difficulties, tears and the inability to speak (McKiernan and McCarthy 2010).

In stressful situations such as having a child admitted to PICU, the hypothalamus in the brain is activated (Marieb and Hoehn 2010). It initiates an adrenaline response which in turn heightens some responses such as the release of glucose and dampens other responses such as digestive activity (Marieb and Hoehn 2010). The frontal lobe plays a large role in decision making and is very sensitive to these stress induced changes caused by the adrenalin response (Starcke and Brand 2012). This in turn impacts on decision making during times of acute stress (Starcke and Brand 2012). Sleep deprivation also threatens competent decision making by varying the activation of certain brain regions such as nucleus accumbens and insula, both associated with risky decision making and emotional processing (Venkatraman et al 2007).

Nursing staff play a key role in maintaining the physical health of the family unit (Høye and Severinsson 2010). Paediatric nurses cannot force parents to sleep and eat, however, can promote interventions and support strategies that give parents time, space and environments to make smart decisions for their physical health (Kutash and Northop 2007). Some 'helpful' strategies and interventions as reported by families of intensive care unit patients include; reducing the physical distance from patient to family, physically seeing staff

provide 'caring behaviours' towards their loved ones, having a comfortable environment to wait in and most commonly reported as of greatest importance was receiving timely information (Kutash and Northop 2007).

Multicultural families report slightly different themes whilst having a child in the intensive care unit, whether short term, long term or on multiple occasions (Høye and Severinsson 2010). These themes were reported as specifically impacting on their overall struggle to preserve their cultural belonging within the modern health care system (Høye and Severinsson 2010). According to Høye and Severinsson (2010), these non-western ethnic background families identified the following themes that negatively affecting their psychological and psychosocial health:

- Having information 'filtered'.
- Language barriers.
- Lack of acknowledgement of cultural traditions.
- Poor communication of roles, rules and expectations.

These themes were specifically in regards to their experience of encounters with nursing staff (Høye and Severinsson 2010). Nurses need to be sensitive to cultural customs and incorporate customs where possible into care plan to help promote optimal health in these families (Høye and Severinsson 2010).

It is, however, important to note that health professionals generally expect higher degrees of distress in families than what manifests (Myhren et al 2004). Families report that generally they are satisfied with the support and communication given in the intensive care unit environment despite the enormity of stress they face (Myhren et al 2004). A longitudinal study from 2011-2014 showed a significant improvement in patient/customer satisfaction associated with nursing and medical competency (Sarode et al 2015).

In conclusion, from the themes reviewed above it is evident that health professionals, in particular nursing staff, would benefit from further training in assessing, screening and addressing distress in family units within the paediatric intensive care setting. Provoking insightful thought processes through education, will improve patient and family satisfaction.

Please note that although the topic reviewed in this literature review is very current and relevant to all health professionals working in the PICU, there is very little current literature available on this topic. It would be recommended that current research into this area in needed.

CONCLUSION

The family unit becomes at great risk of poor psychological and psychosocial health when a child member is admitted to an intensive care unit. The paediatric nurse plays a vital role in detecting 'at risk' family units. Once these families are identified, health professionals can engage and promote services and strategies to preserve the health of the family unit. However, further education and training for these health professional is needed to increase insightfulness and improve clinical practice. It is imperative that health professionals acknowledge the disruption to wellness families face when a child is admitted to an intensive care unit. Without this fundamental acknowledgement, adequate screening and preservation of health cannot be effectively achieved. This increases the risk of negative, long term, psychological and psychosocial outcomes for the family unit.

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RESEARCH PAPERS

Emergency management of patients with Supratherapeutic INRs on Warfarin: a multidisciplinary education study

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KEYWORDS
warfarin, vitamin k, anticoagulant, reversal, guidelines, emergency management, supratherapeutic, INR

ABSTRACT

Objective
Supratherapeutic INRs exceeding 4.5 are associated with increased risk of haemorrhage. The aim of this study was to evaluate the efficacy of an educational program focused at improving emergency clinician compliance with the Thrombosis and Haemostasis Society of Australia and New Zealand (THANZ) guidelines.

Design
A pre and post-intervention study was undertaken. Retrospective data from 1 July 2014 to 30 June 2015 and prospective data 1 January 2016 to 31 December 2016 were collected.

Setting
This study was conducted in a large tertiary care hospital in Melbourne, Victoria, Australia.

Subjects
Included were all consecutive patients in the study periods that presented to the emergency department with an initial INR result of >4.5 on warfarin only.

Interventions
Development and delivery of an educational program in accordance with the current THANZ guidelines was implemented.

Main outcome measures
To improve education regarding the correct management of emergency patients on warfarin with a supratherapeutic INR.

Results
Data on 158 patients with an INR >4.5 were collected. Data on 46 patients were excluded. Management in 31 patients did not follow recommended guidelines. There was no difference detected between groups with 17 compliant with guidelines pre-intervention and 14 post intervention; p=0.87.

Conclusion
Emergency department management of patients on warfarin with supratherapeutic INR's requires continual quality improvement. Frequency of emergency clinician compliance with the current evidence-based guidelines was moderate and did not improve significantly with targeted education. This highlights the complexities of warfarin management and the need for multi-disciplinary engagement of patients presenting with supratherapeutic INRs.

INTRODUCTION

Warfarin, a vitamin K antagonist, is the most commonly prescribed anticoagulant for the prevention of thromboembolic disorders, despite many challenges related with its use in clinical practice. Common indications for warfarin use include atrial fibrillation, prosthetic heart valves and treatment of venous thromboembolisms (Tran et al 2013). Bleeding is the most common adverse effect. Many patient factors increase the risk of bleeding, such as age, prior bleeding history, specific comorbidities, excessive alcohol consumption and reduced renal function (Tran et al 2013).

In clinical practice, warfarin is a challenging medication to manage due to its narrow therapeutic index and potential for many significant medication and nutrient interactions. Decisions regarding warfarin dosing are guided by the International Normalised Ratio (INR) results. Strict surveillance of the INR is essential during warfarin treatment with blood testing undertaken at least every six weeks in patients with controlled therapeutic levels, and tests undertaken several times a week during initial commencement of warfarin therapy or in patients with difficulty maintaining therapeutic levels. These factors often contribute to a high incidence of over and under anticoagulation. Patients on long-term warfarin therapy incur a risk of haemorrhage of 1% to 3% per year, leading to hospitalisation or death (Tran et al 2013).

Numerous international healthcare systems have developed guidelines to improve the safe use of warfarin. Furthermore, other studies have implemented an education program targeting warfarin management in hospitalised patients with a reduction in supratherapeutic INR levels and bleeding events post education (Dharmarajan et al 2011). However, despite this, adverse events to warfarin are common.

Supratherapeutic INRs, especially those exceeding 4.5, are associated with increased risk of haemorrhage. Consensus Guidelines of the Thrombosis and Haemostasis Society of Australia and New Zealand (THANZ) offer advice on strategies to prevent over-anticoagulation, principles for warfarin reversal and provide evidence-based management guidelines (Tran et al 2013). The aim of this study was to evaluate the efficacy of an educational program focused at improving emergency clinician compliance with the THANZ evidence-based guidelines for management of patients that presented to the Emergency Department (ED) with supratherapeutic INR levels.

METHOD

A pre and post-intervention cohort study was conducted. Retrospective data from 1 July 2014 to 30 June 2015 and prospective data from 1 Jan 2016 to 31 Dec 2016 were collected on ED patients currently anticoagulated with warfarin. Data collection included baseline demographics, medical history, INR results, bleeding risk assessment, the presence of active bleeding and administration of fresh frozen plasma, Prothrombinex and vitamin K was also collected. The ED used paper-based patient medication and blood product administration charts. Emergency clinicians used both paper-based and electronic documentation detailing the emergency management care of patients.

SETTING

The study was conducted in a large tertiary care hospital in metropolitan Melbourne, Victoria, Australia with 45 emergency beds, approximately 200 emergency nursing staff, three emergency pharmacists, 31 emergency physicians and over 60,000 adult patient presentations annually.

SUBJECTS

Subjects included all consecutive patients in the study periods that presented to the ED and had an initial INR result of >4.5.

ETHICS

Ethics approval to conduct the study was granted by The Alfred Hospital Research and Ethics Committee (Project no. 513/15).

FUNDING

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

STUDY DESIGN

In the pre-intervention phase, compliance of emergency clinicians with current THANZ guidelines when treating warfarinised patients who presented to the ED with a supratherapeutic INR was assessed by two independent reviewers via retrospective review of medical records. A third reviewer adjudicated disagreements in results obtained.

The intervention implemented for this study was the development and delivery of an educational program in accordance with current THANZ guidelines. Education focused on the management of patients on warfarin therapy presenting to the ED with a supratherapeutic INR with or without bleeding, stipulating the treatment required in accordance with the specific INR result. Educational programs were presented face-to-face to emergency medical and nursing staff through formal and informal sessions from 31 June 2015 to 31 December 2015. THANZ guidelines were emailed to participants and printed on lanyard cards to further consolidate this educational intervention.

In the post-intervention phase, compliance of emergency clinicians with current THANZ guidelines when treating warfarinised patients who presented to the ED with a supratherapeutic INR was assessed by two independent reviewers via retrospective review of medical records, with a final decision by a third reviewer if needed.

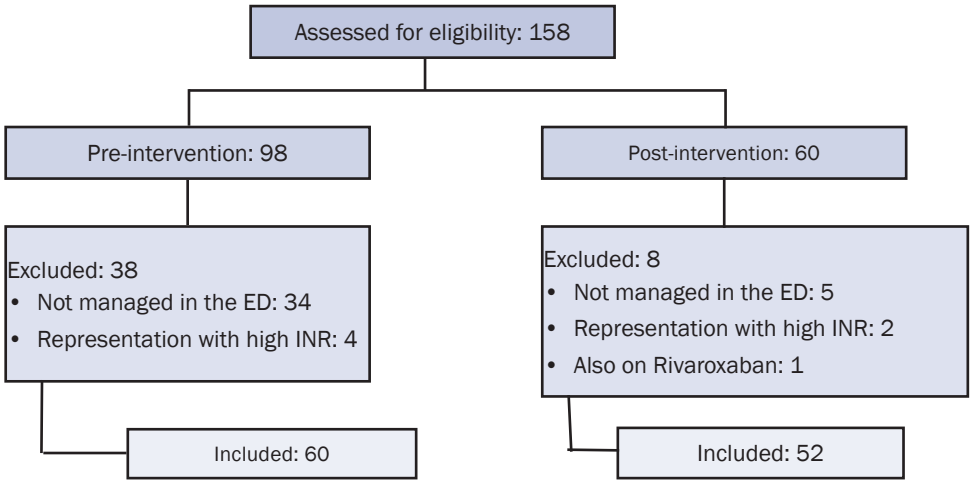
DATA ANALYSIS

We estimated the proportion of patients non-compliant with THANZ guidelines to be 35%. To detect a minimum clinically significant change in the proportion of patients non-compliant with guidelines to 10% with 80% power and 5% level of significance the estimated sample size for the study was 86 with 43 patients in each phase. Continuous data were reported using mean (standard deviation) with statistical significance of differences assessed using Student's t-test. Count data were presented using proportions and statistical significance of differences assessed using the chi-squared test or if number in a cell was <5, Fisher's exact test was used. A p-value of <0.05 was defined to be statistically significant. All analyses were conducted using Stata v 13.0, Statacorp, College Station, Texas.

RESULTS

Data on 158 patients presenting with high INR (>4.5) were collected. Of these, data on 46 patients were excluded. Exclusion criteria and included patients are listed in figure 1.

Figure 1: Inclusion and exclusion criteria



Patient demographics, bleeding status on presentation and bleeding risk are listed in table 1. Patients were older with an average age of 73.2 (15.4) years with no difference between the subgroups. There were more female patients in the post-intervention period (p=0.03). There were no significant differences between the two groups with regards to indication for anticoagulation, degree of bleeding on presentation, and bleeding risk.

Table 1: Patient demographics and clinical features

Demographics and clinical features	Pre-intervention (n=60)	Post-intervention (n=52)	p-value
Age (years)	72.5 (15.0)	74.1 (16.0)	0.58
Male sex	40 (66.7%)	24 (46.1%)	0.03
INR result	6.3 (1.7)	7.1 (3.9)	0.13
Anticoagulation indication:			0.32
- Atrial Fibrillation	34	32	
- Prosthetic Valve	10	10	
- Pulmonary Embolism	5	2	
- Deep Vein Thrombosis	2	1	
- Factor V Leiden deficiency	2	2	
- Unknown	7	5	
Bleeding Category:			0.22
Nil	45	46	
Minor	6	1	
Clinically significant	8	4	
Life threatening	1	1	
Bleeding Risk	13 (21.7%)	10 (19.2%)	0.75

Warfarin was withheld in 108 (96.4%) patients. Vitamin K was given in 42 (37.5%) patients; with a mean dose of 3.8(2.9) mg. Prothombinex was administered to 10 (8.9%) patients and FFP to 4 (3.6%) patients. There were 17 (28.3%) patients non-compliant with guidelines pre-intervention compared to 14 (26.9%) post intervention; p=0.87. Variables for non-compliance are listed in table 2.

Table 2: Nature of non-compliance with guideline

Reason	Pre-intervention (n=17)	Post- intervention (n=14)
Vitamin K given when not indicated	9	8
Vitamin K not given when indicated	1	3
Vitamin K under-dosed	1	0
Vitamin K given in excessive dose	4	1
Fresh Frozen Plasma given when not indicated	0	2
Prothrombinex under dosed	1	0
No reversal of INR with clinically significant bleeding	1	0

DISCUSSION

An educational intervention to emergency medical and nursing staff did not improve adherence to current THANZ guidelines for the management of patients on warfarin with a supratherapeutic INR presenting to the ED. Despite extensive clinician experience with warfarin, management of high INR remains challenging. Reversal guidelines are regularly revised as new research and products become available making it difficult to efficiently remain current. Indeed, previous literature has highlighted the highly variable nature of clinician management (Wilson et al 2001) and poor adherence with guidelines in this area of practice (Atreja et al 2005).

Other results by Roberts and Adams (2006) demonstrated significant improvements in clinician adherence to warfarin reversal guidelines (from 48% to 75%) with the implementation of an 'academic detailing guideline'. However, in comparison to previous reports, this study has demonstrated a relatively high rate of overall compliance with reversal guidelines (approximately 72%). This may be related to a number of factors including the availability of local electronic guidelines on the management of supratherapeutic INRs for clinicians and the presence of clinical pharmacists in the emergency department (Cohen et al 2009).

The most common reason for non-adherence identified in this study was clinician use of vitamin K when it was not indicated in patients with no or a low bleeding risk. The administration of vitamin K when not indicated was perceived as 'benign' practice by clinicians. This study demonstrated great clinician compliance with the management of patients who had sustained significant traumatic injury causing excessive bleeding. However this study also revealed the lack of knowledge around the potential harmful consequences of inappropriate reversal.

Management of anticoagulation in the ED also includes the care of patients using direct oral anticoagulants (DOACs) in preference to warfarin which can be challenging in the event of a traumatic bleed. However, DOACs are used in preference to warfarin due to their favourable harm profile and, significantly lower all-cause mortality. In addition, the risk of stroke and systemic embolic disease, especially haemorrhagic stroke is significantly reduced (Hanley and Kowey 2015). DOACs also have greater compliance rates when compared to warfarin (Keshishian et al 2016) particularly agents that have daily-dosing regimes, such as Rivaroxaban (Laliberte et al 2013).

Despite this, warfarin continues to be a medication seen in ED populations such as the elderly and those with renal impairment who may have contraindications to DOACS and are underrepresented in many DOAC studies (Hanley and Kowey 2015). Continued use of warfarin may also be fuelled by limited data for reversal of DOACs in the setting of life threatening bleeding and an inability to quantify anticoagulant effect, this is life threatening in the trauma patient (Cuker and Siegal 2015). Another limitation to DOAC use may be financial, however, DOACs have been shown to be cost-neutral or even cost-beneficial compared with warfarin in specific patients (Janzic and Kos 2014; Coyle et al 201).

A reduction in ED presentations with high INRs may become increasingly uncommon with the aid of recent advances in INR monitoring including the development of home-based and outpatient monitoring strategies utilising smartphone applications. Previous literature has established that home monitoring of anticoagulation therapy is feasible, accurate and associated with greater time in therapeutic range. However only patients who are able to successfully undertake the education required and have been deemed competent by their practitioner will be able to use home monitoring devices (Hambleton 2003). With this new technology ED management of patients who manage their INR with this technology may demonstrate a reduced incidence of inappropriate reversal, as patients will be well educated on the warfarin dosing requirements for their INR (Hambelton 2003).

Minimal Australian literature is available regarding the role of nurses in the management of anticoagulated patients. Internationally, nurses have been involved in nurse-led anticoagulation monitoring systems, hospital-based nurse practitioner-led anticoagulation services and nurse-led patient testing in general practice surgeries. Nurses often recognise medication related problems and their involvement in the management of warfarin therapy should be broadened (Bajorek et al 2006). Various healthcare systems have also developed nurse and pharmacist led anticoagulation clinics as a strategy for warfarin management. In a study undertaken by Rose et al (2017) the warfarin management of 2,000 patients via anticoagulation clinics over 39 sites was implemented. A standardised approach was used for the training and education of primary healthcare physicians, nurses and pharmacists working in these clinics. The results demonstrated a reduction in patients with critically supratherapeutic INRs and therapeutic INRs improved from 65% to 75%.

Within an emergency-nursing context anticoagulation education should focus on appropriate assessment of anticoagulated patients using scoring systems such as the HAS-BLED and awareness of potentially serious drug interactions with warfarin (Pisters et al 2010) which may lead to early escalation of patients at high risk of bleeding. However nurses need to also advocate for the patient who do not require reversal with vitamin k, as inappropriate reversal can be harmful to these patients. Increasing the involvement of emergency nurses in the assessment, management and care of warfarin patients may improve compliance with the correct emergency management of patients presenting with supratherapeutic INRs.

The growing role of clinical pharmacists within the ED has been associated with improved patient outcomes and decreased medication errors (Tong et al 2016; Patanwala et al 2012). Consequently, the ED pharmacist may also help support clinicians in the management of supratherapeutic INRs. Pharmacist-led warfarin dosing for ambulatory patients in one Australian hospital reduced the mean number of days required to reach therapeutic INR compared to standard care (Dooley et al 2011). Another Australian study demonstrated positive outcomes with 62 pharmacists successfully completing an anticoagulation education program. Future legislation is proposing that Australian pharmacists will play a larger role in the management of patients on warfarin as part of a collaborative model post discharge from hospital (Stafford et al 2010). This expansion of their scope of practice could see a future reduction of ED presentations for supratherapeutic INRs and safer ED management of these patients.

The future of anticoagulation management requires a collaborative approach. Positive clinical outcomes demonstrated in previous studies utilised a collaborative model of care involving physicians, pharmacists and nurses. Further research in this area will involve the increasing use of home testing devices and DOAC's. Pharmacists and nurses will play an integral role with physicians in coordinating the care and education of these anticoagulation strategies. This has the potential to improve the safe ED management of these patients and, reduce the number of emergency presentations involving supratherapeutic INRs. The results of this study confirm the importance of an interdisciplinary approach to the care of patients presenting to the ED

with supratherapeutic INRs. Further studies are required to explore the collaborative model of care and the complications that may arise from incorrect emergency management of supratherapeutic INRs, especially in patients at high risk of deep vein thrombosis (DVT) and stroke.

LIMITATIONS OF STUDY

As a single-centre study, these results are potentially limited in their application to other departments. As a retrospective study with convenience sampling, there is always the potential for selection bias and data extraction errors. The study was conducted in a busy, major metropolitan tertiary hospital. Junior medical staff routinely rotate every three months. It is possible that some of the clinicians in this study were not exposed to all of the intervention strategies. The study may have been more successful if the education session was relaunched in successive quarters. In addition, the development of supportive summary documents such as the indications for warfarin reversal from the THANZ guidelines along with promotional posters may have assisted with improving clinician compliance. Encouraging nursing staff to flag confirmed or potential supratherapeutic INRs to medical staff and engaging pharmacists in the management of these patients would have assisted with the implementation of the correct intervention and may have also improved medical clinician compliance. Education regarding the difficulty with titrating warfarin dosing to achieve safe INR and the adverse outcomes that can occur from over or under anticoagulation, rather then purely focusing on the THANZ guidelines may have also improved compliance in this study. Finally, a prospective study looking at complications and patient outcomes and the incidence of DVT and stroke in patients who were inappropriately reversed would further help illustrate the importance of correct reversal.

CONCLUSION

Emergency Department management of patients on warfarin presenting with a supratherapeutic INR requires continual quality improvement. Frequency of emergency clinician compliance with the current evidence-based guidelines was moderate and did not improve significantly with targeted education. This study also demonstrated great clinician compliance with the management of patients who had sustained significant traumatic injury causing excessive bleeding. However this study also revealed the lack of knowledge around the potential harmful consequences of inappropriate reversal. This highlights the complexities of warfarin management and the need for multidisciplinary engagement of patients presenting with supratherapeutic INRs

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Perceived barriers and enablers to conducting nursing assessments in residential aged care facilities in Victoria, Australia

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KEYWORDS

Assessment, nurses, nursing home, older people

ABSTRACT

Objective
Nurses working in aged care facilities need to be adequately prepared to manage the increasingly complex care needs of older people. This paper reports on the views of nurses on the barriers and enablers to conducting nursing assessments with older people in residential aged care, six weeks after attending a four day education and training workshop on this topic.

Design
Descriptive evaluation.

Setting
Data were collected in a range of venues in which the education was delivered.

Subjects
Registered (RNs) and enrolled (ENs) nurses (n= 345) working in residential aged care facilities in Victoria, Australia.

Findings
Fourteen barriers and eight enablers, which affect the capacity of nurses to conduct assessments with older people, were identified. The most common cited barriers included lack of time (78%), residents' poor state of health (41%) and the absence of equipment (33%). Common enablers were organisational support (38%); staff education and training (29%); having the appropriate equipment (22%); positive staff attitudes (17%) and the resident's condition and cooperation (16%).

Conclusion
Nursing assessments are vital to the delivery of quality and evidence based aged care. The issues identified provide aged care services and managers with a basis for ensuring that nurses have the necessary preparation, training and ongoing support to perform the appropriate and required assessments to provide the best possible care.

INTRODUCTION

Assessment is the foundation of nurses' clinical practice in that it: identifies patient needs; informs care planning, decision making and choice of interventions; and allows the recognition and monitoring of risk (clinical and other) and deterioration of health status. A nursing assessment takes into account the physical, functional, psycho-social and environmental domains of care (Jarvis et aland 2016) and can be undertaken on admission, at a time of deterioration or when there is a health issue or, as part of a daily focused assessment.

It is well recognised that older people are often frail (Clegg et al 2013), have health problems affecting multiple body systems and are at risk of increased morbidity and mortality (Stuck and Iliffe 2011), particularly if they have dementia (Draper et al 2011). This increased medical acuity and complexity of care needs is very evident in the residential aged care sector where common conditions such as dementia (48%), depression (22.5%), arthritis (14.2%), cerebrovascular disease (22.5%), diabetes (6.9%) and pain, falls and urinary incontinence (17%) have a significant impact on care needs (Hillen et aland 2017).

For nurses working in aged care settings this presents many challenges, not least of which is their ability to assess, identify and meet the unique needs of the older person. Both registered nurses (RNs) and enrolled nurses (ENs) have a vital and central role to play in data gathering and the assessment of residents (Nursing and Midwifery Board of Australia 2016a, 2016b). Although some 120 assessment skills are known to be taught to students in nursing curricula (Giddens andand Eddy 2009), the literature reports that nurses in Australia (Birks et al 2013) and the United States of America (Giddens 2007; Secrest et aland 2005) may not use up to a third of the assessment skills taught. Many nurses also remain unclear about the boundaries of their professional responsibility with respect to the use of assessment skills (Birks et al 2014). It is not known, (at least from our review of the literature), whether any of the skills taught in nursing curricula are specific to the assessment of older people, such that nurses learn to differentiate between normal aged related changes and abnormal changes or pathology.

It is clear however that when nurses do not use their skill set to conduct health assessments to the full scope of their practice, this becomes a significant issue. Underutilised skills can not only compromise the identification and management of healthcare needs and the safety of care recipients (Munroe et al 2013), but also result in the erosion of skills (Birks et al 2013; Phillips et al 2006). A meta-analysis of the literature on the factors influencing the decisions of residential aged care nurses to transfer residents to hospital (Laging et al 2015), found that they often do not have the necessary clinical assessment skills, or the confidence to be able to identify early signs of deterioration in residents living in aged care facilities. This impacted on the ability of nurses to care for these residents.

Winbolt (2008) and Lesa and Dixon (2007) noted that large numbers of nurses employed in Australia and New Zealand were trained prior to the introduction of university programs where physical assessment skills, (Birks et al 2013) as a component of health assessment, have been formally taught. The median age of registered nurses and enrolled nurses working in aged care in Australia in 2016 was 47 and 50 years respectively (Mavromaras et al 2017). As a result, a significant number of aged care nurses may not have the assessment skills (Laging et al 2015) or confidence with the use of the medical terminology required to describe assessment process and findings (Phillips et al 2006), or, even recognise their role in the assessment process (Birks et al 2013).

Educating and training aged care nurses can increase their proficiency in undertaking nursing assessments so they can better identify changes in residents' health status and care needs. However, unless nurses are able to implement what they have learnt in their workplace, the benefits of any pedagogical initiatives will be limited.

The necessity for, or perceived value of, nurses' skills is not necessarily related to the incidence or frequency of their use in the clinical arena (Birks et al 2013). Several factors are known to influence whether nurses use their assessment skills and the extent to which they use them. These factors include apparent time constraints and lack of: confidence; role models and; nurses' understanding of the impact of assessments on care delivery (Douglas et al. 2014; Birks et al 2013). We currently know very little about the perceived barriers and enablers to using assessment skills in the Australian residential aged care environment. Our project sought to deliver an education and training program on the health assessment of the older person to enhance the knowledge and skills of nurses working in residential aged care facilities. As part of this educational initiative, we wanted to understand the perceived barriers and enablers to the use of these health assessment skills post-education in the aged care facilities in which the nurses were employed. This paper reports on the perceived barriers and enablers to conducting health assessment as recounted by workshop participants six weeks after they completed the education and training program. The evaluation had ethics committee approval (University FHEC 11/29).

METHOD

The educational program entailed the delivery of 20 workshops to nurses across the state of Victoria, Australia. Each workshop comprised four consecutive days of education and training. A fifth day, six weeks after the completion of each of the workshops, provided an opportunity to collect feedback on nurses' implementation of the assessment skills learned in their workplace. The education and training workshops were advertised to nurses working in residential aged care facilities through local health service networks and offered at no cost to participants. Nurses either self-selected, or were delegated by their managers to attend the education. Workshops took place in a range of health care and non-health care venues and were delivered by an experienced nurse educator.

Weber and Kelley (2007) describe the following four types of assessment: initial comprehensive assessment; ongoing or partial assessment; focused or problem-oriented assessment; and emergency assessment. The workshops taught participants how to conduct assessments with older people so they had at their disposal a full 'tool box' of skills for each of the above contexts as the situation required. The workshop program included the following components:

- Communication and assessment within a person centred and interdisciplinary care framework.
- Clinical reasoning and data collection techniques, organisation of data and the role of assessment in planning care.
- Ethical, legal and professional considerations such as documentation, informed consent and confidentiality.
- Psychosocial assessment including sleep and sexuality.
- Assessment of the integument (skin, hair, nails), abdomen, oral cavity and assessment for dehydration, constipation, malnutrition, urinary tract infection and changes in blood glucose.
- Cardiovascular and respiratory assessment.
- Musculoskeletal assessment and assessment of cognition including mental status, sensation, coordination, reflexes, pain and the senses.

The education and training focused on clinical practice and where relevant, an overview of anatomy and physiology was provided. Normal age related changes were highlighted throughout and examples of how

to document assessment findings were provided. The content was delivered using a variety of paired and group based activities in addition to didactic delivery. Simulation mannequins and other health assessment equipment were provided and participants were given a detailed education resource folder containing the content covered.

Six weeks after the workshops, participants reconvened to provide feedback on any issues related to the implementation and sustainability of assessment practices taught in the workshop in their work place. Participants were asked by one of the researchers to identify and record on 'butchers paper' the factors which they believed impeded (barriers) and aided (enablers) their ability and capacity to conduct health assessments with older people in their aged care facility during the preceding six week period. To encourage participants to honestly share their work place experiences, data pertaining to their role, or employer was not collected. This was completed as an individual activity and each group of participants was then asked to verbally share their responses with the rest of the group for discussion. At the end of each workshop, the researchers collected participants' written responses. These were subsequently collated and subject to content analysis with a low level of abstraction to identify barriers, enablers, and frequency of occurrence across all groups. The research team met to discuss and confirm the identified issues.

FINDINGS

A total of 345 participants attended the four day health assessment workshop program and 315 of these attended the post workshop implementation feedback session on Day 5. The median age of all participants was 50 years, which is close to the average age of nurses working in the residential aged care sector (Mavromaras et al 2017), and 92% of participants were female. Sixty seven percent of participants were RNs and 31% were ENs. Six of the participants (2%) identified as allied health professionals. The majority of workshop participants (61%) had previously not had any formal training in the range of health assessment skills covered in the workshop. More RNs (42%) reported having been taught health assessment prior to the workshop than ENs (31%). The data analysed was grouped into 'barriers' and 'enablers' as follows.

Perceived barriers to conducting health assessments

Ninety two percent of participants listed at least one barrier to conducting health assessments in their workplace (n= 290/315). A total of fourteen barriers were cited (table 1). The most frequently cited barriers were: time (78%); the resident's condition that is, their ill-health, frailty, cognitive impairment and lack of cooperation (41%); and the lack of appropriate equipment (33%). Other reported obstacles were: the negative attitudes of the staff (16%); a shortage of staff trained and educated in health assessment (15%); staffing issues, including staffing levels and skills mix (13%); a lack of support for doing a health assessment from more senior staff and management (9%) and 'heavy' staff workloads (9%). Verbal comments by participants indicated that they were generally more aware of barriers to conducting assessments since completing the workshop and incorporating what they had learned into their clinical roles.

Table 1: Perceived barriers to implementing health assessment

Barrier	% of participants identifying as a barrier	n (multiple responses)
Time	78	225
The resident's condition	41	119
Lack of appropriate equipment	33	96
Negative attitudes of staff	16	46
Staff untrained and uneducated in health assessment	15	44
Staffing levels and skills mix	13	39
Existing workload	9	26
Lack of support from senior staff/management	9	25
Lack of experience and confidence	7	20
A lack of assessment tools and documentation systems	5	15
Lack of opportunity	4	13
Lack of funding	3	8
General Medical Practitioner	2	6
Resident's family	1	3

Perceived enablers to conducting health assessments

Only 30% of participants identified enablers to conducting health assessments (n= 93/315). Eight enablers to conducting health assessment were identified (table 2). The most frequently cited enablers to the implementation of health assessment were: managerial support (38%); having a knowledgeable, educated and skilled workforce (29%); having the right equipment (22%); positive attitudes of the staff (17%) and the resident's condition and degree of co-operation (16%).

Table 2: Perceived enablers to the implementation of comprehensive health assessment

Enablers	% of participants identifying as an enabler	n (multiple responses)
Support from management	38	35
Staff educated, skilled, knowledgeable in health assessment	29	27
Equipment	22	20
Positive staff attitudes	17	16
Resident's cooperation and condition	16	15
Confidence	13	12
Resourcing	10	9
Time	6	6

DISCUSSION

Aged care nurses need to be adequately prepared to meet the complex care needs of older people, many of whom are increasingly frail and at risk of adverse outcomes including, delirium, falls and disability (Clegg et al 2013). The health assessment of the older person workshops provided the knowledge and set of skills for aged care nurses to apply in their workplaces to meet the care needs of older people. While all participants

saw assessment as a core component of their role and as essential in gathering data to inform care planning and referral to other disciplines, they highlighted far more barriers than enablers to implementation in practice. This suggests that there is considerable scope for increasing the opportunity and actual practice of nursing assessment in residential aged care. Although support and commitment to the use of assessment skills was widely expressed, there are a number of challenges which need to be addressed in order for assessments to become more embedded in the everyday practice of nurses working in aged care.

The biggest obstacle to conducting health assessments as perceived by aged care nurses is the lack of time within the current work practices of residential aged care services. Lack of time for the delivery of optimal care is a frequently reported nursing issue which has been noted to be a major constraint to the conduct of health assessments by nurses for well over a decade (Douglas et al 2014; Giddens 2007). Because workloads, staffing levels and skills mix patterns were not explored in our study, it is unclear how, or whether, these might be implicated in time being reported as a barrier. Further work around restructuring and modifying some of these factors and how these could better facilitate the incorporation of more comprehensive assessments into the clinical role may be warranted.

Many participants perceived an older person's physical and mental condition as a barrier to performing an assessment even though frailty, ill-health and dementia are the primary reasons for admission into residential aged care (Australian Institute of Health and Welfare (AIHW) 2014) and a further deterioration in health over time (potentiating the need for further assessments) is likely. The identification of time and a resident's health status as factors which determine whether an assessment is carried out, does suggest that conflicting activities may be challenging nurses to adequately meet the care needs of residents who have a cognitive impairment, communication problems and/or a limited ability to participate (or cooperate) with care. The literature does indicate that aged care nursing and caring for people with dementia places high demands on nurses' emotional well-being and professional role (Chenoweth et al 2010), which may go some way to explain the time pressures which nurses have noted. This further underscores the importance of both organisational and managerial support for nurses.

It also highlights the importance of experience and confidence in conducting health assessments as raised by a number of workshop participants and reinforces the view of Carusone et al (2006) and Laging et al (2015), that nurses often do not have sufficient confidence in their own clinical skills and judgement. Laging et al have noted that although nurses may have a high level of clinical competence, their lack of confidence in their own clinical decisions impairs the quality and detail of information that is conveyed to medical practitioners. Developing sound assessment skills is critical for nurses so they are able to recognise and report the early deterioration of residents, particularly those who have more 'complex' needs.

The attitudes of facility staff towards carrying out assessments, adequate education and training in assessment techniques, the availability of appropriate equipment and the support of supervisors and the organisation, were all identified as both barriers and enablers to performing assessments in residential aged care. Peer and organisational support have long been noted to be crucial elements of nurses' job satisfaction (Lua et al 2012). Interestingly, the lack of support from colleagues, senior staff and employer was identified as a barrier to the use of assessment skills by 18% of Australian nurses in a survey of health/care services over 25 years ago (Reaby 1990). More recent literature still points to an absence of visible role models for the conduct of health assessment in most areas of nursing (Zambas 2010).

Assessments cannot be comprehensive or thorough without the availability of appropriate equipment, such as quality stethoscopes, otoscopes and pulse oximeters. Workshop discussions indicated that not all residential aged care facilities had the appropriate equipment, or facilities had the equipment, but staff were unable

to easily access it. These items while essential are however also relatively inexpensive and an investment in the provision of quality care.

Given the median age of workshop participants was fifty years, it is not unexpected that the majority of participants had not received any previous formal training in the full range of assessment skills in their nursing education. In particular examination techniques such as auscultation, palpation and percussion and the use of equipment such as stethoscopes and otoscopes had not been taught. This gap in education and training highlights the need to cultivate a milieu in aged care which promotes and reinforces the widespread use of assessment skills and the importance of enabling nurses to confidently initiate and perform assessments on residents. This is even more imperative in view of the fact that nurses have been reported to use only a subset of their skills in clinical practice (Birks et al 2013); a conclusion which is supported by the findings of this project.

Taking into consideration a person's bio-psycho-social and spiritual needs is the hallmark of holistic care. When assessments are not comprehensive care delivery can become fragmented and suboptimal (West 2006). As Lesa and Dixon (2007) have also noted, when nurses lack the capacity to conduct assessments there is more likely to be a reliance on medical practitioners. In the context of residential aged care facilities this can be problematic as most aged care facilities are reliant on general practitioners (GPs) who are usually working in private practice and therefore are not always immediately available on-site to assess residents (Shanley et al 2011). Timely assessment is important as early detection of condition changes is important to prevent deterioration (Ellis 2011) and potentially allay admission to hospital. It is increasingly important therefore, that nurses working in this setting are confident and competent to carry out timely assessments on residents who are suspected of being unwell.

Laging et al (2015) found that the ability of staff to appropriately assess residents was reduced by onerous workloads and a limited skill base. Delays in assessment were linked to a delayed recognition of deterioration and an increased likelihood of subsequent transfer to hospital. Greater use of assessment skills, documenting findings and developing care plans based on this information, could further develop nurses' confidence performing an assessment with residents.

All Australian residential aged care facilities are co-funded by the Australian Government and resident contributions. The amount of Government funding each resident attracts is based on a care needs assessment conducted on admission and thereafter annually, or if there is a substantial change in the level of care required. This care needs assessment is guided by the Aged Care Funding Instrument (ACFI) which involves assessment of functional domains such as nutrition, mobility, continence, vision and hearing as well as psychosocial and emotional needs. The instrument also includes reporting of specialist nursing needs such as complex wound care and palliative care. The ACFI is designed to identify functional deficits and care needs and as such does not always prompt a corresponding physical assessment. For example a hearing deficit may be identified, but there is no ACFI prompt to conduct a physical examination of the ears. There is therefore a risk that the requirement to complete ACFI assessments may drive the level of assessment, rather than a comprehensive health assessment being conducted which will in turn inform the ACFI.

Although the ACFI was not cited by participants as a barrier to health assessment, it was raised by workshop participants in general discussion as they were concerned that conducting assessments would duplicate work undertaken order to complete the ACFI. Interestingly some participants were under the impression that completion of the ACFI constituted a comprehensive health assessment. Discussion regarding the definition of a comprehensive health assessment and the knowledge gained through the workshop demonstrated to participants that a comprehensive assessment provides more in-depth information and that the information

required by ACFI can easily be extracted from the findings of a comprehensive health assessment. We would suggest that residential aged care services review their current work practices to explore whether, or how any existing assessments could replace or complement other existing assessments rather than add to them, especially with respect to the completion of the ACFI.

CONCLUSION

This paper reports on the factors which nurses perceive to enable and/or impede the conduct of assessments in residential aged care facilities. Multiple issues which impact on the full use of the assessment skills of nurses from aged care facilities were identified and these raise a number of issues about the preparedness and capacity of nurses to provide appropriate care to older people. Nurses in aged care are increasingly required to care for older people with complex health and care needs. The increased responsibility which this increasing acuity demands, has made the use of assessment skills by nurses even more vital. Nurses need to have adequate assessment skills and be able to implement these skills to recognise residents' health problems sooner and possibly avoid admission to hospital. Comprehensive assessments also improve the quality and meaningfulness of information being communicated to medical practitioners and other health professionals (Baid et al 2009; Odell et aland 2009). The most important enabler to leverage and drive such practice change is organisational and managerial support. The issues raised by this project are arguably relevant to all residential aged care service providers and where on-site medical care is more reliant on visiting medical practitioners.

STRENGTHS AND LIMITATIONS

The views reported on in this paper are unique to the 315 registered and enrolled nurses who had completed the nursing assessment of the older person education/training program. As such it cannot be said that their views represent those of other nurses who carry out health assessments in residential aged care facilities. We believe the reporting to have been honest and the consistency of views shared by participants give the reported findings credibility. We are also aware that while many of the barriers and enablers may seem obvious to anyone; we have been able to provide evidence by asking a sizeable sample of nurses for their perceptions.

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Exploring the experiences of internationally and locally qualified nurses working in a culturally diverse environment

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KEY WORDS
Internationally qualified nurses, diversity management, workforce

ABSTRACT

Objective
This article explores the support needs, attitudes and experiences of both internationally and locally qualified nurses working within a culturally diverse environment.

Design
Open and closed survey questions.

Setting
Hospital in Sydney, Australia.

Subjects
108 nurses were surveyed, representing 14% of the nursing staff at the hospital.

Main outcome measure(s)
The research project measured the experiences encountered by internationally qualified nurses (IQNs) in relation to language use, discrimination, culture and differing health systems. It provided a forum to discuss how their cultural background, professional background and linguistic skills affect interactions with patients and other staff. It also explored suggestions for improvement in cross-cultural relations between staff, and support for IQNs and their peers in a diverse staff environment.

Results
Although IQNs feel they are adjusting well to their role, locally qualified nurses largely disagree. Staff were aware of discrimination from patients towards staff, and from other staff towards staff. The research revealed that IQNs are unsure when to use their language skills, have different approaches to nursing and expectations of the staff-patient/family relationship.

Conclusion
Adjustment to the Australian healthcare system for IQNs is challenging. There are a number of strategies that can support both IQNs in their integration, as well as all nurses to work more effectively together in a cross-cultural work environment.

INTRODUCTION

Hospitals are culturally diverse environments due to the cultural diversity of the Australian population and the recruitment of internationally qualified health professionals. The proportion of the population born overseas has increased from 2011 to 2016 in Australia from 25% to 26% (ABS 2016a), and in New South Wales (NSW) from 26% to 28% (ABS 2016b). Internationally Qualified Nurses (IQNs) are routinely recruited from overseas to assist with shortages in Australian hospitals (Health Workforce Australia 2012). As a result, the percentage of overseas born nurses has increased in Australia from 25% in 2001 to 33% in 2011 (ABS 2013). In 2016, the percentage rose to 38% (Australian Government 2016). 'Overseas born' is defined as those who have gained qualifications overseas and then migrated as well as those who have migrated then gained qualifications in Australia. The countries of origin of the nurses have also changed, with an increase in those from non-English speaking countries (NESC) (ibid; Ohr et al 2010).

Australian and NSW multicultural policies acknowledge the importance of language and intercultural skills of culturally diverse staff in working with clients from culturally and linguistically diverse (CALD) backgrounds (NSW Health 2017; Multicultural NSW 2016; NHMRC 2005). Nursing literature also highlights the importance of these skills (Jeon and Chenoweth 2007; Gerrish and Griffith 2004; Omeri and Atkins 2002; Dreachslin et al 2000). Studies demonstrate that expanding the cultural diversity of health professionals increases effective communication, satisfaction and access to culturally competent health care for patients from CALD backgrounds (Institute of Medicine 2004; Stevens et al 2003; Hawthorne et al 2000; Snowden et al 1995).

While IQNs bring valuable skills to their role, they also face challenges due to language issues, differing approaches towards patient care, unfamiliarity with the health system and culture shock (Ohr et al 2017; Brunero 2009; NSW Government 2008; Konno 2006; Smith et al 2006; Eisenbruch 2001; Wallace et al 1996). Research has also highlighted areas of perceived discrimination for IQNs and nurses from CALD backgrounds (Trenerry et al 2010; Omeri 2006; Blackford and Street 2002). In response to this, resources and programs have been developed to assist overseas trained staff in their transition (NSW Department of Health 2010; Brunero 2009; NSW Government 2008) and some have been evaluated (Chun Tie et al 2018; Ohr et al 2017).

Diversity management involves instilling an organisational culture where diversity is positively acknowledged and valued (Prasad and Mills 1997). In order to instil this culture, structural support is needed beyond just fulfilling Equal Employment Opportunity principles (Chun Tie et al 2018; Hudelson 2004; Bloor 1999). Managing diversity is defined as "planning and implementing organisational systems and practices to manage people so that the potential advantages of diversity are maximised while its potential disadvantages are minimised" (Cox 1993, p11). This literature discusses the organisational benefits when staff have the skills to work with staff and clients from CALD backgrounds (Weech-Maldonado et al 2002). Despite the benefits, there has been limited research and program development on diversity management in the United States of America (USA) and Australia (Klinken Whelan et al 2008; Dreachslin et al 2004; Weech-Maldonado et al 2002).

At a hospital in Sydney, the Diversity Health Coordinator (DHC) received feedback from the nursing department and culturally diverse staff that there was a need to assess whether internationally qualified and CALD nurses felt sufficiently supported. The DHC then conducted key informant discussions with nursing managers and IQNs to assess the situation. This raised a number of support issues for internationally qualified and locally qualified nurses, as well as for the organisation. Nursing managers were often unprepared upon IQN arrival, and IQNs themselves lacked information about their placement. While other hospitals in the area had been employing IQNs for some time including those from NESCs, at this hospital more IQNs were coming from NESCs than previously and it was not fully prepared for their needs.

Nursing managers were also concerned about the quality of the bridging courses for IQNs. There were also reports of different caring practices such as some nurses expecting to provide more clinical rather than personal care, as this was usually managed by family in their home country. Anecdotal reports were also provided about some nurses expressing different cultural views about death and dying such as letting elderly patients die with dignity rather than prolonging their lives artificially. There were also instances where the hierarchical social class structure in the home country, such as the caste system between nurses originally from India, was impacting on the allocation of nursing tasks. There were also concerns about the exclusion of other staff members when bilingual staff used their home language with peers during communal breaks.

These concerns highlighted the need to initiate a research project to explore the experiences of all nurses working within an increasingly diverse environment. While previous international research has examined the experiences of IQNs (Omeri 2006; Blackford and Street 2002), this research examined the views of *both* internationally qualified and locally qualified nurses as these often conflicting workplace practices appeared to be impacting on both groups. It was anticipated that gaining a full understanding of each perspective would inform recommendations that would benefit all nurses. In particular, it aimed to: explore IQNs experiences in terms of language use, culture and differing health system experiences; explore how all staff experience the diverse staff environment; provide a forum for staff to provide feedback on IQN orientation; explore suggestions for improvement in cross-cultural relations; and recommend support for IQNs and their peers.

METHODS

In 2012, a steering committee was established to guide the objectives of the project. The committee consisted of representatives from Diversity Health, Education & Training, Human Resources, Employee Assistance Program, Nursing and Multicultural Health Service. After attempts to conduct focus groups with nurses were unsuccessful, an anonymous semi-structured survey entitled "Working in a Culturally Diverse Staff Environment" was developed based on the aims of the project and distributed to all nursing staff in March 2014. Ethics approval was also gained from the local health service ethics committee. With the support of the nurse unit managers, 602 survey packages were delivered to various hospital wards.

FINDINGS

Of the 602 surveys distributed, 108 surveys were returned indicating a response rate of 18% (14% of the nursing pool of 786). The surveys were then analysed to reveal trends. Although the survey consisted of quantitative and qualitative items, the information was mainly analysed in a qualitative way according to patterns in the research (Liamputtong Rice and Ezzy 1999) due to small numbers in some respondent groups.

Clear trends emerged in the data that allowed for division of the respondents into two distinct groups: English speaking background (ESB) respondents and non-English speaking background (NESB) respondents. The ESB group consisted of i) Australian born nurses and ii) nurses born overseas in English speaking countries (ESC) who were qualified in Australia or in other ESCs. The NESB group consisted of nurses who were i) born in a NESC and Australian qualified, ii) born and qualified in a NESC and iii) an unidentified group that did not indicate where they were born or qualified. The unidentified group showed the same trends as the NESB groups therefore it was integrated into this group. Thus, the ESB group consisted of 79 respondents (73%) and the NESB group of 29 respondents (27%) (see figure 1).

The survey responses were analysed and grouped into categories according to patterns in the research. Themes included acceptance, level of discrimination, use of second language, approaches to caring and social adjustment.

Figure 1: Groups and subgroups of respondents

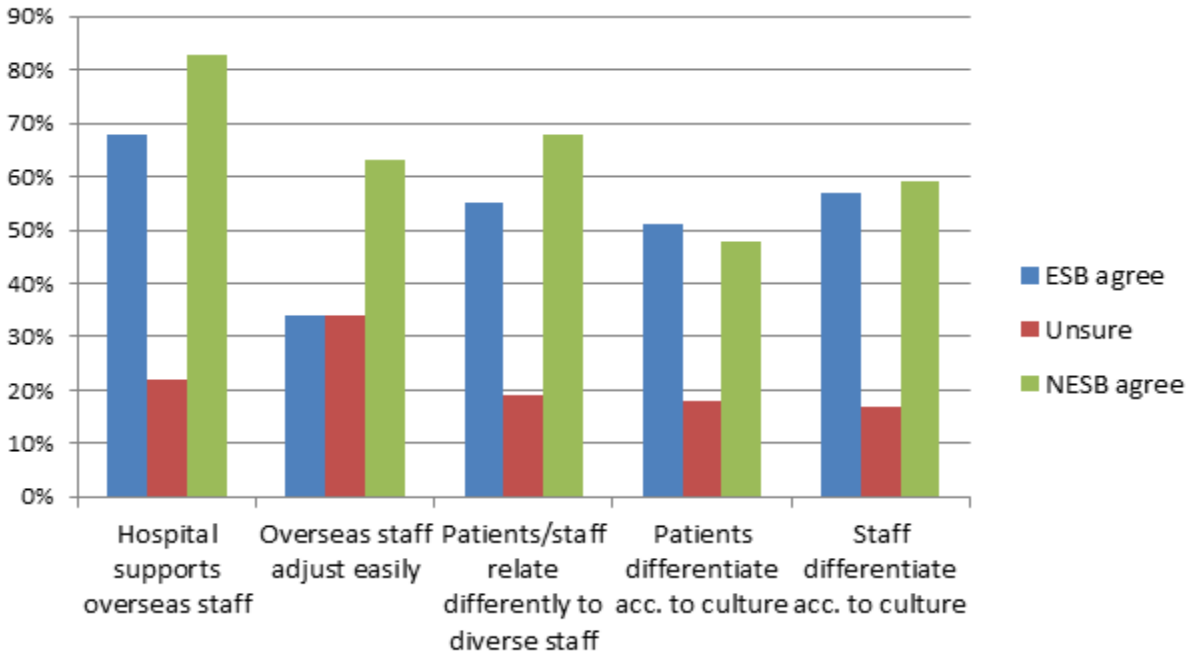
Groups	Subgroups	Respondents
ESB respondents (73%)	Australian born nurses	63%
	Nurses born overseas in an ESC and qualified in Australia or overseas in ESC	10%
NESB respondents (27%)	Nurses born in NESC and Australian qualified	13%
	Nurses born and qualified in NESC	11%
	Unidentified nurses	3%

Acceptance of culturally diverse staff

Most staff reported the workplace was supportive of IQNs. Of all the staff, it was the NESB staff that felt the hospital was the most supportive. NESB staff also felt they adjusted more easily to the workplace than their ESB colleagues felt they did.

Staff were also asked whether staff and patients relate differently to culturally diverse staff. The majority of respondents agreed that staff and patients do relate differently, with NESB nurses more likely to report this than ESB staff. Slightly more ESB staff reported *patients* related differently to the cultural background of staff, and more NESB reported *staff* related differently to the cultural background of staff. The trend of relating differently was observed more for staff than patients. Figure 2 outlines this data.

Figure 2: Agreement with statements regarding acceptance of culturally diverse staff

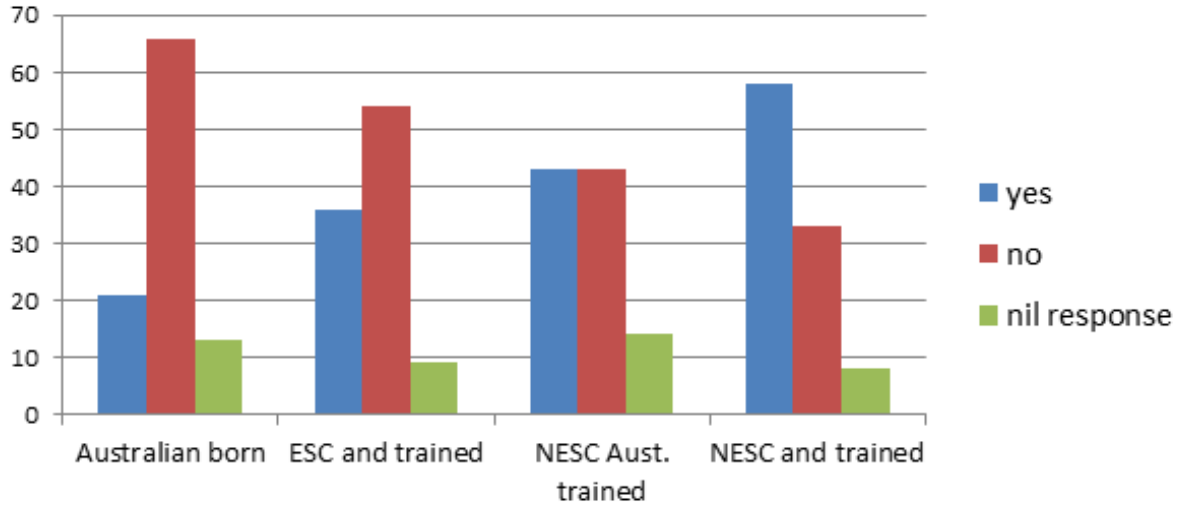


Level of discrimination

Overall, 30% of all respondents felt there was discrimination in relation to the cultural background of staff. Perceptions of discrimination differed with only 23% of ESB staff agreeing there was discrimination compared to 50% of NESB staff. Figure 3 outlines subgroup perceptions about discrimination.

Reponses were similar across both NESB and ESB groups with regard to the most common areas of discrimination, which included 'being left out of discussions' followed by 'workload allocation', 'being given responsibility' and 'opportunities for career development'.

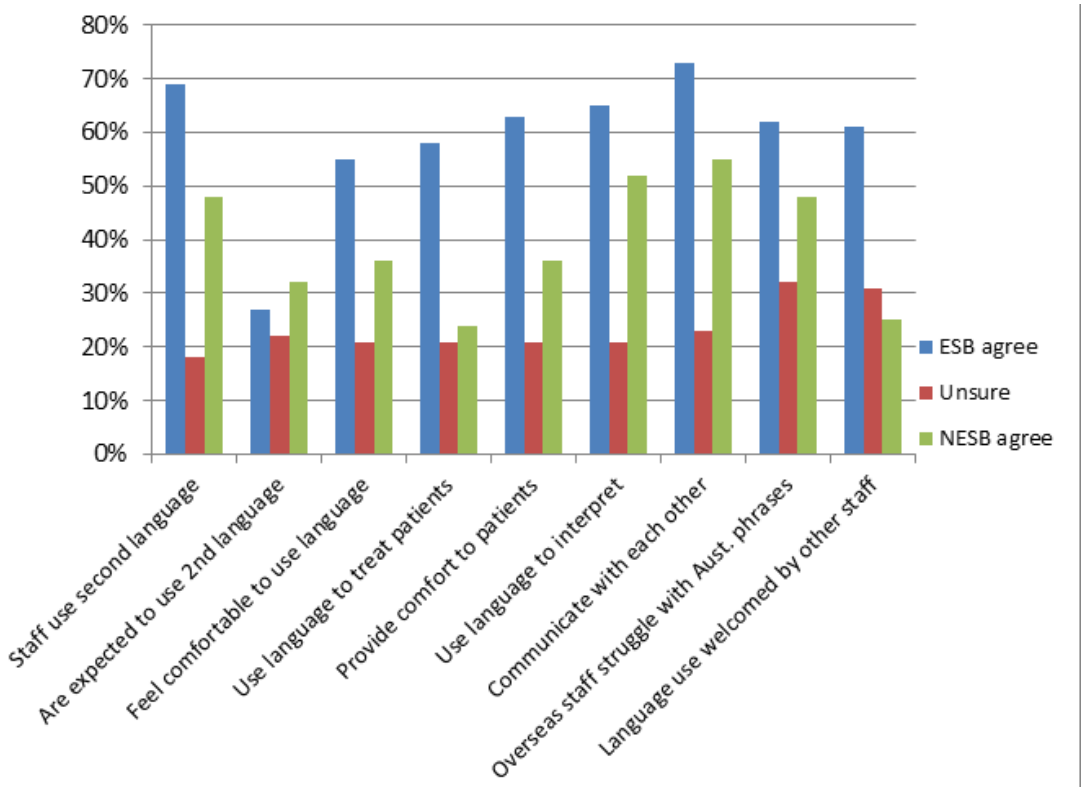
Figure 3: Agreement discrimination exists according to staff cultural background



Use of second language in the workplace

Perceptions of how language is used in the workplace, and when it is appropriate to use it, varied across groups. A number of questions in the survey were used to better understand the use of a second language both amongst staff and with patients. Figure 4 sets out the different perceptions of how languages were used.

Figure 4: Agreement with statements regarding use of second language in workplace



NESB staff were half as likely as ESB staff to report that a second language was welcomed by patients. In fact, a number of NESC born and qualified staff strongly disagreed that patients and families welcomed a second language. NESB staff reported that they struggled much less with Australian phrases and sayings than ESB staff believed they did.

The majority of NESB and ESB groups agreed that bilingual staff were not expected to use their language. ESB staff believed bilingual staff used, and were comfortable to use, their second language at work more than NESB staff. In fact, many NESB staff reported feeling uncomfortable using their second language.

There were also differences in the perceptions of when bilingual staff used their second language. While ESB staff mostly reported it occurred to treat and provide comfort to patients, most NESB staff disagreed. ESB staff mostly agreed that bilingual staff use their language to communicate with each other, while NESB staff were divided. Both ESB and NESB groups mostly agreed that bilingual staff use their second language to interpret for other staff, despite less than 20% of all staff agreeing that this was appropriate.

Comments provided about when staff thought it was appropriate to use another language indicated a degree of confusion. There were also differing opinions about the desirability of using a second language in the workplace. ESB staff felt that the most appropriate use of a second language was in patient focused situations, while NESB staff felt it was on break time and to communicate with other staff. Interestingly ESB staff felt this was the most inappropriate use of a second language. The most common inappropriate use of language reported by NESB staff was in the workplace, including the ward and nurses' station. Both groups recognised that it was inappropriate to use a second language in front of non-bilingual staff.

Approaches to caring

ESB staff were evenly divided in their opinion of whether or not nursing practices differ between Australian and IQNs. NESB staff however, were less likely to identify differences. Australian born staff and those who were ESC born and trained identified a number of areas in which those differences occurred. The areas of most difference identified by Australian born staff were 'personal care of patients', 'relationships between staff and their patients/families', and 'expectations of how patients/families should behave'. NESC born and trained staff identified fewer areas of care where there were differences. In contrast to ESB staff, no NESC born and qualified staff identified differences in personal care and relationships between staff and their patients/families. This indicates a significant disparity between the observations of the two groups. The area identified most by NESB staff was 'expectations of how patients/families and their visitors should behave'. No NESB staff identified that there were differences in approaches to care in the areas of mental health, end of life or medication and pain management. Interestingly NESB Australian trained staff had similar perceptions as Australian born staff in all areas except with regard to end of life care, where they were more likely to identify different approaches to care.

Social adjustment and support

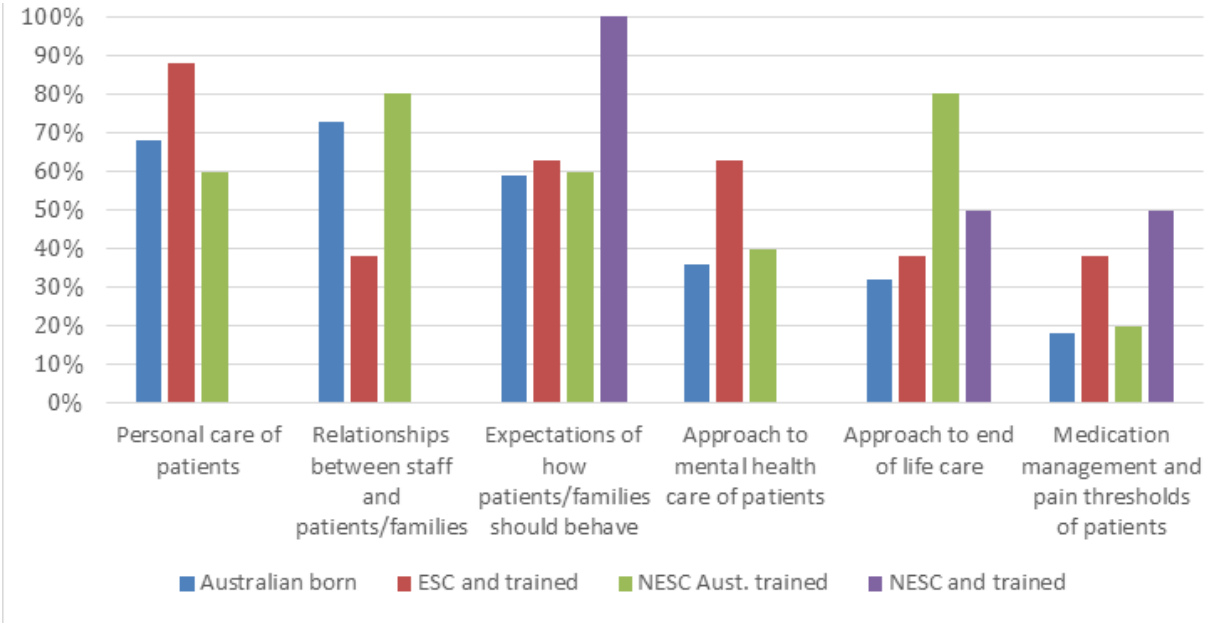
Respondents were asked to comment on the adjustment of IQNs to working in the Australian health care system and what support could be provided. The issues identified by ESB staff included adjustment to nursing roles in Australia, their expectations and understanding of practices, acknowledgement of difficulty, social hierarchy back home impacting on work behaviour and the need for support and supervision. Assistance identified by NESB staff included support from management and nurse educators, more orientation to the Australian nursing system, guidance on acceptable behaviour, and allowing time to adjust.

There were similar suggestions from all respondents to support newly arrived IQNs including how to understand Australian cultural norms, colloquialisms and the healthcare system. ESB staff were more likely to identify

'understanding Australian medical terminology and jargon' as an issue than NESB staff. This may indicate that NESB staff are not aware of the gaps that exist in this area.

The most common recommendations across both groups to what would assist *all* staff working in a culturally diverse environment were 'mentoring/buddy system', 'team building activities', and 'workshops for all staff on working cross-culturally in the workplace'.

Figure 5: Areas in which different approaches to care were identified



DISCUSSION

The findings raised issues in relation to cross-cultural staff relations, communication skills, use of a second language, different ways of caring and social adjustment and induction.

Cross-cultural staff relations

Overall staff were supportive of IQNs, with more NESB than ESB staff feeling the hospital was supportive and that IQNs adjusted easily. The results indicated that the cultural background of staff does impact on staff relations and those with patients. Differences mainly felt by NESB staff indicated that they are quite aware that some staff are treated more positively than others.

Discrimination was perceived by all groups and more so for NESB. Overall, 30% of all respondents felt there was discrimination in relation to the cultural background of staff from both staff and patients. This rate was higher than the NSW Health 2015 survey which indicated 15% of staff have experienced discrimination by a patient, colleague or manager (NSW Government 2015).

Research has also highlighted areas of perceived discrimination for nurses from CALD backgrounds (Trenerry et al 2010; Blackford and Street 2002). Studies in Australia (Omeri 2006; Hawthorne 2001), the United Kingdom (Smith et al 2006; Gerrish and Griffith 2004; Allen and Larsen 2003; Ward 1993), Canada (Turrittin et al 2002) and the USA (Dreaschlin 2000) indicate that IQNs have perceived discrimination from other staff as well as patients. This may be under reported as staff may be reluctant to discuss this with their superiors as they are afraid of negative repercussions to their employment (Jenkins and Huntington 2015) and may not fully understand their rights.

The areas of perceived discrimination mainly concerned opportunities for promotion, responsibility and work load. This is consistent with other research conducted with IQNs (Jenkins and Huntington 2015; Tregunno et al 2009; Kingma 2008; Larsen 2007; Alexis et al 2006; Culley and Mayor 2001). Deegan and Simkin (2010) discuss IQNs feeling they lack autonomy and support by other nurses on the basis of their ethnicity or background. However, senior staff were reluctant to advance IQNs due to a lack of familiarity, awareness of certain clinical tasks and concerns about safety. Other research indicates that management may be hesitant to promote IQNs as they are not permanent staff (Gerrish and Griffith 2004). This highlights the need for proper training, support and supervision in clinical nursing areas in which they are unfamiliar.

The psychological impact of discrimination on IQNs as effecting the quality of patient care has also been discussed in the literature (Deegan and Simkin 2010; Kingma 2008; Xu and Kim 2008; Omeri 2006;). This highlights the need for NESB staff and local staff to debrief, receive support and for cross-cultural relations to be enhanced (Deegan and Simkin 2010). All categories of staff in this research indicated that cross-cultural workshops and team building activities would be helpful. This approach has also been supported in the diversity management literature (Alexis et al 2007; Whelan et al 2005; Weech-Maldonado et al 2002; Dreachlin 1999) and nursing research (Chun Tie et al 2018; Ohr et al 2017; Brunero 2009). Other noted activities include conducting staff surveys to measure discrimination (NSW Health 2009; NSW Government 2008; Dreachslin 1999) and compare this by cultural background (Weech-Maldonado et al 2002). Staff should also be informed about anti-bullying policies and procedures (Nursing and Midwifery Board 2015), and those in leadership roles trained in how to identify and manage discrimination appropriately.

Use of second language

Perceptions varied across groups of when and how to use a language other than English (LOTE), reflecting a lack of clarity in the NSW Health policy (NSW Health 2017). Policies indicate staff can use a LOTE in direct patient care but they do not specify what level of proficiency is needed or in what situations.

Our research indicated that NESB staff did not feel comfortable using their first language in the workplace. They reported they used it much less frequently than ESB staff thought they did. NESB staff were also half as likely as ESB staff to report that their native language was welcomed by patients. The fact that few bilingual respondents spoke a LOTE that is commonly present in the patient population may have been a factor in these responses.

ESB staff felt it was inappropriate for NESB staff to communicate in their shared language with other NESB staff. NESB staff however thought this was appropriate, indicating a need to explore and clarify this issue further with staff. Policy for IQNs states “If you speak a language other than English you may find you can use this skill in the course of your work” but does not clarify in which contexts (NSW Health 2010, p19). Approaches to this issue have generally included the need to respect the Code of Conduct and respect fellow workers (Nursing and Midwifery Board of Australia 2018).

The findings also indicate NESB staff often interpreted for other staff, despite this being contrary to policy (NSW Health 2017). This demonstrates the need for more clarity and discussion of bilingual staff use of a LOTE in the workplace, and when a professional interpreter should be used.

Communication Skills

NESB staff were less likely to report difficulty with Australian phrases and sayings than ESB staff. Most NESC born and trained staff who disagreed that they struggle with English language have lived in Australia for less than 10 years which may contribute to their inability to recognise difficulties. Likewise, NESB staff were less likely to identify ’understanding Australian medical terminology and jargon’ as areas of support. These findings indicate that language support, particularly during the early period of settlement and adjustment, is

crucial. Various research and reports have highlighted the need to assist IQNs with communication skills in the area of colloquialisms, abbreviations, terminology and idiom to improve patient safety (Chun Tie et al 2018; O'Callaghan 2015; Deegan and Simkin 2010; NSW Department of Health 2010; Takeno 2010; Brunero et al 2008; Francis et al 2008; Jeon and Chenoweth 2007; Konno 2006; Weech-Maldonado et al 2002). "Nursing English" classes have also been recommended for IQNs across NSW which focus on pronunciation, intonation and functional language as well as face-to-face workshops to discuss cultural and language differences (Brunero 2009). While IQNs must pass strict English language requirements (Nursing and Midwifery Board of Australia 2015; Hawthorne 2012), they may still need assistance practicing these language skills in the fast-paced hospital environment.

Different approaches to caring

ESB staff reported differences in approaches to caring more than NESB staff, including 'personal care of patients' and 'relationships between staff and their patients/families'. In contrast no NESC born and trained staff identified differences in either of these two areas. This demonstrates that IQNs lack information about the different ways that nursing is provided in Australia and are not aware of the differences.

Other research has discussed different approaches to care for IQNs. For instance, Gerrish and Griffith (2004) discusses the difficulty that IQNs face due to different practices, and the time it takes to ensure practices are safe. In some countries nurses have more responsibility in giving injections and may not provide personal care (Francis et al 2008; Konno 2006).

The need for better orientation and induction into different care arrangements has been noted in research and reports (Chun Tie et al 2018; O'Callaghan 2015; Brunero 2009) and is an area that needs to be addressed nationally and institutionally (Brunero 2009; Eisenbruch 2001). Better understandings of care arrangements and standards would promote patient safety and may address areas of discrimination.

Social adjustment and induction

The findings indicated ESB staff perceive there are more difficulties and need of support for IQNs than NESB staff. Issues related to the impact of social standing overseas have been discussed in research conducted in rural Australia (Francis et al 2008) and were reported in our study. Staff coming from more hierarchical structures overseas may also be more fearful of authority in Australia (Chun Tie et al 2018; Gerrish and Griffith 2004). This highlights the need to explain more collaborative forms of communication in Australian health care systems between managers, staff and patients (Chun Tie et al 2018; O'Callaghan 2015).

While some literature has recommended a mentoring system to assist IQNs (Weech-Maldonado et al 2002), research has demonstrated that social support needs to occur in a sensitive way so that mentors are appropriately trained to support specific needs (Allan 2010; Brunero 2009; Konno 2006). The mentor would assist the IQNs to adjust as well as to assist other locally qualified staff understand their needs (Western Australia Government 2006; NSW Nurses and Midwives Association 2012).

The managing diversity nursing literature promotes an organisational culture where staff see diversity as a positive (Dreachslin et al 2004; Cope and Kalantzis 1997), and systems and services are in place to enable better induction for IQNs (Chun Tie et al 2018; Brunero 2008). Our research revealed NESB staff could be better supported and welcomed by staff. Other research has discussed how staff from diverse backgrounds bring a range of different experiences and skills, however locally trained staff did not find this knowledge useful (O'Callaghan 2015; Blackford and Street 2002). Resolving this situation would involve promoting diversity in the organisation (Weech-Maldonado et al 2002), ensuring adjustment and induction procedures for IQNs are in place and thereby create a supportive environment for all staff.

LIMITATIONS

Findings and recommendations presented here are based on survey results of voluntary participants from one hospital. This study used a relatively small sample size from the overall number of nursing staff. For these reasons, it is difficult to generalise findings as applicable to all nursing staff in hospitals. The survey design also meant that views could not be checked or explored in more detail. The original intention was to conduct focus groups with nurses so as to holistically understand the experience and the range of factors affecting their experience. While there was initial interest from IQNs to participate, this was not the case later on so an anonymous survey was designed. Recommendations may assist other health settings as well as further research on successful models of induction.

RECOMMENDATIONS

Based on the findings, the following recommendations are presented:

- Develop a webpage for IQNs to access prior to arrival which provides information about the hospitals, their location and Australian approaches to nursing care.
- Strengthen the peer mentor program to provide extra support to IQNs.
- Extend the orientation phase over a three-month period for IQNs.
- Implement an acculturation course for IQNs within three months of their commencement that explains Australian norms, nursing in Australia and communication issues.
- Deliver seminars for all nurses to promote awareness of differing models of nursing overseas.
- All staff to undertake cross cultural training and include guidelines on bilingual staff use of their LOTE.
- Promote awareness of anti-discrimination policies, programs and support.

CONCLUSION

The research revealed that NESB and ESB staff have different opinions of the experiences and support of IQNs. IQNs do not feel comfortable, are unsure when to use their language skills, have different approaches to nursing care and expectations of the staff-patient/family relationship. Although IQNs feel they are adjusting well into their role, ESB nurses largely disagree which likely indicates that IQNs cannot assess that with which they are not familiar. They are too new to have been exposed sufficiently to the Australian English language and the nuances of their role. There were some similarities in that most staff across all groups are aware of a level of discrimination from patients to staff, and staff to staff. Overall, a number of strategies can support IQNs in adjusting to nursing in Australia and all staff working together. Nursing leadership can also assist in developing an open non-discriminatory environment that supports rapid integration of IQNs. These recommendations support the need for policy and guideline development in managing diversity at organisational and national levels.

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Analysis of interviews to uncover the effects of nurse prescribing on the doctor-nurse relationship

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KEY WORDS

Nurse prescribing, professional relationship, doctor and nurse views

ABSTRACT

Objective
The introduction of nurse prescribing has had a profound effect on how patients obtain a prescription. Yet very little has been researched about the effects of nurse prescribing on the professional relationship between nurses and doctors since its introduction. It was this lack of enquiry that led to this research study to see if this relationship has changed since the introduction of the nurse prescriber.

Design methods
A purposeful sample approach was chosen, interviews were undertaken using a semi-structured method and interpretative phenomenological analysis was used to analyse the data.

Setting
A large teaching hospital in the north west of England.

Subjects
Four nurse prescribers and four doctors working in orthopaedics, breast surgery or urology looking after adult elective surgery patients.

Main outcomes
What emerged from this study is a complex pattern of readjustment within this relationship. The power once enjoyed by the medical profession is now challenged by the introduction of the nurse prescriber. A number of themes emerged around the topics of prescribing, relationship, educational and communication. Each help to focus how this change manifests itself in the relationship and how it needs to evolve if the maximum benefit from nurse prescribing is to be achieved.

Conclusions
What has emerged from this research is how complex the relationship between the nurse prescriber and doctor really is. The power to prescribe medication that was once the sole preserve of the medical profession is now shared with the nurse prescriber. But this shared authority remains unequal; the medical profession remains at least unwilling to give up its position of control just yet, but the dialogue has begun.

INTRODUCTION

A review of the literature on nurse prescribing would reveal a dichotomy of views, from support of nurse prescribing as a way to improve patients care to doctors viewing such a proposal as a step too far. Yet despite the medical professions opposition the UK government pushed forward with the proposals (DOH 2003; 2002; 2001; 2000; 1999a, 1999b). Having lost the initial argument the medical professions shifted its objections to questioning nurse prescribing in terms of its safety, its comparability and even if it was really necessary (Funnell et al 2014; Carey et al 2009, Watterson et al 2009; Bradley and Nolan 2007; Ladd 2005; Fisher and Vaughan-Cole 2003; Rodden 2001; Luker et al 1998). What has not been debated or discussed in any great depth is how the introduction of the nurse prescriber may affect the relationship between the nurse and the doctor.

METHODOLOGY

According to Dzurec and Abraham (1993) all forms of research develop from the human desire to understand and make sense of the world. In seeking the views of two professional groups (doctors and nurses) regarding the introduction of the nurse prescriber to elucidate this first-person experience, a phenomenological approach was chosen. Phenomenology is not only a philosophy, but also an approach and method for human science research (Heinonen 2015). Descriptive phenomenology by Husserl (1913/1983) emphasised the careful description of ordinary everyday life. While interpretive phenomenology by Heidegger (1927/1962) is about interpreting and understanding and not just describing the human experiences. Both approaches are concerned with the lived experience and the meaning of an experience through the identification of essential themes (Polit and Beck 2006).

The interpretative phenomenological analysis (IPA) approach by Smith et al (2009) was chosen. As Smith (2004) suggested the assumption of IPA is to learn something about the respondents' psychological world, such as the beliefs and constructs that have been manifested or suggested by what the respondents have said. IPA achieves this through purposive sampling, by finding a closely defined group for whom the posed research question will be significant. In this case the specificity of the sample group is doctors and nurses and the question is how the introduction of nurse prescribing has affected the relationship. According to Finlay and Ballinger (2006) IPA is a useful method when there is a need to obtain an in-depth appreciation of an issue, event or phenomenon of interest, in its natural real-life context. The level of detail undertaken by an IPA approach means very small numbers of cases can be used so the breadth of the study is sacrificed for a more in-depth one with the aim of revealing something of the experience of each of those individuals (Smith et al 2009).

A total of 10 participants (five nurses and five doctors) were identified and all worked within a hospital in the north west of England. All worked in surgery but within different speciality's and did not work directly with each other. According to Smith (2009) for an IPA study the maximum number of participants is 10, while the minimal number would be two participants. Due to clinical issues the number of participants eventually interviewed was eight – four nurses and four doctors. Analysis of the interviews revealed a number of themes such as, Prescribing, Relationship, Education and Communication.

FINDINGS

Prescribing

The nurse prescribers' role has evolved in response to the reduction in the number of junior doctors and an ever increasing demand from patients for treatment on the National Health Service (NHS). This shift in emphases is illustrated by these quotes:

"I feel that ..... you are offering a more complete service as an advanced nurse practitioner (ANP) and the patients are getting their drugs in a more timely manner...especially as doctors are limited." Nurse B.

"because of the way staffing levels..in..medical specialities is now..... if you got somebody on the ward all the time like you guys (ANP`s).....that can prescribe it is far better thing." Doctor 2.

"I see them working alongside the team... because nurse prescribers are more regularly working with the team it's a very positive role.... and a more safer way in terms of patient care." Doctor 3.

These quotes reveal the benefits of nurse prescribing in terms of flexibility and continuity of care. Yet despite what appears to be a harmonious relationship there remains areas of conflict. These points of conflict appear to revolve around prescribing issues, and involve more than just doctors as illustrated in the following quotes:

"There were certain ones that they (management) wanted us to have, but we...basically rebuked them and said no thank-you." Nurse A.

"We were.... pushed you might say to try and prescribe more than we wanted too... but.. we won." Nurse B.

These two quotes display a certain level of pressure felt by these nurses to prescribe more medication. Nurse prescribers are governed by a myriad of competing and sometimes opposing forces. Nationally there is the Nursing and Midwifery Council (NMC) which regulates all registered nurses, it outlines very clearly what the nurse prescribers' responsibilities are, in relation to prescribing. However as a nurse prescriber you are also bound by the overarching legal legislation that governs all practitioners detailing what drugs a practitioner can legally prescribe. In either case a nurse breaching these rules faces a number of sanctions. For breaches of NMC rules a nurse could face suspension or being struck off the NMC register, while a breach of drug legislation may warrant imprisonment. This is not unique to nurse prescribers. A similar arrangement also covers doctors with their governing body the General Medical Council (GMC). However nurse prescribers also have two further layers to navigate, within the hospital environment. The first is the individual directorates who each interpret nurse prescribing differently. While overseeing the nurse prescribers is the hospital's non-medical prescribers committee (made up of consultants and senior pharmacist) that has both an oversight role as well as an administrative role for granting or amending drugs the nurse prescriber has access too. While it is important to have a certain level of oversight, the level and complexity of this oversight has led to a wide variation in interpretation, even within this single hospital. as demonstrated by the following two quotes:

"I developed the formulary...its really to do with urology and all around our role as urology nurses." Nurse C.

"They have given me a surgical formulary which is even more limited than the generic formulary." Nurse D.

While Nurse C`s indicates that her formulary was a joint venture with her manager and so was considered fit for her role Nurse D`s formulary was imposed by management which did not take into account her clinical role and so in her opinion left her with an inferior formulary. This was not the only issue identified, Nurse C`s role incorporated both hospital and community settings. As a result Nurse C had numerous contact with doctors within the hospital as well as numerous general practitioners (GP). While Nurse C's working relationship in the hospital was deemed good, her relationship with the GPs was more difficult as seen in the following quote:

"one of our Consultants... as part of his practice includes prescribing initially Tadalafil 10mg twice weekly yet some GP`s have actually come back to us and complained that this is not recommended dose it should be PRN. However BAUS (British Association of Urological Surgeons) have recommended this treatment option as part of their post-operative recovery... but only for this procedure." Nurse C.

This raises an interesting point, as legally there is no difference between a nurse`s or doctor's prescription. So why does the GP reject the nurses prescription? Could it be an assumption from the GP that the nurse

prescriber has made an error in prescribing this drug, hence why the GP has queried the prescription? This would explain the initial enquires from the GP`s requesting clarification. However on further questioning Nurse C indicated that this happens a lot, which is both frustrating and annoying despite information being provided to the GPs in the discharge letter regarding the prescribing of this medication. It was also noted by Nurse C that when the prescription is re-presented with the consultants' signature the prescription is accepted by the GPs. Why this occurs is unclear, but it raises the possibility that it's the signature on the prescription that determines whether the GP queries the prescription. This idea of a difference between a nurse`s and a doctor's prescription was explored within the research study. While the nurses interviewed made no mention of any differences, the doctors in the study did express their views:

> *"I think there are certain groups of prescriptions which should be limited... certain cancer medication... should not automatically be given to all nurse prescribers unless they are working in such roles as oncology and have been specifically trained then that's ok, but I think to give everyone all this training for all these specific needs may not be appropriate.. for the NHS." Doctor 1.*

> *"I have not had any problems with nurses prescribing drugs as long as they are within their limits and capabilities....I am sure that the drugs that are allowed for nurses to prescribe should not include the whole formulary... but a restricted one." Doctor 3.*

The above quotes demonstrates quiet clearly the doctors dilemma of both acknowledging nurse prescribing merits, while still trying to control the nurse prescriber as articulated in these two quotes:

> *"supervised or at least been looked at by a senior medical person." Doctor 3.*

> *"As long as it's suitably monitored." Doctor 4.*

The implication here is that nurse prescribing needs to be monitored (presumably for patient safety). While the point has some merit could not the same argument be made for all prescribers? Medical staff do have an important role to play with regard to reviewing medication, however the primary reviewer of all medication within the hospital setting is the ward pharmacist. They function as a resource for all prescribers, supporting and monitoring all prescriptions regardless of who the prescriber is. Interestingly while some of the doctors interviewed suggested medical staff could act as monitors of nurse prescribers, only Doctor 2 mentioned pharmacy`s role in this interesting quote:

> *"because everything is so heavily overseen by pharmacists its actual very rare that prescribers make.... that many mistakes." Doctor 2.*

While this quote does not mention doctors for supervision, the implication is that pharmacists review all prescriptions. There is one further point to make about this quote by inference, Doctor 2 makes no distinction between the prescriptions of doctors and nurses. This led to the following quote from another doctor which also touched on parity between the two prescribers:

> *"We (doctors) prescribe an alpha blocker....if a nurse can prescribe an alpha blocker....then in the end who prescribes it...to me does not make a big deal of difference...as long as the protocols are followed." Doctor 4.*

This quote offers a further dimension to the doctors views on nurse prescribers. In this doctors view who prescribers the medication is not important, it is how this decision is reached that is the important factor. While it is unclear if the protocol is to be used by either professionals or just the nurse prescriber, the prescribing decision is the primary concern. This concern regarding the correct decision was also mentioned by Doctor 2 in this quote:

"some..... junior doctors... tend to over prescribe antibiotics ... I think nurse prescribers are more willing to check about prescribing than the junior doctor and that makes it a safer practice." Doctor 2.

This quote reveals two important points; the first is an acknowledgement that junior doctors tend to over prescribe antibioticsand secondly nurse prescribers do not over prescribe antibiotics. Doctor 2 offers a rather simplistic explanation for this discrepancy that a nurse prescriber is more willing to contact a senior doctor before prescribing an antibiotic than a junior doctor. What is not made clear by Doctor 2 is the reason why junior doctors are reluctant to seek senior advice before prescribing an antibiotic. One possible explanation is the dynamics of the junior-senior doctor relationship, they may not wish to appear unable to make a clinical decision in front of a senior doctor they may require a reference from at some point.

Relationship

What emerged from the interviews was a strong theme around the doctor-nurse prescriber relationship. A further theme revolved around the nurse prescriber and the ward nurses. What was also revealed from the analysis of the interviews and supported within the literature was how little mention was made of the patients' relationship with either prescriber except for passing references to improving patient flow or obtaining a prescription on time.

Doctor-nurse prescriber relationship

When discussing relationships the idea of an equitable division of labour was raised by Nurse A when she attempted to explain how this worked with the medical staff:

"I think they saw us taking the easy jobs leaving them more difficult prescribing issues." Nurse A.

Nurse A`s quote offers us the major objection from the medical profession that nurse prescribers take as quoted "the easy jobs" which by extension implies the doctors are left with the more complicated prescribing issues. This can be viewed negatively by the medical profession if it was wholly true. The reality however is much more complex and was highlighted by the following quote from nurse B as to a possible reason why the doctors get frustrated with nurse prescribers:

"I think the doctors are quite confused as to what we can and can`t prescribe... because lots of ANP`s ... have different formulary." Nurse B.

While doctors maybe unfamiliar with the formularies a nurse prescriber may work from, this was not the only confusion to emerge from the transcripts as seen in this quote:

"their role is to principally ease the burden of the junior staff." Doctor 4.

Doctor 4's quote shows that at least some doctors view the nurse prescribers' role in terms of easing the burden of the junior staff and not improving patient care. This idea of reducing the burden was also identified by some nurse prescribers:

"they`re quite happy (the doctors) for me to prescribe as long as it`s in the p-formulary." Nurse C.*

(*p-formulary is a list of drug, either by name or classification including routes, that a nurse prescriber has access to for any patient within an agreed speciality.)

"the workload has been reduced as ANP`s take on more roles...so by taking on this role we allow the junior staff more time to go to theatre to gain experience." Nurse D.

These statements clearly indicated that nurse prescribers do not pick the easy jobs but in fact work to their formulary. The desire of nurse prescribers to take on more prescribing (so reducing the doctors workload), is balanced against the need of the doctors to maintain control.

Nurse prescriber and ward relationship

The relationship between the nurse prescribers and the ward nurses was (like the doctors) a rather mixed picture of both positive and negative elements. The biggest negative issue was the perception of the ward staff regarding the nurse prescribers' refusal to prescribe certain drugs, as seen in these quotes:

> *"They still seem to ask for drugs that we are not able to prescribe." Nurse B.*

> *"They (the ward staff) can`t keep a track on what drugs I can and can`t prescribe....they just ask me to prescribe a patients TTH`s*." Nurse D.*

(*TTH- To Take Home medication on discharge).

The frequency with which this occurs suggest it cannot be down to just confusion alone, but a reflection of the wide variety of formularies this hospital has developed. But while this potentially could be a serious issue, the nurse prescribers also indicated the positive aspects of this relationship with the ward nurses, as seen in this quote:

> *"Nurse on the ward see us as a great help...someone who is there....to ask for...help." Nurse D.*

Educational

Educational issues highlighted the mismatch between nurses and doctors when it comes to training. Nationally junior doctors have guaranteed time tabled educational sessions, and the nurse prescribers (who are undertaking a similar role) have not been offered similar opportunities as seen in this quote:

> *"Medical staff also have protected teaching time (when ward staff cannot bleep them)...we as nurse prescribers are not offered any such facilities yet we are carrying out tasks that were routinely the junior doctors jobs... without the necessary educational support. Even if we were offered say once a month ....the opportunity to have some up-date on prescribing or pharmacology issues would be a good thing." Nurse D.*

This clearly demonstrates that nurse education is neither guaranteed nor protected. This is despite the fact nurse prescribers have a national qualification and have the same responsibilities as their medical counterparts yet they are treated differently.

> *"We seem to have to jump through more hoops than medics do to prescribe certain drugs and whilst with some drugs I may understand that need. .... nurses have always been quite careful in how they prescribed maybe more so than medics." Nurse B.*

Nurse B reveals an interesting point, that while she acknowledges a nurse prescriber may need further training to prescribe some medication, she wonders why this is not extended to the doctors as well. This idea of extra training was taken up by Doctor 2 in relation to previous comments regarding the prescribing antibiotics made this comment:

> *"Absolutely....I also think that some of the junior doctors...er, tend to over prescribe antibiotics." Doctor 2.*

This idea of extra training for junior doctors was only supported by one of the doctors interviewed, but it did highlight again the gulf between the two professions. While the hospital made the nurse prescriber undergo compulsory training if they wanted to prescribe antibiotics, no such requirement was made of the junior doctors. Therefore it again reinforces the idea that the two professions prescribing are somehow different.

Communication issues

The analysis of the transcripts revealed a number of communication issues. Nurse A gives a great overview of the communication issue with this quote:

> *"There are a lot of variables, it depends on the person .... the lazy ones are quite happy for you to prescribe everything and then question why can`t you prescribe more for them?... while the more efficient ones might like to prescribe their own medication so ask us not to prescribe anything for them." Nurse A.*

Nurse A views on communication is very emotive, and somewhat simplistic but very revealing. Poor communication to her is a doctor who is not interested in what she can prescribe. As a result not only does she have to constantly justify her role she is also repeating what she can and cannot prescribe. Interestingly Nurse A also offers a view on what good communication looks like; it is a doctor that tells her directly that he will prescribe the medication. It is not clear if the medication prescribed by the doctor is medication Nurse A can or cannot prescribe but Nurse A certainly appreciates the doctor talking to her over prescribing matters. Interestingly Nurse B also had similar experience as seen in this quote:

> *"I think once you explain it to them some accept... what you are telling them. However....others are a bit.... (sigh)...as if they don`t really want to understand you." Nurse B.*

Nurse B has made a similar distinction as Nurse A (without using lazy or efficient) regarding medical staff willingness to understand the nurse prescribers' role. How this affects the professional role between the two is only partially indicated by a further quote from Nurse B:

> *"I would not say have an unpleasant attitude towards you....there are limitations to our prescribing role." Nurse B.*

It is unclear in these answers whether this reflects a true level of communication breakdown or personality clashes. What is clear however is the potential for a serious breakdown in team cohesion could impact patient care? Despite these negative comments, however Nurse D offers a good example of how this relationship should work as seen in this quote:

> *"During these ward rounds we would be discussing (within the team) patient's management." Nurse D.*

Within this quote Nurse D outlines what she sees as good communication between herself and the doctors. They work as a team dividing up the jobs that the ward round produced which included prescribing issues. This inevitability then led onto communication issue with ward nurses.

> *"I get asked fairly regularly for different things that are not on our formulary.....had to tell them that no you can`t prescribe." Nurse B.*

The implication here is that some nurses on the wards (like some doctors) are also not aware of the limitations on a nurse prescriber. Whether this can lead to a poorer working relationship with the ward staff is not clear from Nurse B`s response but it's a possibility. This was not the only example of poor communication as indicated in the following quote:

> *"they (the ward staff) will just bleep a doctor (not telling him everything) just that this patient needs their TTH`s.. the doctor might complete the TTH`S not realising that he has double up on the patients TTH orders making more work that could be avoided so it can be very time consuming." Nurse D.*

Two issues emerge from this quote; the first one (the obvious one) is a simple communication failure between the ward staff and the doctor. This failure to communicate however also raises a more serious problem for the nurse prescriber and the doctor. While it is not articulated in the answer, who contacts the doctor over this error in the TTH`s? Is it the ward staff or is it left to the nurse prescriber to contact the doctor, and what effect does this have on the relationship between the two?

Interestingly the analysis of the transcripts from the medical participants was very revealing. They viewed communication in very specific terms as illustrated in the following quotes:

> *"As a nurse prescriber you are far more likely to check with me first (as opposed to a junior doctor)." Doctor 2.*

> *"As long as they (nurse prescriber) takes advice of the Consultant or from a senior junior doctor it should not be a problem." Doctor 3.*

These two quotes offer a view of how the doctors view this communication, firstly that communication between the two is viewed at least by the doctors positively. However a more in depth exploration of these statements reveals the medical profession view this communication not so much as an equal two way process but as a way to control what the nurse can prescribe.

DISCUSSION

What this research has revealed is that despite a wealth of information around nurse prescribing, the medical profession remain unsure of the purpose of nurse prescribing. In part this confusion is due to a number of factors not least of which are the myriad of personal formularies within this single hospital trust. As a result two nurse prescribers working in the same surgical division can have very different prescribing formularies. Such anomalies only help foster within the medical profession a belief that medical prescribing is different (some doctors might call superior) to nurse prescribing. This belief is further enhanced if we look at antibiotic prescribing. Nurse prescribers wanting to prescribe antibiotics have to undergo a separate educational course run by the hospital (despite nurse prescribers having a national qualification). Junior medical staff do not require this course before they can prescriber antibiotics. Again this gives the impression that nurse prescribing is somehow different to medical prescribing.

CONCLUSION

What has emerged is despite both groups agreeing that nurse prescribing has improved patients access to medication and generally improved the patients' journey within the hospital environment, there remain some issues. The continuing confusion of the medical profession over what a nurse prescriber can and cannot prescribe needs to be addressed. While nurse prescribers have no objection to undertaking further training to prescribe antibiotics (despite having a national prescribing qualification), should junior doctors (as part of their foundation year program) also undergo this training? The advantage of such a proposal would be an improved working relationship between the two and it would help expel the notion that medical prescribing is different to nurse prescribing. Finally as nurse prescribers become more common and more doctors become exposed to the nurse prescriber the working relationship can only improve and with it a new working relationship can develop.

RECOMMENDATIONS

- The myriad of personal formularies needs addressing, a generic formulary would eliminate discrepancies that have been highlighted in this study.
- Giving nurse prescribers the opportunity to attend educational sessions with junior doctors would help dispel the myth nurse prescribers are not the same as medical prescribers.
- As part of the hospital staffs mandatory training, all health professions should have a session on the role of the nurse prescriber, not only would this help foster a better understanding of the role but it would improve the communication failings highlighted in this study.

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Perceived barriers and enablers to conducting nursing assessments in residential aged care facilities in Victoria, Australia

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KEYWORDS

Assessment, nurses, nursing home, older people

ABSTRACT

Objective
Nurses working in aged care facilities need to be adequately prepared to manage the increasingly complex care needs of older people. This paper reports on the views of nurses on the barriers and enablers to conducting nursing assessments with older people in residential aged care, six weeks after attending a four day education and training workshop on this topic.

Design
Descriptive evaluation.

Setting
Data were collected in a range of venues in which the education was delivered.

Subjects
Registered (RNs) and enrolled (ENs) nurses (n= 345) working in residential aged care facilities in Victoria, Australia.

Findings
Fourteen barriers and eight enablers, which affect the capacity of nurses to conduct assessments with older people, were identified. The most common cited barriers included lack of time (78%), residents' poor state of health (41%) and the absence of equipment (33%). Common enablers were organisational support (38%); staff education and training (29%); having the appropriate equipment (22%); positive staff attitudes (17%) and the resident's condition and cooperation (16%).

Conclusion
Nursing assessments are vital to the delivery of quality and evidence based aged care. The issues identified provide aged care services and managers with a basis for ensuring that nurses have the necessary preparation, training and ongoing support to perform the appropriate and required assessments to provide the best possible care.

INTRODUCTION

Assessment is the foundation of nurses' clinical practice in that it: identifies patient needs; informs care planning, decision making and choice of interventions; and allows the recognition and monitoring of risk (clinical and other) and deterioration of health status. A nursing assessment takes into account the physical, functional, psycho-social and environmental domains of care (Jarvis et aland 2016) and can be undertaken on admission, at a time of deterioration or when there is a health issue or, as part of a daily focused assessment.

It is well recognised that older people are often frail (Clegg et al 2013), have health problems affecting multiple body systems and are at risk of increased morbidity and mortality (Stuck and Iliffe 2011), particularly if they have dementia (Draper et al 2011). This increased medical acuity and complexity of care needs is very evident in the residential aged care sector where common conditions such as dementia (48%), depression (22.5%), arthritis (14.2%), cerebrovascular disease (22.5%), diabetes (6.9%) and pain, falls and urinary incontinence (17%) have a significant impact on care needs (Hillen et aland 2017).

For nurses working in aged care settings this presents many challenges, not least of which is their ability to assess, identify and meet the unique needs of the older person. Both registered nurses (RNs) and enrolled nurses (ENs) have a vital and central role to play in data gathering and the assessment of residents (Nursing and Midwifery Board of Australia 2016a, 2016b). Although some 120 assessment skills are known to be taught to students in nursing curricula (Giddens andand Eddy 2009), the literature reports that nurses in Australia (Birks et al 2013) and the United States of America (Giddens 2007; Secrest et aland 2005) may not use up to a third of the assessment skills taught. Many nurses also remain unclear about the boundaries of their professional responsibility with respect to the use of assessment skills (Birks et al 2014). It is not known, (at least from our review of the literature), whether any of the skills taught in nursing curricula are specific to the assessment of older people, such that nurses learn to differentiate between normal aged related changes and abnormal changes or pathology.

It is clear however that when nurses do not use their skill set to conduct health assessments to the full scope of their practice, this becomes a significant issue. Underutilised skills can not only compromise the identification and management of healthcare needs and the safety of care recipients (Munroe et al 2013), but also result in the erosion of skills (Birks et al 2013; Phillips et al 2006). A meta-analysis of the literature on the factors influencing the decisions of residential aged care nurses to transfer residents to hospital (Laging et al 2015), found that they often do not have the necessary clinical assessment skills, or the confidence to be able to identify early signs of deterioration in residents living in aged care facilities. This impacted on the ability of nurses to care for these residents.

Winbolt (2008) and Lesa and Dixon (2007) noted that large numbers of nurses employed in Australia and New Zealand were trained prior to the introduction of university programs where physical assessment skills, (Birks et al 2013) as a component of health assessment, have been formally taught. The median age of registered nurses and enrolled nurses working in aged care in Australia in 2016 was 47 and 50 years respectively (Mavromaras et al 2017). As a result, a significant number of aged care nurses may not have the assessment skills (Laging et al 2015) or confidence with the use of the medical terminology required to describe assessment process and findings (Phillips et al 2006), or, even recognise their role in the assessment process (Birks et al 2013).

Educating and training aged care nurses can increase their proficiency in undertaking nursing assessments so they can better identify changes in residents' health status and care needs. However, unless nurses are able to implement what they have learnt in their workplace, the benefits of any pedagogical initiatives will be limited.

The necessity for, or perceived value of, nurses' skills is not necessarily related to the incidence or frequency of their use in the clinical arena (Birks et al 2013). Several factors are known to influence whether nurses use their assessment skills and the extent to which they use them. These factors include apparent time constraints and lack of: confidence; role models and; nurses' understanding of the impact of assessments on care delivery (Douglas et al. 2014; Birks et al 2013). We currently know very little about the perceived barriers and enablers to using assessment skills in the Australian residential aged care environment. Our project sought to deliver an education and training program on the health assessment of the older person to enhance the knowledge and skills of nurses working in residential aged care facilities. As part of this educational initiative, we wanted to understand the perceived barriers and enablers to the use of these health assessment skills post-education in the aged care facilities in which the nurses were employed. This paper reports on the perceived barriers and enablers to conducting health assessment as recounted by workshop participants six weeks after they completed the education and training program. The evaluation had ethics committee approval (University FHEC 11/29).

METHOD

The educational program entailed the delivery of 20 workshops to nurses across the state of Victoria, Australia. Each workshop comprised four consecutive days of education and training. A fifth day, six weeks after the completion of each of the workshops, provided an opportunity to collect feedback on nurses' implementation of the assessment skills learned in their workplace. The education and training workshops were advertised to nurses working in residential aged care facilities through local health service networks and offered at no cost to participants. Nurses either self-selected, or were delegated by their managers to attend the education. Workshops took place in a range of health care and non-health care venues and were delivered by an experienced nurse educator.

Weber and Kelley (2007) describe the following four types of assessment: initial comprehensive assessment; ongoing or partial assessment; focused or problem-oriented assessment; and emergency assessment. The workshops taught participants how to conduct assessments with older people so they had at their disposal a full 'tool box' of skills for each of the above contexts as the situation required. The workshop program included the following components:

- Communication and assessment within a person centred and interdisciplinary care framework.
- Clinical reasoning and data collection techniques, organisation of data and the role of assessment in planning care.
- Ethical, legal and professional considerations such as documentation, informed consent and confidentiality.
- Psychosocial assessment including sleep and sexuality.
- Assessment of the integument (skin, hair, nails), abdomen, oral cavity and assessment for dehydration, constipation, malnutrition, urinary tract infection and changes in blood glucose.
- Cardiovascular and respiratory assessment.
- Musculoskeletal assessment and assessment of cognition including mental status, sensation, coordination, reflexes, pain and the senses.

The education and training focused on clinical practice and where relevant, an overview of anatomy and physiology was provided. Normal age related changes were highlighted throughout and examples of how

to document assessment findings were provided. The content was delivered using a variety of paired and group based activities in addition to didactic delivery. Simulation mannequins and other health assessment equipment were provided and participants were given a detailed education resource folder containing the content covered.

Six weeks after the workshops, participants reconvened to provide feedback on any issues related to the implementation and sustainability of assessment practices taught in the workshop in their work place. Participants were asked by one of the researchers to identify and record on 'butchers paper' the factors which they believed impeded (barriers) and aided (enablers) their ability and capacity to conduct health assessments with older people in their aged care facility during the preceding six week period. To encourage participants to honestly share their work place experiences, data pertaining to their role, or employer was not collected. This was completed as an individual activity and each group of participants was then asked to verbally share their responses with the rest of the group for discussion. At the end of each workshop, the researchers collected participants' written responses. These were subsequently collated and subject to content analysis with a low level of abstraction to identify barriers, enablers, and frequency of occurrence across all groups. The research team met to discuss and confirm the identified issues.

FINDINGS

A total of 345 participants attended the four day health assessment workshop program and 315 of these attended the post workshop implementation feedback session on Day 5. The median age of all participants was 50 years, which is close to the average age of nurses working in the residential aged care sector (Mavromaras et al 2017), and 92% of participants were female. Sixty seven percent of participants were RNs and 31% were ENs. Six of the participants (2%) identified as allied health professionals. The majority of workshop participants (61%) had previously not had any formal training in the range of health assessment skills covered in the workshop. More RNs (42%) reported having been taught health assessment prior to the workshop than ENs (31%). The data analysed was grouped into 'barriers' and 'enablers' as follows.

Perceived barriers to conducting health assessments

Ninety two percent of participants listed at least one barrier to conducting health assessments in their workplace (n= 290/315). A total of fourteen barriers were cited (table 1). The most frequently cited barriers were: time (78%); the resident's condition that is, their ill-health, frailty, cognitive impairment and lack of cooperation (41%); and the lack of appropriate equipment (33%). Other reported obstacles were: the negative attitudes of the staff (16%); a shortage of staff trained and educated in health assessment (15%); staffing issues, including staffing levels and skills mix (13%); a lack of support for doing a health assessment from more senior staff and management (9%) and 'heavy' staff workloads (9%). Verbal comments by participants indicated that they were generally more aware of barriers to conducting assessments since completing the workshop and incorporating what they had learned into their clinical roles.

Table 1: Perceived barriers to implementing health assessment

Barrier	% of participants identifying as a barrier	n (multiple responses)
Time	78	225
The resident's condition	41	119
Lack of appropriate equipment	33	96
Negative attitudes of staff	16	46
Staff untrained and uneducated in health assessment	15	44
Staffing levels and skills mix	13	39
Existing workload	9	26
Lack of support from senior staff/management	9	25
Lack of experience and confidence	7	20
A lack of assessment tools and documentation systems	5	15
Lack of opportunity	4	13
Lack of funding	3	8
General Medical Practitioner	2	6
Resident's family	1	3

Perceived enablers to conducting health assessments

Only 30% of participants identified enablers to conducting health assessments (n= 93/315). Eight enablers to conducting health assessment were identified (table 2). The most frequently cited enablers to the implementation of health assessment were: managerial support (38%); having a knowledgeable, educated and skilled workforce (29%); having the right equipment (22%); positive attitudes of the staff (17%) and the resident's condition and degree of co-operation (16%).

Table 2: Perceived enablers to the implementation of comprehensive health assessment

Enablers	% of participants identifying as an enabler	n (multiple responses)
Support from management	38	35
Staff educated, skilled, knowledgeable in health assessment	29	27
Equipment	22	20
Positive staff attitudes	17	16
Resident's cooperation and condition	16	15
Confidence	13	12
Resourcing	10	9
Time	6	6

DISCUSSION

Aged care nurses need to be adequately prepared to meet the complex care needs of older people, many of whom are increasingly frail and at risk of adverse outcomes including, delirium, falls and disability (Clegg et al 2013). The health assessment of the older person workshops provided the knowledge and set of skills for aged care nurses to apply in their workplaces to meet the care needs of older people. While all participants

saw assessment as a core component of their role and as essential in gathering data to inform care planning and referral to other disciplines, they highlighted far more barriers than enablers to implementation in practice. This suggests that there is considerable scope for increasing the opportunity and actual practice of nursing assessment in residential aged care. Although support and commitment to the use of assessment skills was widely expressed, there are a number of challenges which need to be addressed in order for assessments to become more embedded in the everyday practice of nurses working in aged care.

The biggest obstacle to conducting health assessments as perceived by aged care nurses is the lack of time within the current work practices of residential aged care services. Lack of time for the delivery of optimal care is a frequently reported nursing issue which has been noted to be a major constraint to the conduct of health assessments by nurses for well over a decade (Douglas et al 2014; Giddens 2007). Because workloads, staffing levels and skills mix patterns were not explored in our study, it is unclear how, or whether, these might be implicated in time being reported as a barrier. Further work around restructuring and modifying some of these factors and how these could better facilitate the incorporation of more comprehensive assessments into the clinical role may be warranted.

Many participants perceived an older person's physical and mental condition as a barrier to performing an assessment even though frailty, ill-health and dementia are the primary reasons for admission into residential aged care (Australian Institute of Health and Welfare (AIHW) 2014) and a further deterioration in health over time (potentiating the need for further assessments) is likely. The identification of time and a resident's health status as factors which determine whether an assessment is carried out, does suggest that conflicting activities may be challenging nurses to adequately meet the care needs of residents who have a cognitive impairment, communication problems and/or a limited ability to participate (or cooperate) with care. The literature does indicate that aged care nursing and caring for people with dementia places high demands on nurses' emotional well-being and professional role (Chenoweth et al 2010), which may go some way to explain the time pressures which nurses have noted. This further underscores the importance of both organisational and managerial support for nurses.

It also highlights the importance of experience and confidence in conducting health assessments as raised by a number of workshop participants and reinforces the view of Carusone et al (2006) and Laging et al (2015), that nurses often do not have sufficient confidence in their own clinical skills and judgement. Laging et al have noted that although nurses may have a high level of clinical competence, their lack of confidence in their own clinical decisions impairs the quality and detail of information that is conveyed to medical practitioners. Developing sound assessment skills is critical for nurses so they are able to recognise and report the early deterioration of residents, particularly those who have more 'complex' needs.

The attitudes of facility staff towards carrying out assessments, adequate education and training in assessment techniques, the availability of appropriate equipment and the support of supervisors and the organisation, were all identified as both barriers and enablers to performing assessments in residential aged care. Peer and organisational support have long been noted to be crucial elements of nurses' job satisfaction (Lua et al 2012). Interestingly, the lack of support from colleagues, senior staff and employer was identified as a barrier to the use of assessment skills by 18% of Australian nurses in a survey of health/care services over 25 years ago (Reaby 1990). More recent literature still points to an absence of visible role models for the conduct of health assessment in most areas of nursing (Zambas 2010).

Assessments cannot be comprehensive or thorough without the availability of appropriate equipment, such as quality stethoscopes, otoscopes and pulse oximeters. Workshop discussions indicated that not all residential aged care facilities had the appropriate equipment, or facilities had the equipment, but staff were unable

to easily access it. These items while essential are however also relatively inexpensive and an investment in the provision of quality care.

Given the median age of workshop participants was fifty years, it is not unexpected that the majority of participants had not received any previous formal training in the full range of assessment skills in their nursing education. In particular examination techniques such as auscultation, palpation and percussion and the use of equipment such as stethoscopes and otoscopes had not been taught. This gap in education and training highlights the need to cultivate a milieu in aged care which promotes and reinforces the widespread use of assessment skills and the importance of enabling nurses to confidently initiate and perform assessments on residents. This is even more imperative in view of the fact that nurses have been reported to use only a subset of their skills in clinical practice (Birks et al 2013); a conclusion which is supported by the findings of this project.

Taking into consideration a person's bio-psycho-social and spiritual needs is the hallmark of holistic care. When assessments are not comprehensive care delivery can become fragmented and suboptimal (West 2006). As Lesa and Dixon (2007) have also noted, when nurses lack the capacity to conduct assessments there is more likely to be a reliance on medical practitioners. In the context of residential aged care facilities this can be problematic as most aged care facilities are reliant on general practitioners (GPs) who are usually working in private practice and therefore are not always immediately available on-site to assess residents (Shanley et al 2011). Timely assessment is important as early detection of condition changes is important to prevent deterioration (Ellis 2011) and potentially allay admission to hospital. It is increasingly important therefore, that nurses working in this setting are confident and competent to carry out timely assessments on residents who are suspected of being unwell.

Laging et al (2015) found that the ability of staff to appropriately assess residents was reduced by onerous workloads and a limited skill base. Delays in assessment were linked to a delayed recognition of deterioration and an increased likelihood of subsequent transfer to hospital. Greater use of assessment skills, documenting findings and developing care plans based on this information, could further develop nurses' confidence performing an assessment with residents.

All Australian residential aged care facilities are co-funded by the Australian Government and resident contributions. The amount of Government funding each resident attracts is based on a care needs assessment conducted on admission and thereafter annually, or if there is a substantial change in the level of care required. This care needs assessment is guided by the Aged Care Funding Instrument (ACFI) which involves assessment of functional domains such as nutrition, mobility, continence, vision and hearing as well as psychosocial and emotional needs. The instrument also includes reporting of specialist nursing needs such as complex wound care and palliative care. The ACFI is designed to identify functional deficits and care needs and as such does not always prompt a corresponding physical assessment. For example a hearing deficit may be identified, but there is no ACFI prompt to conduct a physical examination of the ears. There is therefore a risk that the requirement to complete ACFI assessments may drive the level of assessment, rather than a comprehensive health assessment being conducted which will in turn inform the ACFI.

Although the ACFI was not cited by participants as a barrier to health assessment, it was raised by workshop participants in general discussion as they were concerned that conducting assessments would duplicate work undertaken order to complete the ACFI. Interestingly some participants were under the impression that completion of the ACFI constituted a comprehensive health assessment. Discussion regarding the definition of a comprehensive health assessment and the knowledge gained through the workshop demonstrated to participants that a comprehensive assessment provides more in-depth information and that the information

required by ACFI can easily be extracted from the findings of a comprehensive health assessment. We would suggest that residential aged care services review their current work practices to explore whether, or how any existing assessments could replace or complement other existing assessments rather than add to them, especially with respect to the completion of the ACFI.

CONCLUSION

This paper reports on the factors which nurses perceive to enable and/or impede the conduct of assessments in residential aged care facilities. Multiple issues which impact on the full use of the assessment skills of nurses from aged care facilities were identified and these raise a number of issues about the preparedness and capacity of nurses to provide appropriate care to older people. Nurses in aged care are increasingly required to care for older people with complex health and care needs. The increased responsibility which this increasing acuity demands, has made the use of assessment skills by nurses even more vital. Nurses need to have adequate assessment skills and be able to implement these skills to recognise residents' health problems sooner and possibly avoid admission to hospital. Comprehensive assessments also improve the quality and meaningfulness of information being communicated to medical practitioners and other health professionals (Baid et al 2009; Odell et aland 2009). The most important enabler to leverage and drive such practice change is organisational and managerial support. The issues raised by this project are arguably relevant to all residential aged care service providers and where on-site medical care is more reliant on visiting medical practitioners.

STRENGTHS AND LIMITATIONS

The views reported on in this paper are unique to the 315 registered and enrolled nurses who had completed the nursing assessment of the older person education/training program. As such it cannot be said that their views represent those of other nurses who carry out health assessments in residential aged care facilities. We believe the reporting to have been honest and the consistency of views shared by participants give the reported findings credibility. We are also aware that while many of the barriers and enablers may seem obvious to anyone; we have been able to provide evidence by asking a sizeable sample of nurses for their perceptions.

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The Art of Clinical Supervision: strategies to assist with the delivery of student feedback

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KEY WORDS

Clinical supervision, student nurse, clinical teaching, clinical feedback

PREAMBLE

Objective
The Art of Clinical Supervision (ACS) seminar was developed to provide health professionals with the essential knowledge, skill and attitude to support student clinical learning. This paper provides an outline of the strategies provided to participants to support the delivery of feedback to students on clinical placement.

Setting
Western Australian health services.

Primary argument
The provision of timely and descriptive feedback to students on clinical placement is essential for learning and achievement of competence. Health professionals working with students in the delivery of patient care, termed clinical supervisors, require effective strategies to support this communication technique.

Conclusion
ACS participant feedback supports the use of both strategies to formulate the delivery of feedback. This ensures that the student and supervising health professional have discussed the required learning needs, strategies for learning and evaluation.

INTRODUCTION

The Art of Clinical Supervision (ACS), a one-day seminar for nurses and health professionals, provides a safe learning environment for the sharing and reflecting of clinical supervision practice. The seminar was designed as an intervention strategy for a Dr of Philosophy (2010), and with Health Workforce Australia funding was extended for a further three years (2011 – 2014) covering the state of Western Australia (WA). The seminar continues to date as a form of professional development, provided through the University of Notre Dame, Australia to health professionals in WA. This article focuses on one key aspect provided within the ACS, the delivery of feedback to health professional students.

BACKGROUND

In the context of entry to practice health professional education, clinical supervision is the relationship between a student, and the registered health professional responsible for their clinical practice. Health Workforce Australia defines a clinical supervisor as:

> *an appropriately qualified and recognised professional who guides learners' education and training during clinical placements. The clinical supervisor's role may encompass educational, support and organisational functions. The clinical supervisor is responsible for ensuring safe, appropriate and high quality patient-client care (2014, pp.22).*

Other terms used to describe this relationship include preceptor, mentor, coach, buddy and facilitator (Dimitriadou et al 2015).

The clinical supervisor provides student opportunities for practice, incorporating a number of clinical teaching strategies, inclusive of feedback. Feedback provides closure to the student learning experience, which enables an understanding of competence, and supports targeted learning.

Feedback has various definitions, however for the purpose of this seminar, feedback is defined as:

> *a two-way respectful and mutually beneficial process between supervisors and learners. It occurs through communication (written or verbal) between the supervisor and the learner, before, during and after a supervisory or other learning event, and objectively provides the learner with a clear understanding of the level of their competency at a particular time. It also ... enable(s) the learner to express views about the learning experience which enable a supervisor to reflect on and improve their supervisory skills and performance (Health Workforce Australia 2013, pp. 23).*

Feedback supports students to close the gap between current and required performance (Allen and Molloy 2015; Burgess and Mellis 2015; Schartel 2012) to attain competence (Allen and Molloy 2015). Delany and Molloy (2018) describe feedback as vital for teaching and correcting learners, revealing learners' blind spots, reinforcing learning, motivating learners, identifying gaps, improving patient care, and collaboration (p.307). However, despite its importance, feedback is inherently an emotive conversation for both the supervisor and student, which can be seen to threaten relationships, and therefore difficult to effectively engage in (Delany and Molloy 2018).

The literature articulates insufficient and superficial feedback is common on student placements. Consequently, students are left confused and unsure about their level of practice, achieved learning, and skills requiring consolidation. In contrast students provided with informative and descriptive detail are able to reflect on their performance and enact change or reinforce behaviour to consolidate competence (Allen and Molloy 2015; Schartel 2012).

Various barriers are cited to providing feedback, in particular health professionals being time poor in busy clinical environments in which patient care is a priority; and supervisors lack of confidence in their ability to provide feedback (Ford et al 2016; Plakht et al 2013), in particular when there is concern about student performance (Plakht et al 2013). Regardless, clinical supervisors can ill afford to doubt the undeniable link between clinical supervision and student learning (Ford et al 2015), and the role of feedback in this process (Burgess and Mellis 2015). Clinical supervisor education for health professionals is lacking in entry to practice training, therefore its delivery in the workplace is essential to support ability and confidence in clinical teaching, assessment and feedback (Russell et al 2016).

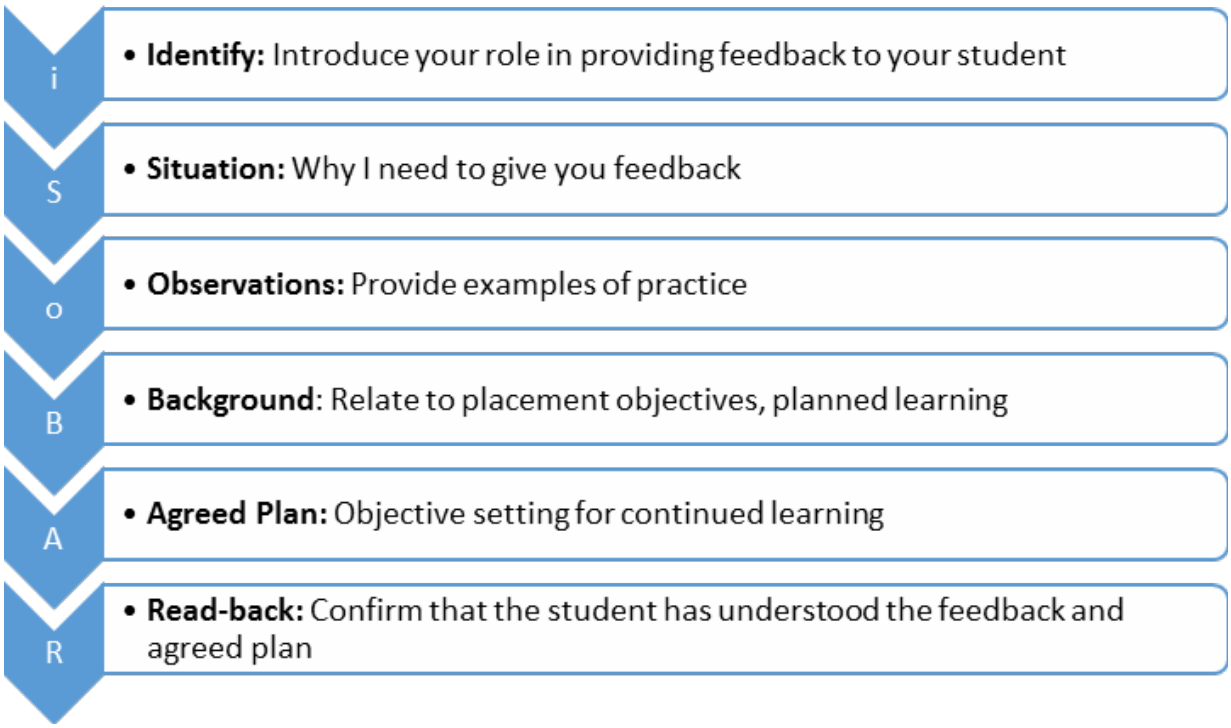
ACS: Effective strategies for the delivery of student feedback

The ACS seminar provides tips for success for health professionals, inclusive of feedback. The seminar acknowledges that supervisors may have no formal qualifications in education, nor desire to, due to their speciality practice being patient care. To avoid educational jargon, and to ensure that health professionals can easily recall strategies for success, the ACS deliberately avoids adding additional acronyms for professionals to learn and remember. As such for the delivery of feedback the iSoBAR method was chosen along with Blooms Taxonomy of learning, both well-recognised sets of terms used within health services and entry to practice programs. Additionally, Bloom's taxonomy, is embedded within the seminar as a framework to plan, deliver and evaluate learning, which closes with feedback.

iSoBAR

iSoBAR is the Western Australian Health clinical handover tool (Government of Western Australia 2013) that is incorporated across health service documentation. There are a variety of versions of isobar in use that are advocated by the National Safety and Quality Framework, (2017). The below figure 1 articulates the application of the iSoBAR acronym in the context of student feedback.

Figure 1: iSoBAR for student feedback (adapted from iSoBAR, Government of Western Australia 2013, pp.7)



Examples of Feedback

Application of the iSoBAR tool for the delivery of feedback is provided in the following four examples to ACS participants. Each example highlights common forms of feedback by clinical supervisors.

Feedback types

Example 1. Immediate – 'positive/achieved' feedback

Example 2. Immediate – 'consolidating/working towards' feedback

Example 3. Summary (end of shift/week/placement) – 'positive/achieved' feedback

Example 4. Summary (end of shift/week/placement) – 'consolidating/working towards' feedback

Within this paper two examples have been provided, Example 1 (figure 2) and Example 4 (figure 3).

BLOOM'S TAXONOMY OF LEARNING

There are three domains of learning according to Bloom et al (1956), later revised (Anderson et al 2001):

1. Knowledge (cognitive, mental skills)
2. Skills (psychomotor, manual or physical skills)
3. Attitude (affective, growth in feelings)

The clinical environment is a place for students to practice and gain both confidence and competence in all three of these domains. The clinical environment supports this process through experiential learning that is learning through practice (Delany and Molloy 2018)

During the ACS, participants are introduced to structured clinical learning around these three domains to facilitate student development of knowledge, skill and attitude. This framework can then be used to provide feedback. The following example in table 1 and table 2 articulates this into practice with the three domains applied to the example of blood pressure. In table 1 Bloom's domains are applied to the clinical teaching and assessment of blood pressure, whilst table 2 describes considerations for the provision of feedback about the student's competence related to blood pressure.

Table 1: Clinical Teaching using Bloom's domains of learning – blood pressure, example

Domain	Teaching/learning considerations
Knowledge questioning	What is the student's knowledge level about blood pressure, for example use questioning to determine their understanding of: what is a blood pressure the measurement of, when/why it should be measured, what other information it can be used with to determine clinical assessment and care decisions? Ask questions of increasing difficultly to determine level of knowledge through to evaluation, refer to Blooms 6 levels of cognitive domain.
Skill observing	What level of skill does the student possess in performing the procedure – can they apply the skill in different situations e.g. (paediatric versus adult patient, obese patient, manual versus machine operated). You will need to observe the student, and ask clarifying questions about different scenarios that are not able to be observed.
Attitude observing	Does the student display an appreciation for the appropriate application of the knowledge and skills obtained? In this instance does the student display acceptance about the importance of a blood pressure and its relationship to patient health status. You will need to observe that the student incorporates the knowledge and skill into everyday practice with an appreciation for its use and benefit, you may support this with questions about application in different scenarios.

Figure 2: Example 1. Immediate – 'positive/achieved' feedback

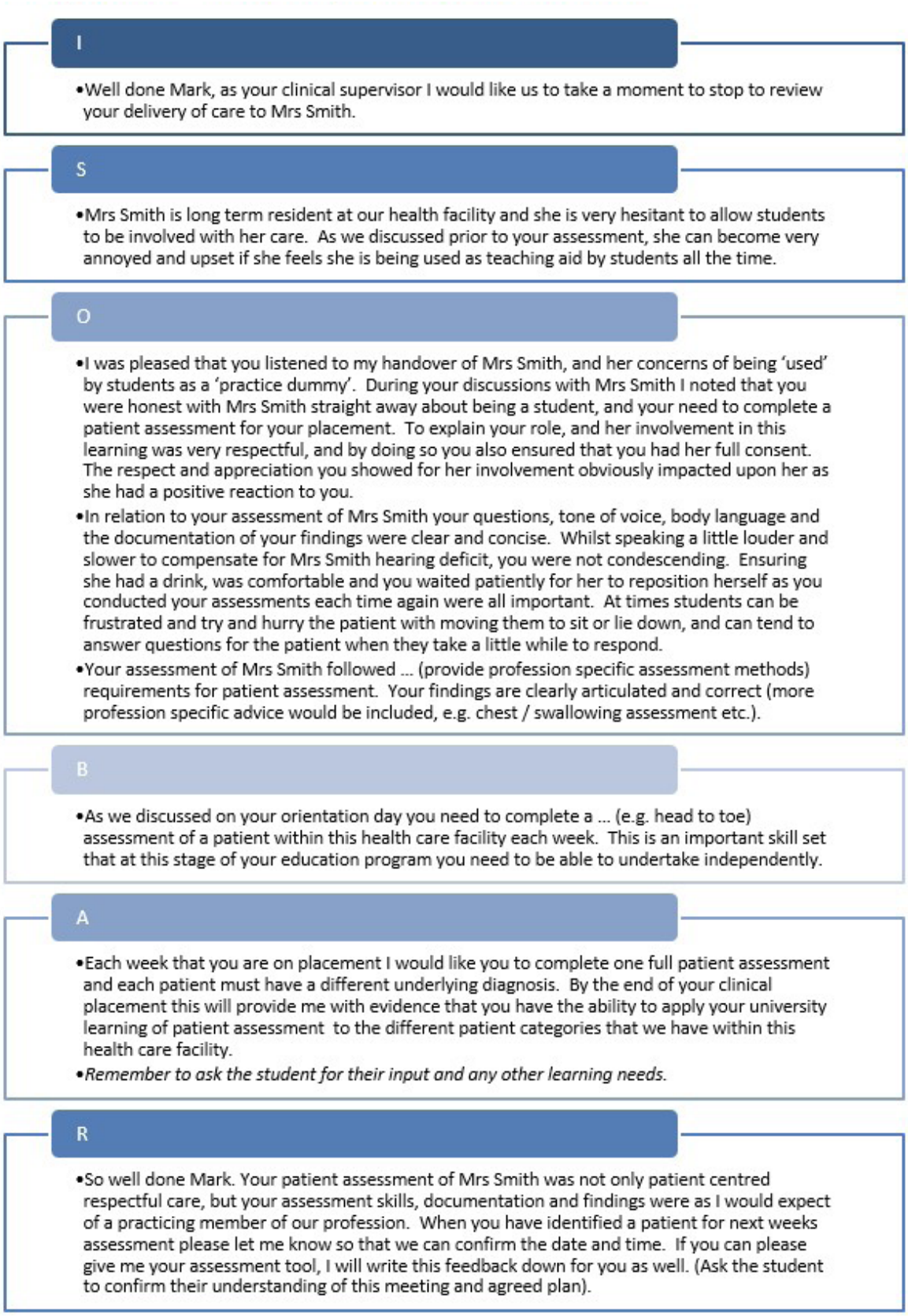


Figure 3: Example 4. Summary (end of shift/week/placement) – 'consolidating/working towards' feedback

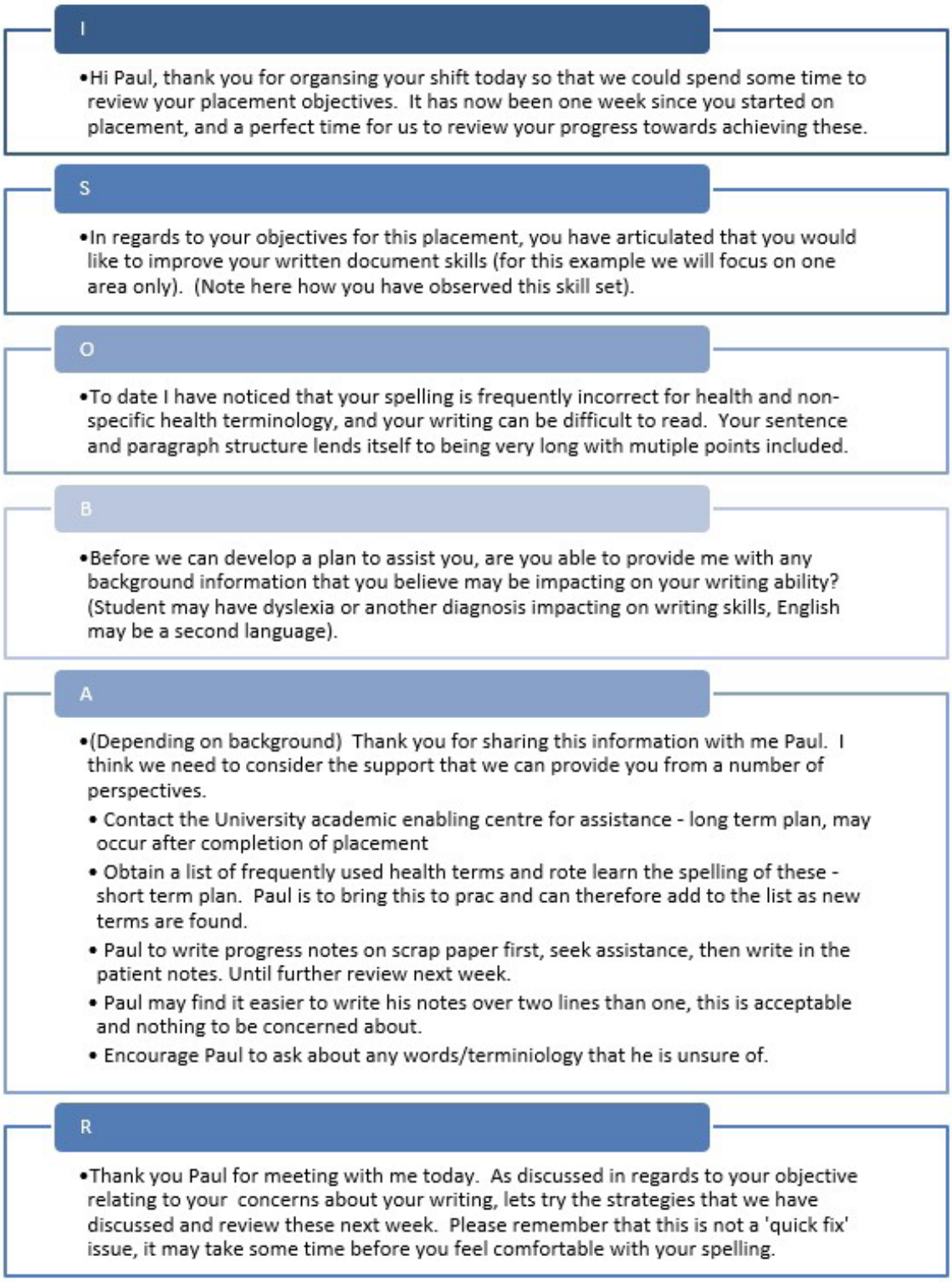


Table 2: Feedback example using Bloom et al's (1956) domains of learning – blood pressure, example

Domain	Feedback
Knowledge	Relate information to the student about their knowledge – do they need to read further, you may refer to texts, journal articles, and policy and procedure manuals.
Skill	Provide specific detail about the skill, completed steps, missed steps, and any incomplete steps. This should also include their style of communication with the patient during the procedure, was it appropriate, did they inform the patient appropriately of the care to be delivered.
Attitude	Provide clarification about their application of knowledge and skills. Does the student naturally undertake the procedure without prompting? Have they incorporated blood pressure as a necessary form of patient assessment?

This delivery method can also be used for skills that do not involve a manual or physical skill set, for example communication: Knowledge would relate to the best practice of communication, whilst the skill relates to the application of these communication styles.

FEEDBACK

Participants of the ACS have articulated that these two processes of delivering feedback are appropriate and helpful for fulfilling the role of the clinical supervisor. Ongoing evaluation of the seminar has provided support for these strategies. Examples of feedback include:

> *"Teaches us how to provide feedback in a constructive way" (2018)*

> *"Useful tools we can use as a framework for feedback" (2018)*

> *"Valuable insight into giving feedback" (2018)*

In addition, ongoing evaluation of the ACS continues to demonstrate the seminar's value:

> *"Thank you for organising a very useful workshop. It was excellent and has helped me to refocus on the most important things we need to undertake for the benefit of the students who come to our hospitals for their practical placements" (2018).*

DISCUSSION

Engaging with health professionals to improve their knowledge, skill and attitude as a clinical supervisor is essential for the continued graduation of safe and competent health professionals (Burgess & Mellis 2015). The literature overwhelmingly supports the concept that feedback promotes student engagement with learning, achievement of clinical competencies and engagement with self-evaluation, whilst insufficient or inappropriate feedback can hinder student progress (Burgess & Mellis 2015; Plakht et al 2013; Schartel 2012).

The delivery of professional development education to support clinical supervisors that is relevant, meaningful and effortlessly implemented is essential in a time when employees are overwhelmed by continuing changes to the health care system. Additionally, the literature articulates that teaching how to deliver feedback should be centred on student 'knowledge, behaviours or actions' (Schartel 2012, pp. 86). Utilising Bloom's domains of learning provides such a model to direct both learning and feedback, providing a streamlined approach for health professionals. This supports timely feedback that is also patient care centred, to improve student practice (Burgess & Mellis 2015; Plakht et al 2013).

CONCLUSION

For students to successfully achieve their learning objectives, they require informative feedback that is timely and descriptive. Clinical supervisors, working with students at the point of patient care, are best equipped to provide this timely feedback for continued student reflection and growth. Supporting health professionals to deliver feedback that is meaningful enables students to practice and progress through their learning. Investing in health professional development as clinical supervisors is not only essential, but crucial to support student competence.

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Bioelectrical impedance analysis as a marker of nutritional status in chronically ill patients

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KEYWORDS

nutritional risk, albumin, phase angle, chronic disease.

ABSTRACT

Objective
The aim of the study was to evaluate different methods of nutritional status analysis like basic anthropometric data, laboratory data and bioelectrical impedance analysis (BIA) with phase angle (PA) in patients with chronic diseases.

Setting
Clinic for Internal Medicine, Department of Nephrology, University Clinical Centre Maribor, a tertiary referral centre in Slovenia, Europe.

Subjects
Patients with chronic disease and increased nutritional risk (≥1 fulfilled NRS 2002 criterion) at the time of inclusion in the study.

Results
Patients had chronic kidney disease (93%), arterial hypertension (80%), active infection (33.3%), heart failure (23.3%), diabetes mellitus (20%), active malignancy (10%), autoimmune disease (6.6%), history of stroke (6.6%), chronic obstructive pulmonary disease (3.3%) and/or liver cirrhosis (3.3%). Mean serum albumin was 33.6±5.7 g/L, mean BMI 25.6±4.4 kg/m2 and mean PA 4.4±1.2°. No correlation between serum albumin and BMI was found. Lower PA was associated with lower serum albumin (p=0.045) and advanced age (p=0.043). The department nurses conducted nutritional education for all patients included in the study. Study was performed in accordance with the Strengthening the reporting of observational studies in epidemiology.

Conclusion
Results of the study show the importance of nutritional risk assessment in all chronically ill patients. BIA is a promising method of determining nutritional status. PA values have important diagnostic, therapeutic and prognostic implications as they are a marker of body cell mass, membrane function and metabolic health. A multifaceted approach to assess malnutrition in patients with chronic diseases is important, followed by a prompt nutritional intervention.

INTRODUCTION

Malnutrition is a general term indicating a state of nutrition in which a deficiency, excess or imbalance of energy, protein and other nutrients causes adverse effects on body composition, function and clinical outcome (Poulia et al 2012). It can be the result of poor nutritional intake, impaired utilisation or loss of nutrients, or may stem from several acute or chronic diseases. Malnutrition affects 7-16% of patients out of hospital (Leistra et al 2009) and is even more common in hospitalised patients (Leistra et al 2013). Additionally, nutritional status often deteriorates during a hospital stay (Allard et al 2016), which leads to higher rates of complications, increased morbidity and mortality (Kyle et al 2013; Poulia et al 2012).

The first step to successfully treat malnutrition is the appropriate diagnosis. To recognise patients at risk, several screening tools have been proposed. The Nutritional Risk Screening 2002 (NRS-2002) is the tool proposed by the European Society for Clinical Nutrition and Metabolism (ESPEN). It includes four questions about the following parameters: body mass index (BMI) <20.5 kg/m2, presence of weight loss in the past three months, presence of low dietary intake in the past week and the severity of illness. A positive response to any of these questions warrants further nutritional assessment (Poulia et al 2012).

Nutritional status can be assessed by several different methods. Most clinicians currently rely on global clinical assessment and anthropometric parameters, such as body weight, height, waist circumference, and BMI. There are several laboratory parameters which can be used to assess nutritional status, most commonly serum albumin level (Bharadwaj et al 2016). These parameters give us no information on body composition and have therefore several limitations to their application. More advanced modalities on nutritional status assessment and body composition analysis include imaging techniques, such as density assessment, anthropometry, dual energy X-ray absorptiometry (DEXA), computed tomography (CT), magnetic resonance imaging (MRI), nuclear magnetic resonance (NMR) spectroscopy or the use of isotopes. These are, however, expensive, time consuming, and in most hospitals, unavailable for routine use (Jones et al 2009).

Body impedance analysis (BIA) is the most commonly used method to calculate body composition due to its high accuracy, safety, portability and low cost. It provides information on fat mass, muscle mass and hydration status, which is especially useful in chronic kidney disease (CKD) and heart failure patients. It is based on the principle of bioelectrical impedance (the vector sum of resistance and reactance). Although monofrequency BIA (50 kHz) has been the most used method to date, multi-frequency BIA (5-100 kHz) has arisen as a method with more developed and complex theoretical bases, giving us better information on the distribution of water between intra- and extracellular spaces (Caravaca et al 2011).

Phase angle (PA) value determined by BIA is an indicator of cell membrane damage and body cell mass (Varan et al 2016). Higher values represent higher cellularity, cell membrane integrity and better cell function (Norman et al 2012). In healthy subjects, age and gender are the major determinants of PA (Zhang et al 2014). Since it is based on body cell mass, it can be used as an excellent reference for several physiological processes, including energy expenditure and proteolysis. Recent studies have shown that lower levels of PA are associated with increased nutritional risk, higher morbidity and mortality in chronic diseases, cancer and surgical patients (Varan et al 2016; Mushnick et al 2003).

The aim of this study was to use different methods of nutritional status analysis, including basic anthropometric data, laboratory data and BIA with PA in patients with different chronic diseases, who were at risk for malnutrition according to the NRS 2002 screening tool.

STUDY DESIGN AND METHODS

Thirty patients that were hospitalised in the Department of Nephrology, Clinic for Internal Medicine of University Clinical Centre Maribor, in a three-month period (November 1 2016 - January 31 2017), were included in the study.

Patients were mostly admitted from the internal medicine emergency department, some were transferred from other departments and hospitals. The inclusion criteria were increased nutritional risk (≥1 fulfilled NRS 2002 criterion) at the time of admission to the hospital and the presence of at least one chronic disease prior to the hospital admission. Institutional electronic information system was used to check patients' previous chronic diseases. The most common comorbidity was CKD (stages 1-5), including those on renal replacement therapy. Other observed chronic diseases were arterial hypertension, diabetes mellitus, heart failure, chronic obstructive pulmonary disease, liver cirrhosis, malignant disease, autoimmune disease, a history of stroke and/or the presence of an active infection. All patients were given written informed consent before inclusion in the study.

The study was performed in accordance to the STROBE guidelines (STrengthening the Reporting of OBservational studies in Epidemiology). The study was approved by the University Clinical Centre Maribor ethics committee. Informed consent was obtained from each patient.

BMI and BIA parameters, such as muscle mass, fat mass and PA, were used in the nutritional assessment of included patients. To perform bioelectrical impedance, multi-frequency segmental body composition analyser *Tanita, MC780*® (Croatia) was used. The apparatus has a measuring platform which requires standing position of the subject for correct measurement. Patients unable to walk or stand were therefore excluded from the study due to their inability to stand on the measuring platform. The measurements were made on an empty stomach, between 8-12 AM, by the department nurses.

Glomerular filtration rate (GFR) was estimated by using the Chronic Kidney Disease Epidemiology Collaboration equation. By drawing peripheral venous blood, standard laboratory data, such as serum creatinine, haemoglobin, albumin and C-reactive protein (CRP) levels were measured.

Statistical analysis was performed using the SPSS Statistics 22 for Windows. The data was expressed as means ± standard deviations or percentages. Associations between different methods of nutritional status analysis data were tested by the Spearman's correlation coefficient. A p-value < 0.05 was considered statistically significant.

RESULTS

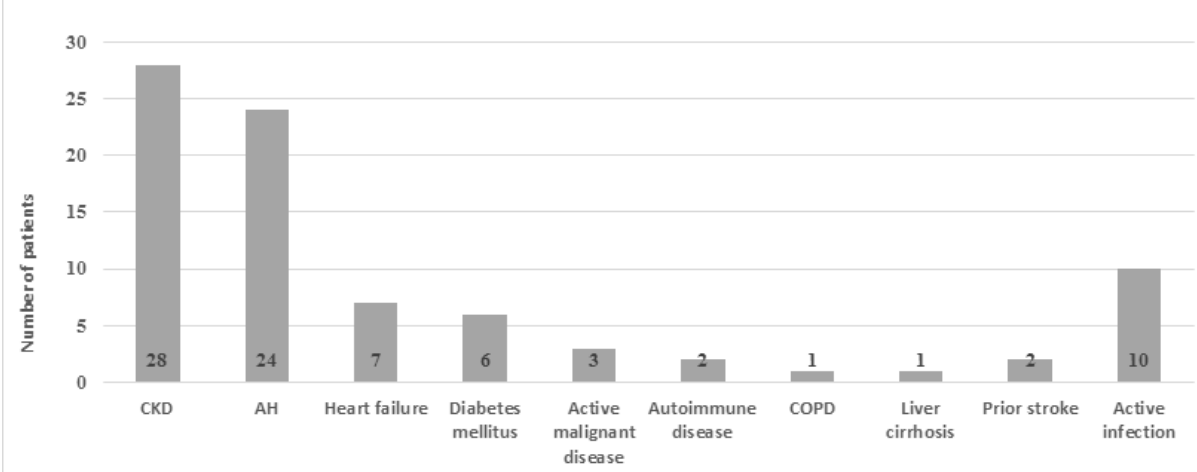
Thirty patients were included in the study, most of them were male (20/30, 66.7%). Their average age was 70.8±17.2 years. Nearly all of them had one fulfilled NRS-2002 criterion (28/30; 93.3%), two patients (6.7%) had two or three fulfilled NRS-2002 criteria, respectively.

All of them had at least one concomitant chronic illness, most commonly CKD (28/30; 93.3%). Mean serum creatinine was 172.1±85.7 µmol/L, mean estimated GFR was 53.4±26 ml/min/1.73 m2. One patient was on haemodialysis for seven years prior to the study (1/30; 3.3%). The second most common concomitant chronic disease was arterial hypertension (24/30; 80%), followed by heart failure (7/30; 23.3%) and diabetes mellitus (6/30; 20%). Active malignant disease was present in three patients (10%), two of them had colorectal adenocarcinoma, and one had a prostate adenocarcinoma. One patient with colorectal carcinoma was in-between cycles of chemotherapy; none of the other patients were receiving radiotherapy or other oncological treatment regimens at the time of the study. Autoimmune disease was present in two patients (6.6%), both

had systemic lupus erythematosus. Chronic obstructive pulmonary disease and liver cirrhosis were observed in one patient (3.3%). Two patients had a history of a cerebrovascular event prior to the inclusion in the study (6.6%). Most of the patients had no active infection at the time of the study (20/30; 66.7%). Those with an infection had an inflammation of the biliary tract (5/10; 50%), a respiratory tract infection (4/10; 40%) or an upper urinary tract infection (1/10; 10%).

Most common comorbidities of included patients and basic descriptive statistics are shown in tables 1 and 2.

Table 1: Comorbidities of included patients.



Legend: CKD – Chronic Kidney Disease; AH – Arterial Hypertension; COPD – Chronic Obstructive Pulmonary Disease.

Table 2: Basic descriptive statistics of included patients.

Parameter	Minimum value	Maximum value	Mean value ± SD
Age (years)	31	94	70.8 ± 17.2
NRS 2002	1	3	1,1 ± 0.4
Serum creatinine (µmol/L)	62	763	172.1 ± 185.7
eGFR (CKD-EPI equation; ml/ min/1.73 m2)	6	90	53.4 ± 26
Serum haemoglobin (g/L)	82	152	115 ± 19.4
CRP (mg/L)	3	359	52.2 ± 83.6
Albumin level (g/L)	17.8	44.4	33.7 ± 5.7
BMI (kg/m2)	18	35	25.6 ± 4.4
Fat mass (kg)	3	29	16.9 ± 7.7
Muscle mass (kg)	34	72	53.5 ± 10.4
Phase angle (°)	3	7	4.4 ± 1.2

Legend: SD – standard deviation; NRS – nutritional risk screening; eGFR – estimated glomerular filtration rate; CKD-EPI equation - Chronic Kidney Disease Epidemiology equation; CRP – C-reactive protein; BMI – Body Mass Index.

Mean serum albumin was 33.7±5.7 g/L, mean BMI was 25.6±4.4 kg/m2, mean fat mass was 16.9±7.7 kg, mean muscle mass was 53.5±10.4 kg and mean PA was 4.4±1.2° (table 2). No correlation between serum albumin and BMI was found. There was also no significant correlation between muscle mass, fat mass and serum albumin. Higher fat mass and muscle mass were associated with higher BMI ($p<0.0001$). Lower PA was associated with lower serum albumin ($p=0.045$) and advanced age ($p=0.043$), however, no correlation was found between muscle mass, fat mass, BMI and phase angle values.

All the patients in the study, and their relatives where possible, received nutritional education by the department nurses.

DISCUSSION

Chronic illnesses and advanced age are the most important risk factors for malnutrition (Correia et al 2014). Several studies have shown correlation between malnutrition and CKD (Muscaritoli et al 2009), severe heart failure (Rahman et al 2016; Amare et al 2015) and liver disease (Purnak and Yilmaz 2013). It is estimated that nearly half of patients with malignant disease develop a syndrome of cachexia, with anorexia, progressive loss of adipose tissue and skeletal muscle mass (Aoyagi et al 2015). Several autoimmune diseases are linked to progressive wasting, especially autoimmune thyroid disease (Kawicka and Regulska-Ilow 2015). Patients with advanced chronic obstructive pulmonary disease are in a state of undernutrition, referred to as pulmonary cachexia (Itoh et al 2013). Patients who suffered stroke are likely to develop malnutrition during the acute phase of the stroke, and later during the rehabilitation stage of the disease (Bouziana and Tziomalos 2011). Muscle mass wasting is a hallmark of diabetes mellitus as well (Chevalier and Farsijani 2014). Protein-energy malnutrition is an independent risk factor predicting decreased length of overall survival and survival at home in geriatric patients (Correia et al 2014). Studies have repeatedly shown that clinical malnutrition is generally associated with increased morbidity and mortality both in acute and chronic illnesses. Longer length of hospital stay and higher treatment costs are reported in malnutrition. Since it has been demonstrated that proper nutritional care can reduce the prevalence of hospital malnutrition and costs, nutritional assessment is mandatory to recognise malnutrition early and initiate timely nutritional therapy (Norman et al 2008).

The BIA is one of the newer techniques for determining body composition and nutritional status. It is especially useful in patients with disturbed hydration and/or altered distribution of extra - and intracellular water, which is the case in many chronic illnesses (for example CKD, liver cirrhosis, heart failure and obesity). The most clinically established impedance parameter is the PA. The PA differs across categories of sex and age. In patients over 70 years old, the normal PA is approximately 5.5° in women (5.6±1.0°) and 6° in men (6.2±1.0°) (Barbosa-Silva et al 2005). Included patients were older adults (average age 70.8 years) and had several comorbidities. The study was performed at the Nephrology department were the most common concomitant illness was CKD. All patients were at increased nutritional risk (≥1 fulfilled NRS criterion). Their lower PA values (average 4.4, range from 3°, to 7°) are therefore understandable.

Lower PA values are associated with adverse prognosis in several diseases. Gupta et al (2004a) evaluated 52 patients (aged 29-79 years) with colorectal carcinoma and concluded that PA values were better at predicting survival than nutrition assessment methods commonly used in clinical practice. In another study, Gupta et al (2004b) confirmed the importance of PA as a prognostic indicator in patients with pancreatic cancer. Abad et al (2011) evaluated 164 dialysis patients (127 on hemodialysis and 37 on peritoneal dialysis) and found that PA is a good predictor of long-term survival in dialysis patients.

According to Araujo Antunes et al (2012), higher values of PA were prognostically favourable in HIV positive patients. In patients with liver cirrhosis, low PA values were associated with shorter survival times, according to a study by Belarmino et al (2017).

Authors, Varan et al (2016), performed a cross sectional study on 120 older adults (average age 75±7.27 years; mean PA 4.2±1.8°) and found statistically significant correlation between lower PA and higher malnutrition risk. According to their data, PA correlated with serum albumin and advanced age, which is similar to this study, where statistically significant correlation between PA and albumin level and between lower PA and advanced age was found.

Since PA and albumin level is influenced by the intracellular to extracellular water ratio, the lower values seen in older patients and in those with several chronic illnesses are thought to reflect a reduction in skeletal mass and hence intracellular water which may be compounded by oedema/extracellular accumulation with aging and poor health (Kyle et al 2012). According to Perna et al (2014), lower PA is linked to reduced relative muscle mass in the elderly. The results of the presented study did not confirm this, as no statistically significant correlation between PA and muscle mass was found. This is most likely due to a small sample size and different measuring technique used in their study (BIA vs Dual Energy X-Ray Absorptiometry - DXA).

No statistically significant correlation between serum albumin and muscle mass was found. Serum albumin is a potential marker of nutritional risk, but it is non-specific and can be reduced in several other conditions, such as in response to physiological stress, in CKD, liver disease and inflammation. Limited longitudinal research available on this topic questions the use of serum albumin measures for this purpose (Snyder et al 2012).

BIA is a promising method of determining fluid balance, nutrition status and it can also be used as a prognostic tool in patients with several chronic illnesses. By providing us with information on body composition it by-passes several weaknesses of other commonly used tools, such as BMI. In the future, more work should be done on detecting patients at risk for malnutrition. Patients at risk should be monitored more closely and they should also undergo nutritional education and if indicated, receive dietary supplements. Studies have shown that prompt intervention can decrease the rate of protein-energy wasting and have favourable prognostic implications (Ocepek et al 2017). There are not enough dietitians and nutritionists available to serve the entire healthcare industry. Nurses therefore play a very important role in nutritional risk assessment, education and in a potential intervention. They are an integral part of patient care, including nutritional assessment and should be properly educated in this field of practice (Henning 2009).

The presented study has several limitations. It is a small, single centre, cohort study, which was performed in only one out of several internal medicine departments in University Clinical Centre, Maribor. The study was performed in a Nephrology department, patients with CKD were therefore over-represented in the sample of included patients.

Patients unable to walk or stand, who are especially at risk for muscle wasting, were not included in the study due to the BIA measurement requirements. The study, however, also has some important advantages. It is one of the first studies researching the role of BIA in this part of Europe and it highlights the importance of nutritional status assessment by using different diagnostic modalities. All the patients in the study received nutritional education, performed by trained nurses. Due to the importance of social support, patients' relatives were also part of the nutritional education. Further monitoring, additional nutritional risk assessment and potential therapeutic interventions of the patients will be done through outpatient clinics.

CONCLUSION

Nutritional risk assessment should be made on all patients with chronic diseases. Currently, the best way is a multifaceted approach, including measuring body weight, height, BMI, serum albumin and performing a body composition analysis. PA values have important diagnostic, therapeutic and prognostic implications. Patients at risk and their relatives if possible should undergo nutritional education by trained professionals. Common reassessments of the nutritional status and prompt intervention in case of increased nutritional risk are important in all chronically ill patients.

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Quality Control Circle improves self-monitoring of blood glucose in Type 2 diabetic patients

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KEY WORDS

Quality control circle, diabetes mellitus, blood glucose monitoring, frequency

ABSTRACT

Objective
To determine the effect of quality control circle (QCC) activity on self-monitoring of blood glucose (SMBG) in type 2 diabetic patients.

Design
Pre-test Post-test study.

Setting
Outpatient clinic of a tertiary hospital in Eastern China.

Subjects
A total of 110 insulin-treated type 2 diabetic patients.

Interventions
Quality control circle.

Main outcome measures
Quality of self-monitoring of blood glucose and blood glucose control in patients.

Results
At the end of QCC activity, the proportion of patients performingregular SMBG and the frequency of SMBG were significantly increased. The incidence of using expired test strips, incorrect timing of blood glucose monitoring, improper operation and non-calibration of meters were all significantly decreased. Consequently, the levels of glycosylated hemoglobin,one-week fasting blood glucose, and one-month incidence of hypoglycemia were significantly decreased in these patients.

Conclusion
The QCC activity plays an active and beneficial role in improving SMBG and blood glucose control in patients with diabetes. This activity should be promoted in future clinical work.

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The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

INTRODUCTION

A quality circle or quality control circle (QCC) refers to a group of workers who do the same or similar work, or perform work complementary to each other. QCC activities have played important roles in the management of major enterprises in the United States of America, Europe, Japan and other developed countries. In recent years, QCC activities have been applied to management in various fields. The health care industry is of no exception. In daily hospital management, the QCC applies scientific analysis methods to find the crux of problems so as to develop corresponding implementation plans and goals and carry them out through different stages. QCC activities have been practiced in the management of medical quality (Wang et al 2013), wait time between continuous surgery (Zhang et al 2015), surgical site infection (Liu and Wang 2016) and hand hygiene compliance (Chen et al 2016) in Chinese hospitals. A previous study evaluated the effect of QCC on 1,103 type 1 diabetic patients receiving an intensive insulin treatment. Their results showed significant decrease in levels of glycosylated hemoglobin, incidence rates of severe hypoglycemia and ketoacidosis (Muller et al 1999).

The prevalence of diabetes mellitus continues to increase worldwide(International Diabetes Federation 2016; NCD Risk Factor Collaboration 2016). In China, a 10-fold increase in the prevalence of diabetes mellitus has been observed in the thirty years between 1980 and 2010 (Ma et al 2017). It is estimated there were as many as 114 million diabetic patients in China in 2010, and half of the Chinese adults had pre-diabetes mellitus(Xu et al 2013;Yang et al 2010).The complications and mortality associated with diabetes mellitus place a large economic burden on patients and the health care system (NCD Risk Factor Collaboration 2016; Diabetes Prevention Program Research 2012; Yang et al 2010). In contrast to the high prevalence,inadequate attention has been paid to self-monitoring of blood glucose(SMBG) in diabetic patients in China. Many diabetic patients demonstrate poor compliance and lack of systematic management of SMBG (Qin et al 2017; Zeng et al 2014).

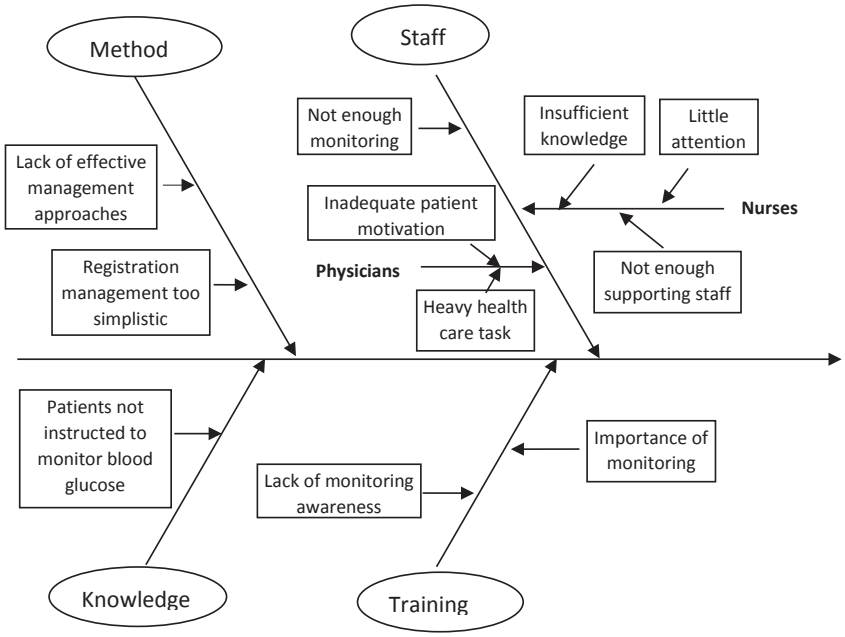
Type 2 diabetes mellitus is a chronic systemic disease. In addition to drugs, diet and exercise are important for the patients' treatment. SMBG is a simple and accurate reflection of the efficacy of treatment. This operation should be a part of treatment from the beginning of care. This study was designed to determine whether the QCC activity could improve the SMBG and blood glucosecontrol in type 2diabetic patients.

METHODS

The QCC was formed following the procedures described previously (Wang et al 2013). Nine experienced nurses from a total of 18 nurses working in the Department of Endocrinology self-selected to become members of the QCC. Of them, fourhad a Bachelor degree and five others had an Associate degree. One nurse was elected as the manager responsible for planning and organising the activities, anda senior nurse worked as a counselor to supervise activities of QCC. The QCC activity was initiated by the manager and participated by all nine members.The QCC activities were performed during July-December of 2016. The activity was held monthly within the Department. This study was approved by the Medical Ethics Committee of the hospital.

Based on the rationality, urgency, supervisors' suggestions, feasibility, expected outcomes, and ability to implement QCC members, to improve the SMBGin insulin-treated type 2 diabetic out-patients was selected as the theme for the QCC. The QCC was named as sugar control circle. The factors causing no or irregular SMBG were analysed from the aspects of staff, knowledge, methods and training (figure 1).

Figure 1: Factors of causing no or irregular self-monitoring of blood glucose in patients.



Inclusion criteria

All insulin-treated type 2 diabetic patients who had regular monthly doctor's visits during the last two years.

Exclusion criteria

Patients with incomplete orno records of SMBG,and patients without finishing the six-month QCC activity were excluded.

Based on the identified factors causing no or irregular SMBG in the patients, the following countermeasures were put forward to solve the issues in lack of SMBG in diabetic patients:

1. At the beginning of the study; all patients attended education sessions to understand the importance of controlling the blood glucose and the correct technique of SMBG.
2. Text message or other communication approaches were established to remind patients to monitor glucose every day.
3. Records of SMBG in diabetic patients were collectedduring each doctor's visit.
4. Members of QCC met monthly to check patients' records, identify problems and their causes, and bring about solutions.

The efficacy of QCC was evaluated based on changes in the following indicators before and after the activity:

1. frequencies of SMBG and the way of using glucose meters in patients. This information was obtained through survey during QCC activity, and cross-validated by the medical record;
2. blood glycosylated hemoglobin, morning fasting blood glucose levels, one-month incidence of hypoglycemia in patients;

3. scores of intangible results for members, including self-growth, engagement, personal ability, team spirit, communication and articulationskills and the use of the QCC(Wang et al. 2013).The intangible results were arbitrarily scored with 1~5points (1 - very poor; 2 - poor; 3 - fair; 4 - good; 5 - excellent) by each QCC member.

Statistical analysis

Data were analysed using the SPSS17.0 software package (SPSS Inc, Chicago, IL)(Chen et al. 2016).Quantitative data were presented as mean ± standard deviation. The t-test was applied to examine their differences before and after QCC activity. The qualitative data was expressed as percentage. The $\chi 2$ test was used to compare their differences before and after the QCC activity.A $P<0.05$ was considered to be statistically significant.

FINDINGS

A total of 110 insulin-treated type 2 diabetic patients were recruited in this study. The medical records showed that 59 patients (53.64%) did not perform regular SMBG. Of them, 17 patients (28.81%) were unconcerned with the need for SMBG due to lack of knowledge about diabetes; 13 patients (22.03%) neglected SMBG because of inadequate attention to the treatment; 23 patients (38.98%) had irregular SMBG owing to forgetfulness, inconvenience and intolerance to pain. These three factors accounted for 89.83% of patients who lacked regular SMBG.

Our result revealed that the proportion of patients withregular SMBGincreased from 46.37% before the QCC activity to 93.64% after the activity ($P<0.001$). The frequencies of SMBG were significantly increased in patients at the conclusion of the QCC activity, as compared with those before the QCC activity (table 1).

Table 1: Frequencies of self-monitoring of blood sugar before and after the QCC activity.

Frequencies of blood monitoring	Prior to QCC (n=110)	After QCC (n=110)	P value
Yes	51 (46.37)*	103 (93.64)	<0.0001
1~15/month	32 (29.09)	42 (38.18)	
≥15 /month	19 (17.27)	61 (55.45)	

* Data were presented as number (%).

After the QCC activity, the incidence of using expired test strips($P<0.0001$), incorrect timing of blood glucose monitoring($P<0.0001$), improper operation and non-calibration of blood glucose meters ($P<0.0001$), and incorrect recording of blood glucose values ($P<0.0001$) were all significantly decreased (table 2).

Table 2: The use of glucose meters before and after the QCC activity.

Indicators	Prior to QCC (n=110)	After QCC (n=110)	P values
Use of expired test stripes	34 (30.91)	4 (3.64)	<0.0001
Incorrect timing of monitoring	67 (60.91)	22 (20.00)	<0.0001
Improper operation of meter	35 (31.82)	11 (10.00)	0.0001
No calibration of meter	89 (80.91)	26 (23.64)	<0.0001
Incorrect recording of blood glucose	54 (49.09)	17 (15.45)	<0.0001

Compared to data prior to the QCC activity, levels of glycosylated hemoglobin (P<0.001),one-week fasting blood glucose(P=0.001), and the one-month incidence of hypoglycemia (P=0.039) were significantly decreased after the QCC activity (table 3).

Table3: Glycosylated hemoglobin, fasting blood glucose levels and one-month incidence of hypoglycemia before and after the QCC activity.

Indicators	Before QCC (n=110)	After QCC (n=110)	P values
HbA1c (%)	6.36 ± 0.23	5.74 ± 0.60	<0.001
Fasting blood glucose levels (mmol/L)	10.39 ± 3.23	9.06 ± 3.11	0.001
One-month incidence of hypoglycemia (%)	33 (33.00)	19 (17.27)	0.039

After the QCC activity, self-growth (P<0.0001), personal ability (P<0.0001), team spirit (P<0.0001), communication and articulation skills (P<0.0001) and the use QCC (P<0.0001), were significantly improved in QCC members (table 4).

Table 4: Scores the intangible results in QCC members (nurses) before and after the end of QCC activity.

Intangible results	Before QCC (n=9)	After QCC (n=9)	P values
Self-growth	2.44±0.78	4.23±0.86	<0.0001
Engagement	1.29±0.38	3.29±0.42	<0.0001
Personal ability	2.59±0.42	4.04±0.56	<0.0001
Team spirit	2.22±0.38	4.23±0.58	<0.0001
Communication and articulation skills	2.23±0.21	4.22±0.36	<0.0001
Use of QCC	1.15±0.28	3.98±0.74	<0.0001

DISCUSSION

The QCC was first introduced by Japanese doctor Kaoru Ishikawa. The QCC activities solve problems in accordance with scientific procedures and continue to improve the overall quality of management (Feng et al 2017; Chen et al 2016). This current study determined the effect of the QCC activity organised by a group of nurses on the SMBG in type 2 diabetic patients.The results revealed that QCC improved SMBG and blood glucose control in these patients.

The first finding in this study was that type 2 diabetic patients improved their SMBG after the completion of the QCC activity. A significantly higher proportion of patients perform SMBG and these patients demonstrated a significant increase in the frequencies of SMBG. On the other hand, using expired test strips, incorrect timing blood glucose monitoring, improper operation and no calibration of glucose meters, and incorrect recording of blood glucose occurred significantly less in these patients. We speculate that participation in QCC activity helped patients to change their traditional concept of treatment,realise the importance of SMBG, andenhance their awareness of self-monitoring. The patientswere therefore more willing to fully mobilise and empower their self-discipline,and move from passively to actively accepting the treatment. Participation in QCC activity thus improves the SMBG in these patients.Similar to these findings, several previous studies have reported the beneficial effects of QCC on management in various fields in China (Chen et al 2016; Liu and Wang 2016; Zhang et al 2015; Wang et al 2013).

As a chronic systemic disease, blood glucose monitoring is particularly important for patients with type 2 diabetes. The American Diabetes Association recommends that SMBG is a must for diabetic patients prescribed drug treatment, and a powerful weapon in the control of ideal blood glucose levels (Chamberlain

et al 2016). Clinical application guide of blood glucose monitoring in China (Chinese Diabetes Society 2015) also recommends daily monitoring of blood glucose for diabetes patients. The data in this study provided strong evidence supporting the importance of regular and correct SMBG during the treatment of patients with type 2 diabetes. With the improvement in SMBG after participation in QCC activity, the patients demonstrated a significant decrease in the levels of glycosylated hemoglobin and fasting blood glucose. In addition, the one-month incidence of hypoglycemia was also significantly decreased in these patients.These results imply that SMBG assists to enhance the efficacy of blood glucose reducing treatments, stabilise blood glucose levels and effectively reduce complications of diabetes. Improvement in SMBG thereby has its potential to enhance the overall health of the patients.

This study demonstrated that intangible results of members (nurses) improved after participation in the QCC activity. During the QCC activity, members cooperated collectively, drew upon useful opinions and developed themes for the project. The factors causing no or irregular SMBG were identified and corresponding approaches were developed by members in this QCC activity. All members of QCC evaluated and confirmed the process to ultimately achieve the desired outcomes (Zhang et al 2015). Members in QCC automatically and spontaneously participated in the management of patients' SMBG. The QCC activity allowed members to alter working attitudes, become more active, inspire their team awareness, and fully mobilise their initiative. Indeed, self-growth, engagement, personal ability, team spirit, communication and articulating skills, and use of QCC were all significantly improvedin members after their participation in the QCC.

The limitations of this study include a non-random study design without a control group. There is a possible selection bias in patients who participated in the QCC. It is noted among all insulin-treated type 2 diabetic patients who had regular monthly doctor's visits during the last two years, only nine patients were excluded from the study due to no interest in this activity (n=6) or incompliancewith the study (n=3). Another limitation is that other confounding information related to blood glucose control including drug treatment was not included. In addition, the intangible outcomes were not scored objectively. Though no control group was included, this study found the QCC activity lasting for six months improved SMBG and blood glucose control in type 2 patients within six months. Before the activity, a high proportion of these patients performed no or irregular SMBG for two years.

CONCLUSION

The QCC activityplays a positive role in the patient's SMBG. Itimproves the frequencies and corrects the improper way of monitoring, and consequently enhances the efficacy the treatment. It also improves team awareness and empowerment in health care teams. QCC is a worthwhile process that should be promoted in clinical work in the future.

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Validity and reliability of the Teamwork Evaluation of Non-Technical Skills tool

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KEY WORDS

Teamwork, TENTS, instrument validation, observational tool

ABSTRACT

Background
TENTS (Teamwork Evaluation of Non-Technical Skills) is a valuable team performance, 13 item observational assessment tool that has been used in clinical settings, but validity and reliability have not been tested.

Objective
This study conducted validity and reliability tests on the TENTS observation tool.

Method
This study used a convenience sample of 109 teamwork event observations conducted in an academic medical center in the United States of America (USA). Five different events were observed; new admissions, transfers to and from other units, rapid response team events, morning rounds, and medical procedures. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted and the Cronbach's alpha coefficients of the inventory were obtained.

Result
The EFA results indicated the TENTS tool consisted of three factors; communication, leadership, and cross-monitoring. These three factors accounted for 46.30% of the total variance and their internal consistencies (Cronbach's α) were .71–.79 (.88 overall).

Conclusion
TENTS is a valid and reliable instrument for observing a variety of clinical teamwork events. EFA and CFA demonstrated that the tool is well-aligned with long-standing essential teamwork components described in the literature and in the TeamSTEPPS™ system.

INTRODUCTION

Several studies have identified teamwork as a crucial factor for reducing medication-related errors, improving care quality, and patient safety (Wheeler et al 2018; Pellegrin et al 2017; Xu et al 2017; Hicksand et al 2014). The Agency for Healthcare Research and Quality developed TeamSTEPPS™, ("TeamSTEPPS 2.0 Online" 2018 DEC) an evidence-based teamwork program that is designed to optimize patient outcomes by improving health care professionals' communication and teamwork skills. However, evaluating the outcomes of TeamSTEPPS™ training is difficult without a proper instrument.

The Teamwork Evaluation of Non-Technical Skills (TENTS) tool was designed and developed by Hohenhaus et al (2008) to measure teamwork performance and has been used in clinical studies (Fraino and Sneha 2015; Sheppard et al 2013; Mayer et al 2011). After obtaining permission from the original author (Hohenhaus et al 2008), the original TENTS tool was modified to eliminate redundancy and add clarity to item meaning and was used while conducting interdisciplinary team event observations during research to evaluate the impact of TeamSTEPPS™ training. The purpose of this study is to test TENTS validity and reliability through a literature review and factor analysis using the observation data.

BACKGROUND

There are two ways in the literature to measure teamwork. One is via the use of retrospective self-evaluation questionnaires, the other is independent observation and evaluation of team performance during team events. This study focuses on the independent observation and evaluation of individual or team performance.

Eleven teamwork evaluation instruments identified in the literature are listed in table 1. Most of the identified teamwork observation tools were designed to evaluate team performance, and two tools were designed to evaluate individual team members during team meetings (Jalil et al 2014; Lamb et al 2011).

Current teamwork observation tools have limitations. The instruments may have limited applicability to all clinical settings. For example, six instruments are limited to use in critical care settings, such as the emergency department or intensive care units, two are designed for use in the operating room (Hull et al 2011; Mishra et al 2009), two are specific to meetings (Jalil et al 2014; Lamb et al 2011), and one for the delivery room (Guise et al 2008). Also, the rating scales used in the instruments vary from one another. Some instruments use qualitative analysis (quality of behavior), others focus on quantitative analysis (frequency of behavior), and one focuses on both frequency and quality (Weller et al 2011). However, Weller et al (2011) only used one question to evaluate the overall quality of the teamwork. Finally, the reliability and validity of these instruments has not been thoroughly tested. Seven out of 11 instruments provide inter-rater reliability, but only five provide internal consistency, only Cooper et al (2010) provided both. All instruments provide content validity, but only two teamwork observational instruments used exploratory factor analysis (EFA) to investigate construct validity (Kolbe et al 2013; Cooper et al 2010). The results indicated that the Teamwork in Multidisciplinary Critical Care Tool (Weller et al 2011) has three factors and the Team Emergency Assessment Measure (Cooper et al 2010) has one factor. Teamwork observational instruments have been tested during actual live events, video events, simulated events (Sawyer et al 2013; Guise et al 2008; Malec et al 2007) or both video and live events (Jalil et al 2014). Among these, actual live events are the most suitable for determining the feasibility and accuracy of observational instruments; however, less than half of the instruments have been tested during actual live events. Observers require focus and familiarity with an instrument when using it for evaluation during actual live events; video events can be viewed multiple times and thus are easier to evaluate compared to actual live events. In simulated events, team members' actions can be anticipated, and thus simulated events are also easier to evaluate than actual live events. Lastly, most teamwork observation instruments only partially

measure TeamSTEPPS™ concepts. For example, the Oxford Nontechnical Skill in Operating Room (Mishra et al 2009) focused on problem-solving and decision-making and did not focus on mutual support. Only the Team Performance Observation Tool (Sawyer et al 2013) has been developed according to TeamSTEPPS™; however, the Team Performance Observation Tool only tested for internal reliability and content validity.

Table 1: Summary of teamwork observational tools

Name of Instrument	Developing authors	Applied Field	Validity	Reliability	Rating score	Rating professional	Live event/ Video
Clinical Teamwork Scale	(Guise et al 2008)	Specificity (delivery room)	Content	Inter-rater, Test-retest	Quality	Team	simulation
The Framework for Observing Coordination Behavior in Acute care teams (Co-ACT)	(Kolbe et al 2013)	Critical care	Content	Inter-rater	Frequency	Team	Video
Explicit Professional Oral Communication Observation Tool	(Kemper et al 2013)	Critical care	Content	Inter-rater Reliability	Frequency	Team	Live
Multidisciplinary Team Performance Assesment Tool	(Lamb et al 2011)	Specificity (Tumor board meeting)	Content	Inter-rater	Quality	Individuals	Video
Mayo High Performance Teamwork Scale	(Malec et al 2007)	Critical care	Content, Construct	Inter-rater	Frequency	Team	Simulation
Oxford Nontechnical Skill in Operating Room	(Mishra et al 2009)	Specificity (Operation room)	Content, Concurrent	Internal consistency	Quality	Team	Live
Observational Teamwork Assessment for Surgery	(Hull et al 2011)	Specificity (Operation room)	Content	Internal consistency	Quality	Team	Live
Team Performance Observation Tool	(Sawyer et al 2013)	Critical care	Content,	Internal consistency	Quality	Team	Simulation
Teamwork in Multidisciplinary Critical Care Tool	(Weller et al 2011)	Critical care	Construct (EFA)	Internal consistency	Frequency Quality	Team	Live
Team Emergency Assessment Measure	(Cooper et al 2010)	Critical care	Construct (EFA)	Inter-rater, Test-retest, Internal consistency	Frequency	Team	Video
Team Performance Assessment of Multidisciplinary Tumor Boards	(Jalil et al 2014)	Specificity (Tumor board meeting)	Content, Construct	Inter-rater	Quality	Individuals	Live, Video

The TENTS does not have these limitations. It can be used in multiple settings and for multiple team events. TENTS can be used to measure the team performance across healthcare professionals or of one health care professional. The tool measures the quality of multiple team behaviors. Since TENTS was developed based on the concepts of TeamSTEPPS™, this study may provide the needed construct validity by using EFA and also convergent validity by using CFA.

INITIAL INSTRUMENT DEVELOPMENT

Salas et al (2008) identified five core concepts of teamwork; team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation. Team leadership refers to the designated or situational team leaders who monitor team activities, cultivate a positive team atmosphere and provide feedback to achieve optimum team performance. Mutual performance monitoring is the ability of team members to monitor their own and other team members' performance. To balance self-monitoring with awareness of others, members must understand one another's roles and responsibilities. Backup behavior occurs when team members anticipate and provide support to other team members. Adaptability is crucial for teamwork as team members respond to rapidly changing and diverse situations. Finally, team orientation is a focus on the success of the collective team that facilitates the open sharing of knowledge and opinions while incorporating the expertise, preferences, and personal goals of all members. These five core concepts of teamwork are aligned with the four core concepts of TeamSTEPPS™; leadership, mutual support, situation monitoring and communication. An observation measurement tool also aligned with these concepts is needed.

The instrument was developed by Hohenhaus et al (2008) to measure four dimensions: communication, leadership, situation monitoring, and mutual support. It contains 21 items and five scale points ranging from "expected but not observed" (0) to "observed and good" (4). The last two of the 21 items measure overall leadership and teamwork. These items were developed using the four core concepts of the TeamSTEPPS™ program. The instrument provides detailed expressions of the scale to enable comprehensive observation. For example, when evaluating the difference between "observed and acceptable" (3) versus "observed and good"(4),the description of good (4) -"the performance is consistent and can be used as a positive example for others", provides a clear definition to distinguish between the two scores.

METHOD

Sample and Participants

Five event types were observed and evaluated using the instrument, new admissions, transfers to and from other units, rapid response team events, morning rounds, and medical procedures such as bronchoscope, stomach scope or take off ECOM, etc. (see table 2).

Each event involved at least two different health care professionals. For example, new admissions usually involved physicians and nurses familiar with each other performing an inital assessment and developing a treatment plan. Transfers to and from other units involved physicians and nurses unfamiliar with each other sharing information about the patient. Rapid response team events involved physicians, nurses and a respiratory therapist responding to urgent patient situations all over the hospital and interacting with many other unfamiliar team members. Morning rounds usually involved physicians, nurses, a pharmacist and sometimes a nutritionist gathering daily to determine treatment and care plans for patients. Medical procedures involved physicians, nurses and an anesthesiologist or technician forming a team again with a mix of familiar and unfamiliar team members.

The events were observed mostly in a pediatric intensive care unit or a surgical intensive care unit, and rapid response team events were observed all over the hospital. The final 109 events were used for data analysis. One observer was recruited to observe all the events. A program director periodically observed events alongside the observer to ensure that the observer maintained the same evaluation standard for all events. The interrater agreement was .90 at the beginning and at the middle of the observation period that spanned one year.

Table 2: Types of observed events (N= 109)

	Frequency	Percent %
New admissions	59	54.1
Medical procedures	12	11.0
Morning rounds	3	2.8
Rapid response teams	16	14.7
Transfer to and from other units	19	17.4
Total	109	100.0

Procedure

Prior to beginning the analysis, four experts were invited to examine the content validity of the tool, two of whom were clinical experts and two of whom had PhDs in nursing. Some items were deleted because of redundancy or if they had been only rarely observed.

The remaining items were confirmed using exploratory factor analysis (EFA) and confirmative factor analysis (CFA). EFA used principal axis factor analysis and promax rotation with Kaiser Normalization. All eigenvalues were greater than 1.00. Items with factor loadings greater than .40 were retained and item–item and item–total correlations were between .30 and .70 (Pett et al 2003).

Two-stage CFA, employing first- and second-order confirmatory factor models, was performed using the EFA model to confirm the structure of the subscale produced through EFA. The model was confirmed using the following criterion: items with factor loadings greater than .50 were considered significant. Goodness-of-fit was defined by a normed fit index (NFI), goodness-of-fit index (GFI), comparative fit index (CFI), and Tucker–Lewis index close to or greater than .90 (Kline 2015).

Internal consistency was confirmed using the Cronbach's alpha coefficients of the overall scale and subscales. Internal reliability was confirmed by a Cronbach's alpha greater than .70 (Nunnally and Bernstein 1967). The analyses were conducted using IBM SPSS AMOS version 18.

FINDINGS

Content Validity

Before use in the observational study and evaluation of its content validity, the TENTS tool was modified with permission from the original author (Hohenhaus et al 2008). The experts consulted in the present study indicated that "speak up" and "ask questions" are similar concepts and suggested deleting "speak up." In addition, they suggested the other three items, "support others," "secure additional resources," and "backup behavior," are similar concepts, and thus suggested deleting two of these items. "Support others" and "secure additional resources" were subsequently deleted. "Uses appropriate critical language," "employs conflict resolution," and "debrief completed" were also deleted because they could not be observed during or when applied to most of the observation events. The other two items, "overall communication" and "overall teamwork," were not included in the factor analysis because they were not necessary for determining individual factors, only for obtaining an overall rating of the events.

Event Characteristics

The following five event types were observed: new admissions (n = 59, 54.1%), transfers to and from other units (n = 19, 17.4%), rapid response team events (n = 16, 14.7%), morning rounds (n = 3, 2.8%), and medical procedures (n = 12, 11.0%).

Exploratory Factor Analysis (EFA)

The Kaiser–Meyer–Olkin test result was greater than .60 (.87) and that of the Bartlett's test of sphericity was significant ($\chi 2 = 504.92$, df = 78, $p < .001$). Both results indicated adequate sampling and a suitable correlation matrix for EFA (Pett et al., 2003). The item measures for sampling adequacy were all higher than .60, which also indicated adequate sampling (Pett et al 2003). In each subscale, all item loadings were greater than .40 and item–item and item–total correlations were all between .70 and .30; therefore, no items were deleted. The final solution was constructed based on the factors of communication, leadership, and cross-monitoring. Communication (five items) represented all attitudes, information, and skills related to team communication; leadership (four items) represented the leadership-related behavior of the leader; while cross-monitoring (four items) represented the team members' interaction behaviors. These three subscales accounted for 37.9%, 4.3%, and 4.1% of the variance respectively (see table 3)

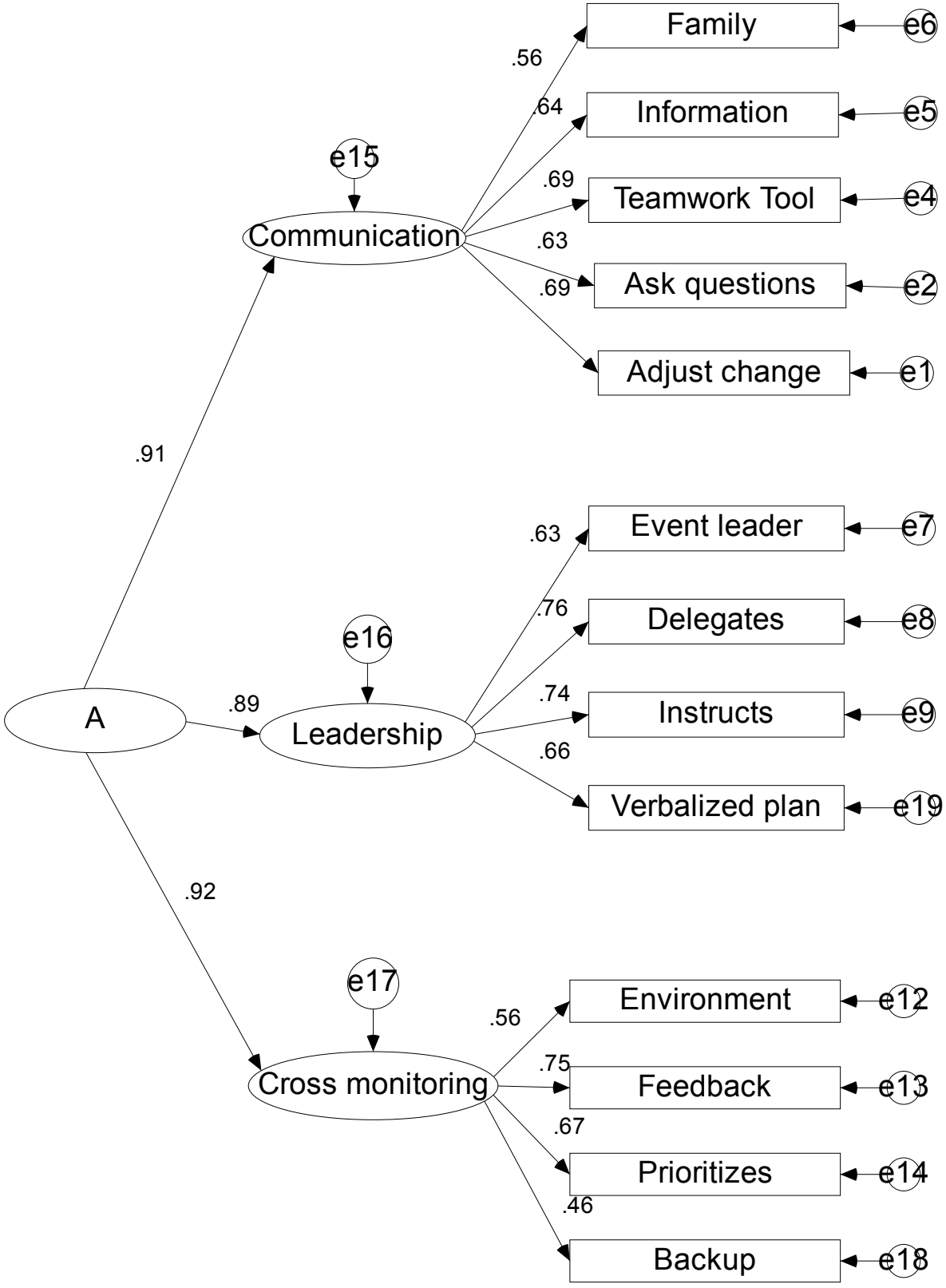
Table 3: Means, Standard deviation, and Pattern Factor Loadings of the TENTS

Original Factor	EFA factor	Mean	Standard deviation	Factor Loading	α
	Factor 1: Communication				.77
Communication	Utilizes teamwork tools	2.70	.78	.82	
Communication	Sends and receives appropriate information	2.75	.67	.64	
Communication	Sends and receives information to/ from patient/family	3.44	.77	.52	
Communication	Asks questions	3.51	.55	.45	
Situation monitoring	Verbalizes adjustments in plan as changes occur	3.13	.83	.43	
	Factor2 : Leadership				.79
Leadership	Instructs as appropriate	3.28	.68	.82	
Leadership	Delegates as appropriate	3.10	.73	.69	
Leadership	Establishes event leader	3.19	.73	.59	
Leadership	Verbalizes plan: States intentions, recommendations and timeframes	2.98	.82	.40	
	Factor 3:Cross monitoring				
Situation monitoring	Uses back-up behavior	3.48	.63	.63	
Situation monitoring	Visually scans environment	2.87	.90	.59	
Mutual support	Prioritizes appropriately	2.95	.71	.48	
Communication	Utilizes feedback between team members	3.05	.77	.41	.71
					.88

*The bold words of each item indicate the labels used in the CFA

The factor loading of "backup behavior" was lower than .50 (.46). All other items (12) were significant, with factor loadings greater than .50. The goodness-of-fit was determined using the NFI (.85), GFI (.91), CFI (.97), and Tucker–Lewis index (.96), all of which were close to or greater than .90 (figure 1).

Figure 1: A second-order confirmatory factor model of the Teamwork Evaluation of Non-Technical Skills Tool (TENTS)



Internal Consistency

The Cronbach's alpha coefficient was .88 for the overall scale, .77 for the first factor, .79 for the second factor, and .71 for the third factor. Thus, internal reliability was confirmed because all Cronbach's alpha coefficients were greater than .70.

DISCUSSION

This study evaluated the psychometric properties of the TENTS tool. Although the original design of the tool has four subscales (communication, leadership, situation monitoring, and mutual support), the EFA results in this study indicated the existence of only three because of the merging of mutual support and situation monitoring. Mutual support is defined by TeamSTEPPS™ as team members helping one another and is dependent on information obtained through situation monitoring, which is defined as the process of scanning to observe other team members and the environment. Although differentiating between mutual support and situation monitoring is simple, these concepts are related in that the interaction between situation monitoring and mutual support can be observed only when team members help or offer help. Therefore, the combination of mutual support and situation monitoring is similar to the concept of cross-monitoring, which refers to the process of scanning team members and their environment to assess their actions.

Three items—"speak up," "secure additional resources," and "support others"—all of which were in the subscale of mutual support in the Hohenhaus et al (2008) scale. "Speak up," was deleted because of the similarity with "ask questions", although "ask questions" was originally below "communication" subscale and "Speak up" was below the "mutual support/assertion" subscale. Hohenhaus et al. (2008) defined "ask questions" as team members feeling comfortable asking questions and "speak up" as team members' ability to express themselves in an appropriate manner. In the observations, a questioning sentence structure was often used to express differing views of the situation, therefore "speak up" was deleted.

"Secure additional resources" and "support others" were deleted because "backup behavior" represents these aspects of supportive behavior. In addition, "secure additional resources," "support others," and "backup behavior" were originally in the same subscale of "mutual support/assertion" and all involve asking for or offering help. "Secure additional resources" refers to asking other team members for help. "Support others" refers to providing help when help is required by another team member (Hohenhaus et al 2008), while "backup behavior" indicates team members' awareness of other team members' strengths and weaknesses and their provision of help in a timely manner (Hohenhaus et al 2008). With three slightly different concepts, team members engaged in cross-monitoring may accordingly backup each other, so "secure additional resources" and "support others" may not be necessary because team members directly offer help when required. Although the factor loading of the "back up" is .46 which is lower than .5, "back up" was retained in the model because it encompasses how team members perform situation monitoring and provide one another needed support. This is also considered an important factor related to cross-monitoring other team members' behaviors.

The CFA model identified similar underlying constructs as included in the original TENTS tool. The first construct was communication and it contained the 4 communication variables from TENTS and supported adding the additional "adjust change" variable that was originally included in situation monitoring. "Adjust change" is the behavior of team members thinking out loud to communicate while confirming a shared mental model as the event unfolds. The verbalization aspect of adjust change fits the communication construct. The construct of leadership contained the same variables as those in Hohenhaus et al (2008). The third construct, cross-monitoring, was similar to situation monitoring in the original TENTS. However, cross-monitoring considered not only situation monitoring but also all team members monitoring each other. Therefore, "prioritize" and "offer feedback" fit into this subscale.

TENTS has been successfully used to evaluate teamwork events in pediatric and surgical intensive care units and rapid response team events in a variety of hospital settings in real time. Although some items were deleted for being too similar to other items, the remaining items enabled the observer to better detect teamwork behaviors. During real-time events, a teamwork observer must immediately distinguish and score a team member's behaviors. This study's reduction of the number of items in TENTS enabled the observer to concentrate on team behavior performance rather than distinguish between various behaviors, thereby minimizing interrater bias and ensuring consistency. This study recruited only one observer and initially used interrater reliability to distinguish between the observer and program manager. The interrater agreement was .90 at the beginning and in the middle of this study.

LIMITATIONS

TENTS can only evaluate the performance of non-technical team skills and not that of clinical skills. Communication with patients or their family members is crucial for patient safety and can be enhanced through teamwork (Xu et al 2017). The original observation events were deleted when patient interaction was not possible and resulted in a smaller sample size. Most of the existing teamwork observational instruments were tested in intensive care units, the emergency care unit, or operating rooms (Hull et al 2016; Kolbe et al 2013; Weller et al 2011). TENTS also was tested mostly in intensive care units with a small number of events observed in general care units.

CONCLUSION

This paper reports on testing the TENTs using 109 event observations. A structure of content validity, reliability, EFA, and CFA was undertaken. To the best of our knowledge, this was the first study to use CFA to test a teamwork observational tool although the sample size was relatively small. The reduced number of items in the TENTS tool facilitated the observation of teamwork in this study. Findings indicate TENTS accurately measures the essential components of teamwork as described in the literature and emphasized in TeamSTEPPS™ and can be used in a variety of settings. A recommendation for future research is to test the use of TENTS as a measurement tool during interprofessional interactions with patients and their family members in general care settings.

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Fast-track rehabilitation and nursing care in post-anesthesia care unit on orthopedic patients

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KEY WORDS

orthopedic surgery, general anesthesia; fast-track rehabilitation; nursing

ABSTRACT

Objective
To assess the efficacy and outcome of fast-track rehabilitation (FTR) for orthopedic surgery patients.

Design
Randomised trial.

Setting
primary care.

Subjects and Methods
Two hundred and twenty patients undergoing orthopedic surgery under general anesthesia between November 2015 to March 2017 were randomly divided into traditional care (control, n=110) and fast-track rehabilitation (FTR, n=110) groups. Patients in the control group were given regular and routine care, while those in FTR group were cared for with multimodal rehabilitation. Demographic and data, postoperative hospital stays, surgical and general complications were assessed.

Results
One hour postoperative body temperature was higher in FTR group than in the control, and the incidence of restlessness, pain and 24 hour postoperative nausea and vomiting were significantly lower ($P < 0.05$, $P < 0.01$). The hospital stays were shorter following the FTR, but the difference was not statistically significant as compared with the control.

Conclusion
FTR can effectively reduce the complications and promote the recovery of the orthopedic patient.

INTRODUCTION

Fast-track surgery (FTS) initiated in the early 1990s aiming to reduce the length of hospital stays has been adapted in many hospitals (Esakov et al 2018; Kastelik et al 2018; Rao et al 2017). The main goal of this concept is to reduce the postoperative length of hospital stay (LOS) and accelerate the recovery of patients. To achieve this, a multidisciplinary team approach is implemented to maintain cardiovascular, pulmonary, gastrointestinal, neurological and humoral functions (Kehlet 2005) under the Consensus Guidelines for ERAS (Lassen et al 2009). This approach combines new technologies and methods with traditional care to reduce the postoperative stress response, complication rate and mortality, and hospitalisation costs (Na et al 2014; Anderson et al 2003). Based on syndrome medicine, a series of interventions can be implemented on preoperative, intraoperative and postoperative patients to minimize intraoperative stress and accelerate postoperative rehabilitation (Offodile et al 2018; Sizonenko et al 2018; Fierens et al 2012). Patients undergoing orthopedic surgery often have severe trauma and are slow to recovery (LeBlanc et al 2014). It is therefore important to develop pathways that reduce surgical stress and enhance rehabilitation for them. Post-Anesthesia Care Unit (PACU) care has been proposed to provide continuous monitoring of patients following anesthesia and surgery to reduce postoperative complications (Varadhan et al 2010; Jakobsen et al 2006). Several studies have shown that FTS rehabilitation improves patient's recovery. For example, it was found that adding a 15-minute-walk on the day of surgery did not increase pain in patients after total knee arthroplasty with enhanced recovery (Zietek et al 2015). Reduced length of stay, increased patient satisfaction and low revision rates together with improved health-related quality of life and functionality have been reported when FTS is implemented (Winther et al 2015). However, it is unclear if and how FTR in PACU would enhance the recovery of orthopedic patients. We investigated the recovery of orthopedic patients with FTR interventions in PACU, and report the role of nursing in the FTR.

PATIENTS AND METHODS

Two hundred and twenty patients undergoing orthopedic surgery under general anesthesia and moved to PACU with tracheal tubes between November 2015 and March 2017 at our hospital were selected for the study. All patients had limb fractures. Patients with pathological fractures and serious cardiovascular or other organ dysfunction were excluded. The patients were randomly divided into 110 cases in the control and the FTR groups using a random number table. The control group consisted of 46 male and 64 female, aged from 29 to 91 (57.76 ± 13.76) years with 24 cases of upper limb fracture and 86 cases of lower limb fracture. The operation time ranged from 55 to 220 (128.04 ± 69.29) minutes. There were 54 males and 56 females in the FTR group, aged from 25 to 88 (59.22 ± 15.74) years. 28 and 82 patients in the group had upper limb lower extremity fracture, respectively, and the operation time was 65 to 210 (120.26 ± 55.16) minutes. There was no significant difference in gender, age and operation time between the two groups ($P > 0.05$).

THE FAST–TRACK PROCEDURE

The fast–track procedure is based on principles previously described (Husted 2012; Kehlet and Wilmore 2008) and was implemented by the nursing team. For patients in the control group, the traditional anaesthesia and PACU resuscitation cares were used. After surgery, the patients with tracheal tubes were sent to the PACU at 22 to 24 degrees celsius with a humidity of 50% to 60%, where they were connected to a connecting ventilator with a tidal volume of 8 to 10mL/kg, respiratory frequency of 12 times/ min at an oxygen flow rate of 1 to 2L/min. The patients were monitored for heart rate, respiration, arterial blood pressure and blood oxygen saturation using a multifunction monitor (MP30, Philipps, USA). Postoperative infusion liquid was heated to 37 degrees celsius and infused at a speed of 40 of 60gtt/min. Patients were prescribed analgesic agents

if the pain was unbearable. Once breathing spontaneously, the patients were intravenously injected with 0.02mg/kg of neostigmine (0.02 mg/kg) and atropine (0.01 mg/kg). After extubation oxygen (2-3 L/min) was supplied using nasal cannula till the Steward score was equal to or more than four, and the patient was sent back to the ward. For patients in the FTR group, the nursing team performed the following additional cares:

Body temperature Control

Once sent to the PACU, patient's axillary temperature was measured. If the temperature was < 36 degrees celcius, heating was given at 38 degrees celcius till the temperature reached 37 degrees celcius.

Infusion control

Infusion volume and rate were carefully controlled according to the change of vital signs of patients after operation to meet minimum effective perfusion. In general, the infusion rate was between 20 to 40gtt/ min to avoid excessive heart and lung burden.

Reducing extubation stimulation

Patients continued to use propofol after entering PACU till spontaneous breathing occurred, tidal volume and ventilation volume had restored to the normal range. The patients ceased to use the ventilator. If SpO_2 was > 0.95 and swallowing was observed, the tube was removed and propofol was then discontinued.

Pain care

Thirty minutes before extubation or operation, patients were given analgesics. After operation, analgesics were applied with enhanced and foreseeable pain care. The pain was evaluated as soon as the patients become conscious. If the pain score was two to three, the nurses would take measures to transfer patient's attention, such as playing light music or conducting psychological counseling. If the score was > four, appropriate analgesics were given. If necessary, the analgesic pump might be used for individualised analgesia.

Nausea and vomiting prevention

For patients undergoing lower extremity surgery, nerve block analgesia was applied to reduce opioid drugs that may cause nausea and vomiting. When necessary, antemetics such as droperidol were used.

Psychological intervention

Once conscious, the nurses were introduced to the patients, who would explain the details of surgery, location and time where he/she stayed, as well as the function of PACU to the patients. The purpose was to let patient to have a full understanding of surgery and postoperative care processes for better compliance and cooperation.

Evaluation method

Temperature at the completion of the operation and one hour after were compared. Riker sedation-agitation scale (SAS) and pain numeric rating (PNR) scale were used to assess the sedation-agitation and pain after extubation. The incidence of nausea and vomiting within 24 hours after operation was recorded.

ETHICS

The Declaration of Helsinki (World Medical Association 2008) ethical principles for research involving human subjects were applied. The study was approved by the ethics committee of the hospital. All patients were informed about the study's purpose, the voluntary nature of their participation, and the right to withdraw at any time. Oral informed or written consent was obtained from every participant.

STATISTICAL ANALYSIS

Data were analyzed using SPSS21.0 software. Measurement data were compared using the t test and rank sum test. χ^2 test was used to compare enumeration data. The significant level was set at 0.05.

FINDINGS

Temperatures in the two groups are presented in table 1. As shown, the average one hour post-operative temperature in the FTR group was significantly higher as compared to those in the control, while the temperatures immediately after operation were similar.

Table 1: Body temperatures of orthopedic patients immediately and one hour after surgery

Group	No. patients	Immediately after surgery	1 hour after surgery
Control	110	34.84±0.27	36.00±0.20
Fast-track rehabilitation	110	34.90±0.23	37.12±0.25
t		1.196	22.627
P		>0.05	<0.01

The scores of sedation-agitation and pain and the incidence of nausea and vomiting after extubation and hospital stay days are shown in table 2. These figures were significantly less in the FTR group than in the control group.

Table 2: Scores of sedation-agitation and pain, the incidence of nausea and vomiting after extubation and hospital stay days

Group	No. patients	Sedation-agitation	Pain	Nausea	Vomiting	Hospital stays (day)
Control	110	4.06±0.82	4.02±1.31	18 (16.4)	16 (14.5)	34.4±6.55
Fast-track rehabilitation	110	3.78±0.42	1.90±0.88	4 (3.6)	2 (1.8)	30.6±4.55
X^2/t		2.10	7.06	5.01	4.39	12.22
P		<0.05	<0.05	<0.05	<0.05	<0.05

DISCUSSION

Perioperative stress results from many aspects, including tension, anxiety, hunger, hypothermia, pain, anesthesia and infusion and each of them has an impact on the whole treatment and recovery effect. Applying the concept of FTR would optimize the efforts of medical treatments and nursing measures, reduce the stress and accelerate recovery (Fierens et al 2012; Basse et al 2002) . Several nursing care measures were implemented in our study as part of FTR care to accelerate patient's recovery. Psychological nursing is an important part of FTS. Since the operation causes injury of the body, the patient has the psychology of fear, tension, anxiety and depression. The study shows that 38.46% and 23.08% of fracture patients feel anxious and depressed, respectively (Tang et al 2008). Anxiety and depression often make patients less cooperative in the surgery and increase the risk of operation and postoperative complication rate (Brooke et al 2014). Appropriate psychological care helps relieve patients from the fear, anxiety and physiological stress, resulting in better recovery with less complications (Na et al 2014). In addition, psychological nursing helps develop a good nurse - patient relationship and reduce the emotional fluctuation, psychological and physiological stress of patients. In this hospital, much of psychological nursing is offered by senior nurses, who have been specifically trained or acquired relevant know-how during their career.

Preventing hypothermia after an operation is another important aspect of postoperative care. Perioperative hypothermia is a common complication of surgery, leading to 1.0 to 15 degrees celcius reduction of body temperature in 50% to 70% patients after surgery (Giuliano and Hendricks 2017). Hypothermia may cause a number of adverse reactions, such as incision infection, myocardial ischemia, adverse cardiac events, chills,

and coagulation dysfunction, and prolong and affect the effect of drugs, delay the awakening of anaesthesia and increase mortality. Maintenance of normothermia can reduce the influence of body temperature on coagulation mechanism, drug metabolism and oxygen consumption, and reduce low temperature-associated complications (Prunet et al 2012; Khan et al 2011). As part of FTR, controlled infusion on operation day and after operation is closely monitored by the nursing team in the hospital. It was noted that in the traditional surgical operation and post operation, large infusion is used to maintain desirable blood pressure. However, the postoperative stress would lead to increased secretion of antidiuretic hormones, resulting in water and sodium retention. Therefore, large infusion would aggravate cardiovascular burden. There is evidence that reduced liquid infusion is beneficial for reducing postoperative complications and shortening the postoperative hospital stay (Brandstrup 2006). Therefore, as long as the patient's vital signs are normal, the amount of fluid infusion should be restricted. Reducing pain-induced irritation is an important step in FTR care. Although preventive analgesia effectively reduces the stress response of patients (Buvanendran and Kroin 2009), this study found that nursing care also assists calm the patient's emotion and irritation and should be enhanced. Prevention of postoperative nausea and vomiting, which are common complications after surgery, is another part of nursing intervention to alleviate the negative emotions of patients. This can be achieved by providing a comfortable, clean environment, and if necessary, the use of prescribed antiemetics.

This study shows that by practicing the above-mentioned FTR care through the nursing team, the one hour post-operative temperature, scores of sedation-agitation and pain, the incidence of nausea and vomiting and hospital days were significantly reduced compared to traditional care, demonstrating these nursing measures are effective in accelerating the recovery of the orthopedic patient. The study shows that for orthopedic patient care in the PACU following general anesthesia, it is possible to shorten the hospitalisation time, improve patient satisfaction, minimise surgical stress, prevent and reduce the complications and promote postoperative rehabilitation through combined use of several care measures.

CONCLUSION

A FTR care helps improve the treatment outcomes of patients undergoing orthopedic surgery and the nursing team plays a pivotal role in implementing the program.

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Bioelectrical impedance analysis as a marker of nutritional status in chronically ill patients

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KEYWORDS

nutritional risk, albumin, phase angle, chronic disease.

ABSTRACT

Objective
The aim of the study was to evaluate different methods of nutritional status analysis like basic anthropometric data, laboratory data and bioelectrical impedance analysis (BIA) with phase angle (PA) in patients with chronic diseases.

Setting
Clinic for Internal Medicine, Department of Nephrology, University Clinical Centre Maribor, a tertiary referral centre in Slovenia, Europe.

Subjects
Patients with chronic disease and increased nutritional risk (≥1 fulfilled NRS 2002 criterion) at the time of inclusion in the study.

Results
Patients had chronic kidney disease (93%), arterial hypertension (80%), active infection (33.3%), heart failure (23.3%), diabetes mellitus (20%), active malignancy (10%), autoimmune disease (6.6%), history of stroke (6.6%), chronic obstructive pulmonary disease (3.3%) and/or liver cirrhosis (3.3%). Mean serum albumin was 33.6±5.7 g/L, mean BMI 25.6±4.4 kg/m2 and mean PA 4.4±1.2°. No correlation between serum albumin and BMI was found. Lower PA was associated with lower serum albumin (p=0.045) and advanced age (p=0.043). The department nurses conducted nutritional education for all patients included in the study. Study was performed in accordance with the Strengthening the reporting of observational studies in epidemiology.

Conclusion
Results of the study show the importance of nutritional risk assessment in all chronically ill patients. BIA is a promising method of determining nutritional status. PA values have important diagnostic, therapeutic and prognostic implications as they are a marker of body cell mass, membrane function and metabolic health. A multifaceted approach to assess malnutrition in patients with chronic diseases is important, followed by a prompt nutritional intervention.

INTRODUCTION

Malnutrition is a general term indicating a state of nutrition in which a deficiency, excess or imbalance of energy, protein and other nutrients causes adverse effects on body composition, function and clinical outcome (Poulia et al 2012). It can be the result of poor nutritional intake, impaired utilisation or loss of nutrients, or may stem from several acute or chronic diseases. Malnutrition affects 7-16% of patients out of hospital (Leistra et al 2009) and is even more common in hospitalised patients (Leistra et al 2013). Additionally, nutritional status often deteriorates during a hospital stay (Allard et al 2016), which leads to higher rates of complications, increased morbidity and mortality (Kyle et al 2013; Poulia et al 2012).

The first step to successfully treat malnutrition is the appropriate diagnosis. To recognise patients at risk, several screening tools have been proposed. The Nutritional Risk Screening 2002 (NRS-2002) is the tool proposed by the European Society for Clinical Nutrition and Metabolism (ESPEN). It includes four questions about the following parameters: body mass index (BMI) <20.5 kg/m2, presence of weight loss in the past three months, presence of low dietary intake in the past week and the severity of illness. A positive response to any of these questions warrants further nutritional assessment (Poulia et al 2012).

Nutritional status can be assessed by several different methods. Most clinicians currently rely on global clinical assessment and anthropometric parameters, such as body weight, height, waist circumference, and BMI. There are several laboratory parameters which can be used to assess nutritional status, most commonly serum albumin level (Bharadwaj et al 2016). These parameters give us no information on body composition and have therefore several limitations to their application. More advanced modalities on nutritional status assessment and body composition analysis include imaging techniques, such as density assessment, anthropometry, dual energy X-ray absorptiometry (DEXA), computed tomography (CT), magnetic resonance imaging (MRI), nuclear magnetic resonance (NMR) spectroscopy or the use of isotopes. These are, however, expensive, time consuming, and in most hospitals, unavailable for routine use (Jones et al 2009).

Body impedance analysis (BIA) is the most commonly used method to calculate body composition due to its high accuracy, safety, portability and low cost. It provides information on fat mass, muscle mass and hydration status, which is especially useful in chronic kidney disease (CKD) and heart failure patients. It is based on the principle of bioelectrical impedance (the vector sum of resistance and reactance). Although monofrequency BIA (50 kHz) has been the most used method to date, multi-frequency BIA (5-100 kHz) has arisen as a method with more developed and complex theoretical bases, giving us better information on the distribution of water between intra- and extracellular spaces (Caravaca et al 2011).

Phase angle (PA) value determined by BIA is an indicator of cell membrane damage and body cell mass (Varan et al 2016). Higher values represent higher cellularity, cell membrane integrity and better cell function (Norman et al 2012). In healthy subjects, age and gender are the major determinants of PA (Zhang et al 2014). Since it is based on body cell mass, it can be used as an excellent reference for several physiological processes, including energy expenditure and proteolysis. Recent studies have shown that lower levels of PA are associated with increased nutritional risk, higher morbidity and mortality in chronic diseases, cancer and surgical patients (Varan et al 2016; Mushnick et al 2003).

The aim of this study was to use different methods of nutritional status analysis, including basic anthropometric data, laboratory data and BIA with PA in patients with different chronic diseases, who were at risk for malnutrition according to the NRS 2002 screening tool.

STUDY DESIGN AND METHODS

Thirty patients that were hospitalised in the Department of Nephrology, Clinic for Internal Medicine of University Clinical Centre Maribor, in a three-month period (November 1 2016 - January 31 2017), were included in the study.

Patients were mostly admitted from the internal medicine emergency department, some were transferred from other departments and hospitals. The inclusion criteria were increased nutritional risk (≥1 fulfilled NRS 2002 criterion) at the time of admission to the hospital and the presence of at least one chronic disease prior to the hospital admission. Institutional electronic information system was used to check patients' previous chronic diseases. The most common comorbidity was CKD (stages 1-5), including those on renal replacement therapy. Other observed chronic diseases were arterial hypertension, diabetes mellitus, heart failure, chronic obstructive pulmonary disease, liver cirrhosis, malignant disease, autoimmune disease, a history of stroke and/or the presence of an active infection. All patients were given written informed consent before inclusion in the study.

The study was performed in accordance to the STROBE guidelines (STrengthening the Reporting of OBservational studies in Epidemiology). The study was approved by the University Clinical Centre Maribor ethics committee. Informed consent was obtained from each patient.

BMI and BIA parameters, such as muscle mass, fat mass and PA, were used in the nutritional assessment of included patients. To perform bioelectrical impedance, multi-frequency segmental body composition analyser *Tanita, MC780*® (Croatia) was used. The apparatus has a measuring platform which requires standing position of the subject for correct measurement. Patients unable to walk or stand were therefore excluded from the study due to their inability to stand on the measuring platform. The measurements were made on an empty stomach, between 8-12 AM, by the department nurses.

Glomerular filtration rate (GFR) was estimated by using the Chronic Kidney Disease Epidemiology Collaboration equation. By drawing peripheral venous blood, standard laboratory data, such as serum creatinine, haemoglobin, albumin and C-reactive protein (CRP) levels were measured.

Statistical analysis was performed using the SPSS Statistics 22 for Windows. The data was expressed as means ± standard deviations or percentages. Associations between different methods of nutritional status analysis data were tested by the Spearman's correlation coefficient. A p-value < 0.05 was considered statistically significant.

RESULTS

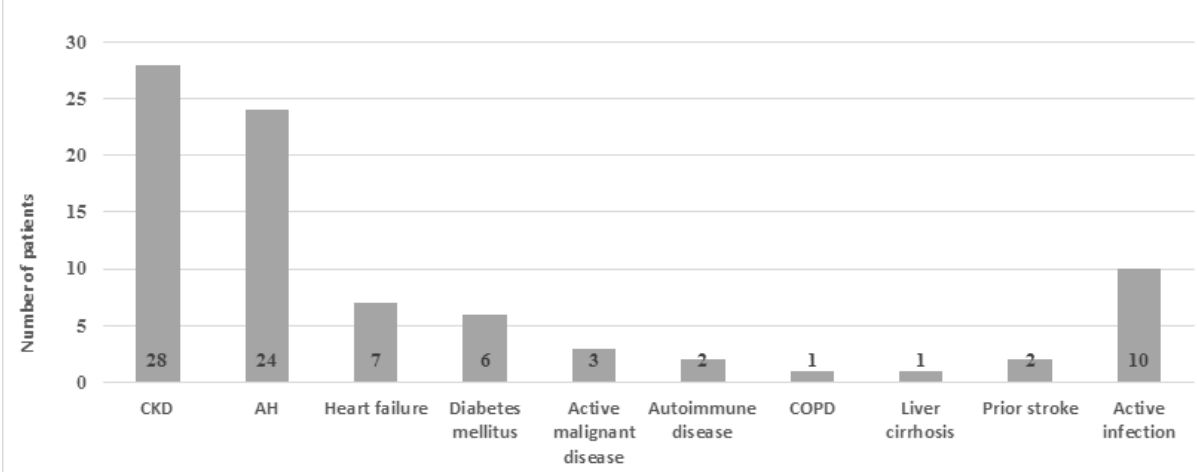
Thirty patients were included in the study, most of them were male (20/30, 66.7%). Their average age was 70.8±17.2 years. Nearly all of them had one fulfilled NRS-2002 criterion (28/30; 93.3%), two patients (6.7%) had two or three fulfilled NRS-2002 criteria, respectively.

All of them had at least one concomitant chronic illness, most commonly CKD (28/30; 93.3%). Mean serum creatinine was 172.1±85.7 µmol/L, mean estimated GFR was 53.4±26 ml/min/1.73 m2. One patient was on haemodialysis for seven years prior to the study (1/30; 3.3%). The second most common concomitant chronic disease was arterial hypertension (24/30; 80%), followed by heart failure (7/30; 23.3%) and diabetes mellitus (6/30; 20%). Active malignant disease was present in three patients (10%), two of them had colorectal adenocarcinoma, and one had a prostate adenocarcinoma. One patient with colorectal carcinoma was in-between cycles of chemotherapy; none of the other patients were receiving radiotherapy or other oncological treatment regimens at the time of the study. Autoimmune disease was present in two patients (6.6%), both

had systemic lupus erythematosus. Chronic obstructive pulmonary disease and liver cirrhosis were observed in one patient (3.3%). Two patients had a history of a cerebrovascular event prior to the inclusion in the study (6.6%). Most of the patients had no active infection at the time of the study (20/30; 66.7%). Those with an infection had an inflammation of the biliary tract (5/10; 50%), a respiratory tract infection (4/10; 40%) or an upper urinary tract infection (1/10; 10%).

Most common comorbidities of included patients and basic descriptive statistics are shown in tables 1 and 2.

Table 1: Comorbidities of included patients.



Legend: CKD – Chronic Kidney Disease; AH – Arterial Hypertension; COPD – Chronic Obstructive Pulmonary Disease.

Table 2: Basic descriptive statistics of included patients.

Parameter	Minimum value	Maximum value	Mean value ± SD
Age (years)	31	94	70.8 ± 17.2
NRS 2002	1	3	1,1 ± 0.4
Serum creatinine (µmol/L)	62	763	172.1 ± 185.7
eGFR (CKD-EPI equation; ml/ min/1.73 m2)	6	90	53.4 ± 26
Serum haemoglobin (g/L)	82	152	115 ± 19.4
CRP (mg/L)	3	359	52.2 ± 83.6
Albumin level (g/L)	17.8	44.4	33.7 ± 5.7
BMI (kg/m2)	18	35	25.6 ± 4.4
Fat mass (kg)	3	29	16.9 ± 7.7
Muscle mass (kg)	34	72	53.5 ± 10.4
Phase angle (°)	3	7	4.4 ± 1.2

Legend: SD – standard deviation; NRS – nutritional risk screening; eGFR – estimated glomerular filtration rate; CKD-EPI equation - Chronic Kidney Disease Epidemiology equation; CRP – C-reactive protein; BMI – Body Mass Index.

Mean serum albumin was 33.7±5.7 g/L, mean BMI was 25.6±4.4 kg/m2, mean fat mass was 16.9±7.7 kg, mean muscle mass was 53.5±10.4 kg and mean PA was 4.4±1.2° (table 2). No correlation between serum albumin and BMI was found. There was also no significant correlation between muscle mass, fat mass and serum albumin. Higher fat mass and muscle mass were associated with higher BMI ($p<0.0001$). Lower PA was associated with lower serum albumin ($p=0.045$) and advanced age ($p=0.043$), however, no correlation was found between muscle mass, fat mass, BMI and phase angle values.

All the patients in the study, and their relatives where possible, received nutritional education by the department nurses.

DISCUSSION

Chronic illnesses and advanced age are the most important risk factors for malnutrition (Correia et al 2014). Several studies have shown correlation between malnutrition and CKD (Muscaritoli et al 2009), severe heart failure (Rahman et al 2016; Amare et al 2015) and liver disease (Purnak and Yilmaz 2013). It is estimated that nearly half of patients with malignant disease develop a syndrome of cachexia, with anorexia, progressive loss of adipose tissue and skeletal muscle mass (Aoyagi et al 2015). Several autoimmune diseases are linked to progressive wasting, especially autoimmune thyroid disease (Kawicka and Regulska-Ilow 2015). Patients with advanced chronic obstructive pulmonary disease are in a state of undernutrition, referred to as pulmonary cachexia (Itoh et al 2013). Patients who suffered stroke are likely to develop malnutrition during the acute phase of the stroke, and later during the rehabilitation stage of the disease (Bouziana and Tziomalos 2011). Muscle mass wasting is a hallmark of diabetes mellitus as well (Chevalier and Farsijani 2014). Protein-energy malnutrition is an independent risk factor predicting decreased length of overall survival and survival at home in geriatric patients (Correia et al 2014). Studies have repeatedly shown that clinical malnutrition is generally associated with increased morbidity and mortality both in acute and chronic illnesses. Longer length of hospital stay and higher treatment costs are reported in malnutrition. Since it has been demonstrated that proper nutritional care can reduce the prevalence of hospital malnutrition and costs, nutritional assessment is mandatory to recognise malnutrition early and initiate timely nutritional therapy (Norman et al 2008).

The BIA is one of the newer techniques for determining body composition and nutritional status. It is especially useful in patients with disturbed hydration and/or altered distribution of extra - and intracellular water, which is the case in many chronic illnesses (for example CKD, liver cirrhosis, heart failure and obesity). The most clinically established impedance parameter is the PA. The PA differs across categories of sex and age. In patients over 70 years old, the normal PA is approximately 5.5° in women (5.6±1.0°) and 6° in men (6.2±1.0°) (Barbosa-Silva et al 2005). Included patients were older adults (average age 70.8 years) and had several comorbidities. The study was performed at the Nephrology department were the most common concomitant illness was CKD. All patients were at increased nutritional risk (≥1 fulfilled NRS criterion). Their lower PA values (average 4.4, range from 3°, to 7°) are therefore understandable.

Lower PA values are associated with adverse prognosis in several diseases. Gupta et al (2004a) evaluated 52 patients (aged 29-79 years) with colorectal carcinoma and concluded that PA values were better at predicting survival than nutrition assessment methods commonly used in clinical practice. In another study, Gupta et al (2004b) confirmed the importance of PA as a prognostic indicator in patients with pancreatic cancer. Abad et al (2011) evaluated 164 dialysis patients (127 on hemodialysis and 37 on peritoneal dialysis) and found that PA is a good predictor of long-term survival in dialysis patients.

According to Araujo Antunes et al (2012), higher values of PA were prognostically favourable in HIV positive patients. In patients with liver cirrhosis, low PA values were associated with shorter survival times, according to a study by Belarmino et al (2017).

Authors, Varan et al (2016), performed a cross sectional study on 120 older adults (average age 75±7.27 years; mean PA 4.2±1.8°) and found statistically significant correlation between lower PA and higher malnutrition risk. According to their data, PA correlated with serum albumin and advanced age, which is similar to this study, where statistically significant correlation between PA and albumin level and between lower PA and advanced age was found.

Since PA and albumin level is influenced by the intracellular to extracellular water ratio, the lower values seen in older patients and in those with several chronic illnesses are thought to reflect a reduction in skeletal mass and hence intracellular water which may be compounded by oedema/extracellular accumulation with aging and poor health (Kyle et al 2012). According to Perna et al (2014), lower PA is linked to reduced relative muscle mass in the elderly. The results of the presented study did not confirm this, as no statistically significant correlation between PA and muscle mass was found. This is most likely due to a small sample size and different measuring technique used in their study (BIA vs Dual Energy X-Ray Absorptiometry - DXA).

No statistically significant correlation between serum albumin and muscle mass was found. Serum albumin is a potential marker of nutritional risk, but it is non-specific and can be reduced in several other conditions, such as in response to physiological stress, in CKD, liver disease and inflammation. Limited longitudinal research available on this topic questions the use of serum albumin measures for this purpose (Snyder et al 2012).

BIA is a promising method of determining fluid balance, nutrition status and it can also be used as a prognostic tool in patients with several chronic illnesses. By providing us with information on body composition it by-passes several weaknesses of other commonly used tools, such as BMI. In the future, more work should be done on detecting patients at risk for malnutrition. Patients at risk should be monitored more closely and they should also undergo nutritional education and if indicated, receive dietary supplements. Studies have shown that prompt intervention can decrease the rate of protein-energy wasting and have favourable prognostic implications (Ocepek et al 2017). There are not enough dietitians and nutritionists available to serve the entire healthcare industry. Nurses therefore play a very important role in nutritional risk assessment, education and in a potential intervention. They are an integral part of patient care, including nutritional assessment and should be properly educated in this field of practice (Henning 2009).

The presented study has several limitations. It is a small, single centre, cohort study, which was performed in only one out of several internal medicine departments in University Clinical Centre, Maribor. The study was performed in a Nephrology department, patients with CKD were therefore over-represented in the sample of included patients.

Patients unable to walk or stand, who are especially at risk for muscle wasting, were not included in the study due to the BIA measurement requirements. The study, however, also has some important advantages. It is one of the first studies researching the role of BIA in this part of Europe and it highlights the importance of nutritional status assessment by using different diagnostic modalities. All the patients in the study received nutritional education, performed by trained nurses. Due to the importance of social support, patients' relatives were also part of the nutritional education. Further monitoring, additional nutritional risk assessment and potential therapeutic interventions of the patients will be done through outpatient clinics.

CONCLUSION

Nutritional risk assessment should be made on all patients with chronic diseases. Currently, the best way is a multifaceted approach, including measuring body weight, height, BMI, serum albumin and performing a body composition analysis. PA values have important diagnostic, therapeutic and prognostic implications. Patients at risk and their relatives if possible should undergo nutritional education by trained professionals. Common reassessments of the nutritional status and prompt intervention in case of increased nutritional risk are important in all chronically ill patients.

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Fast-track rehabilitation and nursing care in post-anesthesia care unit on orthopedic patients

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KEY WORDS

orthopedic surgery, general anesthesia; fast-track rehabilitation; nursing

ABSTRACT

Objective
To assess the efficacy and outcome of fast-track rehabilitation (FTR) for orthopedic surgery patients.

Design
Randomised trial.

Setting
primary care.

Subjects and Methods
Two hundred and twenty patients undergoing orthopedic surgery under general anesthesia between November 2015 to March 2017 were randomly divided into traditional care (control, n=110) and fast-track rehabilitation (FTR, n=110) groups. Patients in the control group were given regular and routine care, while those in FTR group were cared for with multimodal rehabilitation. Demographic and data, postoperative hospital stays, surgical and general complications were assessed.

Results
One hour postoperative body temperature was higher in FTR group than in the control, and the incidence of restlessness, pain and 24 hour postoperative nausea and vomiting were significantly lower ($P < 0.05$, $P < 0.01$). The hospital stays were shorter following the FTR, but the difference was not statistically significant as compared with the control.

Conclusion
FTR can effectively reduce the complications and promote the recovery of the orthopedic patient.

INTRODUCTION

Fast-track surgery (FTS) initiated in the early 1990s aiming to reduce the length of hospital stays has been adapted in many hospitals (Esakov et al 2018; Kastelik et al 2018; Rao et al 2017). The main goal of this concept is to reduce the postoperative length of hospital stay (LOS) and accelerate the recovery of patients. To achieve this, a multidisciplinary team approach is implemented to maintain cardiovascular, pulmonary, gastrointestinal, neurological and humoral functions (Kehlet 2005) under the Consensus Guidelines for ERAS (Lassen et al 2009). This approach combines new technologies and methods with traditional care to reduce the postoperative stress response, complication rate and mortality, and hospitalisation costs (Na et al 2014; Anderson et al 2003). Based on syndrome medicine, a series of interventions can be implemented on preoperative, intraoperative and postoperative patients to minimize intraoperative stress and accelerate postoperative rehabilitation (Offodile et al 2018; Sizonenko et al 2018; Fierens et al 2012). Patients undergoing orthopedic surgery often have severe trauma and are slow to recovery (LeBlanc et al 2014). It is therefore important to develop pathways that reduce surgical stress and enhance rehabilitation for them. Post-Anesthesia Care Unit (PACU) care has been proposed to provide continuous monitoring of patients following anesthesia and surgery to reduce postoperative complications (Varadhan et al 2010; Jakobsen et al 2006). Several studies have shown that FTS rehabilitation improves patient's recovery. For example, it was found that adding a 15-minute-walk on the day of surgery did not increase pain in patients after total knee arthroplasty with enhanced recovery (Zietek et al 2015). Reduced length of stay, increased patient satisfaction and low revision rates together with improved health-related quality of life and functionality have been reported when FTS is implemented (Winther et al 2015). However, it is unclear if and how FTR in PACU would enhance the recovery of orthopedic patients. We investigated the recovery of orthopedic patients with FTR interventions in PACU, and report the role of nursing in the FTR.

PATIENTS AND METHODS

Two hundred and twenty patients undergoing orthopedic surgery under general anesthesia and moved to PACU with tracheal tubes between November 2015 and March 2017 at our hospital were selected for the study. All patients had limb fractures. Patients with pathological fractures and serious cardiovascular or other organ dysfunction were excluded. The patients were randomly divided into 110 cases in the control and the FTR groups using a random number table. The control group consisted of 46 male and 64 female, aged from 29 to 91 (57.76 ± 13.76) years with 24 cases of upper limb fracture and 86 cases of lower limb fracture. The operation time ranged from 55 to 220 (128.04 ± 69.29) minutes. There were 54 males and 56 females in the FTR group, aged from 25 to 88 (59.22 ± 15.74) years. 28 and 82 patients in the group had upper limb lower extremity fracture, respectively, and the operation time was 65 to 210 (120.26 ± 55.16) minutes. There was no significant difference in gender, age and operation time between the two groups ($P > 0.05$).

THE FAST–TRACK PROCEDURE

The fast–track procedure is based on principles previously described (Husted 2012; Kehlet and Wilmore 2008) and was implemented by the nursing team. For patients in the control group, the traditional anaesthesia and PACU resuscitation cares were used. After surgery, the patients with tracheal tubes were sent to the PACU at 22 to 24 degrees celsius with a humidity of 50% to 60%, where they were connected to a connecting ventilator with a tidal volume of 8 to 10mL/kg, respiratory frequency of 12 times/ min at an oxygen flow rate of 1 to 2L/min. The patients were monitored for heart rate, respiration, arterial blood pressure and blood oxygen saturation using a multifunction monitor (MP30, Philipps, USA). Postoperative infusion liquid was heated to 37 degrees celsius and infused at a speed of 40 of 60gtt/min. Patients were prescribed analgesic agents

if the pain was unbearable. Once breathing spontaneously, the patients were intravenously injected with 0.02mg/kg of neostigmine (0.02 mg/kg) and atropine (0.01 mg/kg). After extubation oxygen (2-3 L/min) was supplied using nasal cannula till the Steward score was equal to or more than four, and the patient was sent back to the ward. For patients in the FTR group, the nursing team performed the following additional cares:

Body temperature Control

Once sent to the PACU, patient's axillary temperature was measured. If the temperature was < 36 degrees celcius, heating was given at 38 degrees celcius till the temperature reached 37 degrees celcius.

Infusion control

Infusion volume and rate were carefully controlled according to the change of vital signs of patients after operation to meet minimum effective perfusion. In general, the infusion rate was between 20 to 40gtt/ min to avoid excessive heart and lung burden.

Reducing extubation stimulation

Patients continued to use propofol after entering PACU till spontaneous breathing occurred, tidal volume and ventilation volume had restored to the normal range. The patients ceased to use the ventilator. If SpO_2 was > 0.95 and swallowing was observed, the tube was removed and propofol was then discontinued.

Pain care

Thirty minutes before extubation or operation, patients were given analgesics. After operation, analgesics were applied with enhanced and foreseeable pain care. The pain was evaluated as soon as the patients become conscious. If the pain score was two to three, the nurses would take measures to transfer patient's attention, such as playing light music or conducting psychological counseling. If the score was > four, appropriate analgesics were given. If necessary, the analgesic pump might be used for individualised analgesia.

Nausea and vomiting prevention

For patients undergoing lower extremity surgery, nerve block analgesia was applied to reduce opioid drugs that may cause nausea and vomiting. When necessary, antemetics such as droperidol were used.

Psychological intervention

Once conscious, the nurses were introduced to the patients, who would explain the details of surgery, location and time where he/she stayed, as well as the function of PACU to the patients. The purpose was to let patient to have a full understanding of surgery and postoperative care processes for better compliance and cooperation.

Evaluation method

Temperature at the completion of the operation and one hour after were compared. Riker sedation-agitation scale (SAS) and pain numeric rating (PNR) scale were used to assess the sedation-agitation and pain after extubation. The incidence of nausea and vomiting within 24 hours after operation was recorded.

ETHICS

The Declaration of Helsinki (World Medical Association 2008) ethical principles for research involving human subjects were applied. The study was approved by the ethics committee of the hospital. All patients were informed about the study's purpose, the voluntary nature of their participation, and the right to withdraw at any time. Oral informed or written consent was obtained from every participant.

STATISTICAL ANALYSIS

Data were analyzed using SPSS21.0 software. Measurement data were compared using the t test and rank sum test. χ^2 test was used to compare enumeration data. The significant level was set at 0.05.

FINDINGS

Temperatures in the two groups are presented in table 1. As shown, the average one hour post-operative temperature in the FTR group was significantly higher as compared to those in the control, while the temperatures immediately after operation were similar.

Table 1: Body temperatures of orthopedic patients immediately and one hour after surgery

Group	No. patients	Immediately after surgery	1 hour after surgery
Control	110	34.84±0.27	36.00±0.20
Fast-track rehabilitation	110	34.90±0.23	37.12±0.25
t		1.196	22.627
P		>0.05	<0.01

The scores of sedation-agitation and pain and the incidence of nausea and vomiting after extubation and hospital stay days are shown in table 2. These figures were significantly less in the FTR group than in the control group.

Table 2: Scores of sedation-agitation and pain, the incidence of nausea and vomiting after extubation and hospital stay days

Group	No. patients	Sedation-agitation	Pain	Nausea	Vomiting	Hospital stays (day)
Control	110	4.06±0.82	4.02±1.31	18 (16.4)	16 (14.5)	34.4±6.55
Fast-track rehabilitation	110	3.78±0.42	1.90±0.88	4 (3.6)	2 (1.8)	30.6±4.55
X^2/t		2.10	7.06	5.01	4.39	12.22
P		<0.05	<0.05	<0.05	<0.05	<0.05

DISCUSSION

Perioperative stress results from many aspects, including tension, anxiety, hunger, hypothermia, pain, anesthesia and infusion and each of them has an impact on the whole treatment and recovery effect. Applying the concept of FTR would optimize the efforts of medical treatments and nursing measures, reduce the stress and accelerate recovery (Fierens et al 2012; Basse et al 2002) . Several nursing care measures were implemented in our study as part of FTR care to accelerate patient's recovery. Psychological nursing is an important part of FTS. Since the operation causes injury of the body, the patient has the psychology of fear, tension, anxiety and depression. The study shows that 38.46% and 23.08% of fracture patients feel anxious and depressed, respectively (Tang et al 2008). Anxiety and depression often make patients less cooperative in the surgery and increase the risk of operation and postoperative complication rate (Brooke et al 2014). Appropriate psychological care helps relieve patients from the fear, anxiety and physiological stress, resulting in better recovery with less complications (Na et al 2014). In addition, psychological nursing helps develop a good nurse - patient relationship and reduce the emotional fluctuation, psychological and physiological stress of patients. In this hospital, much of psychological nursing is offered by senior nurses, who have been specifically trained or acquired relevant know-how during their career.

Preventing hypothermia after an operation is another important aspect of postoperative care. Perioperative hypothermia is a common complication of surgery, leading to 1.0 to 15 degrees celcius reduction of body temperature in 50% to 70% patients after surgery (Giuliano and Hendricks 2017). Hypothermia may cause a number of adverse reactions, such as incision infection, myocardial ischemia, adverse cardiac events, chills,

and coagulation dysfunction, and prolong and affect the effect of drugs, delay the awakening of anaesthesia and increase mortality. Maintenance of normothermia can reduce the influence of body temperature on coagulation mechanism, drug metabolism and oxygen consumption, and reduce low temperature-associated complications (Prunet et al 2012; Khan et al 2011). As part of FTR, controlled infusion on operation day and after operation is closely monitored by the nursing team in the hospital. It was noted that in the traditional surgical operation and post operation, large infusion is used to maintain desirable blood pressure. However, the postoperative stress would lead to increased secretion of antidiuretic hormones, resulting in water and sodium retention. Therefore, large infusion would aggravate cardiovascular burden. There is evidence that reduced liquid infusion is beneficial for reducing postoperative complications and shortening the postoperative hospital stay (Brandstrup 2006). Therefore, as long as the patient's vital signs are normal, the amount of fluid infusion should be restricted. Reducing pain-induced irritation is an important step in FTR care. Although preventive analgesia effectively reduces the stress response of patients (Buvanendran and Kroin 2009), this study found that nursing care also assists calm the patient's emotion and irritation and should be enhanced. Prevention of postoperative nausea and vomiting, which are common complications after surgery, is another part of nursing intervention to alleviate the negative emotions of patients. This can be achieved by providing a comfortable, clean environment, and if necessary, the use of prescribed antiemetics.

This study shows that by practicing the above-mentioned FTR care through the nursing team, the one hour post-operative temperature, scores of sedation-agitation and pain, the incidence of nausea and vomiting and hospital days were significantly reduced compared to traditional care, demonstrating these nursing measures are effective in accelerating the recovery of the orthopedic patient. The study shows that for orthopedic patient care in the PACU following general anesthesia, it is possible to shorten the hospitalisation time, improve patient satisfaction, minimise surgical stress, prevent and reduce the complications and promote postoperative rehabilitation through combined use of several care measures.

CONCLUSION

A FTR care helps improve the treatment outcomes of patients undergoing orthopedic surgery and the nursing team plays a pivotal role in implementing the program.

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Validity and reliability of the Teamwork Evaluation of Non-Technical Skills tool

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KEY WORDS

Teamwork, TENTS, instrument validation, observational tool

ABSTRACT

Background
TENTS (Teamwork Evaluation of Non-Technical Skills) is a valuable team performance, 13 item observational assessment tool that has been used in clinical settings, but validity and reliability have not been tested.

Objective
This study conducted validity and reliability tests on the TENTS observation tool.

Method
This study used a convenience sample of 109 teamwork event observations conducted in an academic medical center in the United States of America (USA). Five different events were observed; new admissions, transfers to and from other units, rapid response team events, morning rounds, and medical procedures. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted and the Cronbach's alpha coefficients of the inventory were obtained.

Result
The EFA results indicated the TENTS tool consisted of three factors; communication, leadership, and cross-monitoring. These three factors accounted for 46.30% of the total variance and their internal consistencies (Cronbach's α) were .71–.79 (.88 overall).

Conclusion
TENTS is a valid and reliable instrument for observing a variety of clinical teamwork events. EFA and CFA demonstrated that the tool is well-aligned with long-standing essential teamwork components described in the literature and in the TeamSTEPPS™ system.

INTRODUCTION

Several studies have identified teamwork as a crucial factor for reducing medication-related errors, improving care quality, and patient safety (Wheeler et al 2018; Pellegrin et al 2017; Xu et al 2017; Hicksand et al 2014). The Agency for Healthcare Research and Quality developed TeamSTEPPS™, ("TeamSTEPPS 2.0 Online" 2018 DEC) an evidence-based teamwork program that is designed to optimize patient outcomes by improving health care professionals' communication and teamwork skills. However, evaluating the outcomes of TeamSTEPPS™ training is difficult without a proper instrument.

The Teamwork Evaluation of Non-Technical Skills (TENTS) tool was designed and developed by Hohenhaus et al (2008) to measure teamwork performance and has been used in clinical studies (Fraino and Sneha 2015; Sheppard et al 2013; Mayer et al 2011). After obtaining permission from the original author (Hohenhaus et al 2008), the original TENTS tool was modified to eliminate redundancy and add clarity to item meaning and was used while conducting interdisciplinary team event observations during research to evaluate the impact of TeamSTEPPS™ training. The purpose of this study is to test TENTS validity and reliability through a literature review and factor analysis using the observation data.

BACKGROUND

There are two ways in the literature to measure teamwork. One is via the use of retrospective self-evaluation questionnaires, the other is independent observation and evaluation of team performance during team events. This study focuses on the independent observation and evaluation of individual or team performance.

Eleven teamwork evaluation instruments identified in the literature are listed in table 1. Most of the identified teamwork observation tools were designed to evaluate team performance, and two tools were designed to evaluate individual team members during team meetings (Jalil et al 2014; Lamb et al 2011).

Current teamwork observation tools have limitations. The instruments may have limited applicability to all clinical settings. For example, six instruments are limited to use in critical care settings, such as the emergency department or intensive care units, two are designed for use in the operating room (Hull et al 2011; Mishra et al 2009), two are specific to meetings (Jalil et al 2014; Lamb et al 2011), and one for the delivery room (Guise et al 2008). Also, the rating scales used in the instruments vary from one another. Some instruments use qualitative analysis (quality of behavior), others focus on quantitative analysis (frequency of behavior), and one focuses on both frequency and quality (Weller et al 2011). However, Weller et al (2011) only used one question to evaluate the overall quality of the teamwork. Finally, the reliability and validity of these instruments has not been thoroughly tested. Seven out of 11 instruments provide inter-rater reliability, but only five provide internal consistency, only Cooper et al (2010) provided both. All instruments provide content validity, but only two teamwork observational instruments used exploratory factor analysis (EFA) to investigate construct validity (Kolbe et al 2013; Cooper et al 2010). The results indicated that the Teamwork in Multidisciplinary Critical Care Tool (Weller et al 2011) has three factors and the Team Emergency Assessment Measure (Cooper et al 2010) has one factor. Teamwork observational instruments have been tested during actual live events, video events, simulated events (Sawyer et al 2013; Guise et al 2008; Malec et al 2007) or both video and live events (Jalil et al 2014). Among these, actual live events are the most suitable for determining the feasibility and accuracy of observational instruments; however, less than half of the instruments have been tested during actual live events. Observers require focus and familiarity with an instrument when using it for evaluation during actual live events; video events can be viewed multiple times and thus are easier to evaluate compared to actual live events. In simulated events, team members' actions can be anticipated, and thus simulated events are also easier to evaluate than actual live events. Lastly, most teamwork observation instruments only partially

measure TeamSTEPPS™ concepts. For example, the Oxford Nontechnical Skill in Operating Room (Mishra et al 2009) focused on problem-solving and decision-making and did not focus on mutual support. Only the Team Performance Observation Tool (Sawyer et al 2013) has been developed according to TeamSTEPPS™; however, the Team Performance Observation Tool only tested for internal reliability and content validity.

Table 1: Summary of teamwork observational tools

Name of Instrument	Developing authors	Applied Field	Validity	Reliability	Rating score	Rating professional	Live event/ Video
Clinical Teamwork Scale	(Guise et al 2008)	Specificity (delivery room)	Content	Inter-rater, Test-retest	Quality	Team	simulation
The Framework for Observing Coordination Behavior in Acute care teams (Co-ACT)	(Kolbe et al 2013)	Critical care	Content	Inter-rater	Frequency	Team	Video
Explicit Professional Oral Communication Observation Tool	(Kemper et al 2013)	Critical care	Content	Inter-rater Reliability	Frequency	Team	Live
Multidisciplinary Team Performance Assesment Tool	(Lamb et al 2011)	Specificity (Tumor board meeting)	Content	Inter-rater	Quality	Individuals	Video
Mayo High Performance Teamwork Scale	(Malec et al 2007)	Critical care	Content, Construct	Inter-rater	Frequency	Team	Simulation
Oxford Nontechnical Skill in Operating Room	(Mishra et al 2009)	Specificity (Operation room)	Content, Concurrent	Internal consistency	Quality	Team	Live
Observational Teamwork Assessment for Surgery	(Hull et al 2011)	Specificity (Operation room)	Content	Internal consistency	Quality	Team	Live
Team Performance Observation Tool	(Sawyer et al 2013)	Critical care	Content,	Internal consistency	Quality	Team	Simulation
Teamwork in Multidisciplinary Critical Care Tool	(Weller et al 2011)	Critical care	Construct (EFA)	Internal consistency	Frequency Quality	Team	Live
Team Emergency Assessment Measure	(Cooper et al 2010)	Critical care	Construct (EFA)	Inter-rater, Test-retest, Internal consistency	Frequency	Team	Video
Team Performance Assessment of Multidisciplinary Tumor Boards	(Jalil et al 2014)	Specificity (Tumor board meeting)	Content, Construct	Inter-rater	Quality	Individuals	Live, Video

The TENTS does not have these limitations. It can be used in multiple settings and for multiple team events. TENTS can be used to measure the team performance across healthcare professionals or of one health care professional. The tool measures the quality of multiple team behaviors. Since TENTS was developed based on the concepts of TeamSTEPPS™, this study may provide the needed construct validity by using EFA and also convergent validity by using CFA.

INITIAL INSTRUMENT DEVELOPMENT

Salas et al (2008) identified five core concepts of teamwork; team leadership, mutual performance monitoring, backup behavior, adaptability, and team orientation. Team leadership refers to the designated or situational team leaders who monitor team activities, cultivate a positive team atmosphere and provide feedback to achieve optimum team performance. Mutual performance monitoring is the ability of team members to monitor their own and other team members' performance. To balance self-monitoring with awareness of others, members must understand one another's roles and responsibilities. Backup behavior occurs when team members anticipate and provide support to other team members. Adaptability is crucial for teamwork as team members respond to rapidly changing and diverse situations. Finally, team orientation is a focus on the success of the collective team that facilitates the open sharing of knowledge and opinions while incorporating the expertise, preferences, and personal goals of all members. These five core concepts of teamwork are aligned with the four core concepts of TeamSTEPPS™; leadership, mutual support, situation monitoring and communication. An observation measurement tool also aligned with these concepts is needed.

The instrument was developed by Hohenhaus et al (2008) to measure four dimensions: communication, leadership, situation monitoring, and mutual support. It contains 21 items and five scale points ranging from "expected but not observed" (0) to "observed and good" (4). The last two of the 21 items measure overall leadership and teamwork. These items were developed using the four core concepts of the TeamSTEPPS™ program. The instrument provides detailed expressions of the scale to enable comprehensive observation. For example, when evaluating the difference between "observed and acceptable" (3) versus "observed and good"(4),the description of good (4) -"the performance is consistent and can be used as a positive example for others", provides a clear definition to distinguish between the two scores.

METHOD

Sample and Participants

Five event types were observed and evaluated using the instrument, new admissions, transfers to and from other units, rapid response team events, morning rounds, and medical procedures such as bronchoscope, stomach scope or take off ECOM, etc. (see table 2).

Each event involved at least two different health care professionals. For example, new admissions usually involved physicians and nurses familiar with each other performing an inital assessment and developing a treatment plan. Transfers to and from other units involved physicians and nurses unfamiliar with each other sharing information about the patient. Rapid response team events involved physicians, nurses and a respiratory therapist responding to urgent patient situations all over the hospital and interacting with many other unfamiliar team members. Morning rounds usually involved physicians, nurses, a pharmacist and sometimes a nutritionist gathering daily to determine treatment and care plans for patients. Medical procedures involved physicians, nurses and an anesthesiologist or technician forming a team again with a mix of familiar and unfamiliar team members.

The events were observed mostly in a pediatric intensive care unit or a surgical intensive care unit, and rapid response team events were observed all over the hospital. The final 109 events were used for data analysis. One observer was recruited to observe all the events. A program director periodically observed events alongside the observer to ensure that the observer maintained the same evaluation standard for all events. The interrater agreement was .90 at the beginning and at the middle of the observation period that spanned one year.

Table 2: Types of observed events (N= 109)

	Frequency	Percent %
New admissions	59	54.1
Medical procedures	12	11.0
Morning rounds	3	2.8
Rapid response teams	16	14.7
Transfer to and from other units	19	17.4
Total	109	100.0

Procedure

Prior to beginning the analysis, four experts were invited to examine the content validity of the tool, two of whom were clinical experts and two of whom had PhDs in nursing. Some items were deleted because of redundancy or if they had been only rarely observed.

The remaining items were confirmed using exploratory factor analysis (EFA) and confirmative factor analysis (CFA). EFA used principal axis factor analysis and promax rotation with Kaiser Normalization. All eigenvalues were greater than 1.00. Items with factor loadings greater than .40 were retained and item–item and item–total correlations were between .30 and .70 (Pett et al 2003).

Two-stage CFA, employing first- and second-order confirmatory factor models, was performed using the EFA model to confirm the structure of the subscale produced through EFA. The model was confirmed using the following criterion: items with factor loadings greater than .50 were considered significant. Goodness-of-fit was defined by a normed fit index (NFI), goodness-of-fit index (GFI), comparative fit index (CFI), and Tucker–Lewis index close to or greater than .90 (Kline 2015).

Internal consistency was confirmed using the Cronbach's alpha coefficients of the overall scale and subscales. Internal reliability was confirmed by a Cronbach's alpha greater than .70 (Nunnally and Bernstein 1967). The analyses were conducted using IBM SPSS AMOS version 18.

FINDINGS

Content Validity

Before use in the observational study and evaluation of its content validity, the TENTS tool was modified with permission from the original author (Hohenhaus et al 2008). The experts consulted in the present study indicated that "speak up" and "ask questions" are similar concepts and suggested deleting "speak up." In addition, they suggested the other three items, "support others," "secure additional resources," and "backup behavior," are similar concepts, and thus suggested deleting two of these items. "Support others" and "secure additional resources" were subsequently deleted. "Uses appropriate critical language," "employs conflict resolution," and "debrief completed" were also deleted because they could not be observed during or when applied to most of the observation events. The other two items, "overall communication" and "overall teamwork," were not included in the factor analysis because they were not necessary for determining individual factors, only for obtaining an overall rating of the events.

Event Characteristics

The following five event types were observed: new admissions (n = 59, 54.1%), transfers to and from other units (n = 19, 17.4%), rapid response team events (n = 16, 14.7%), morning rounds (n = 3, 2.8%), and medical procedures (n = 12, 11.0%).

Exploratory Factor Analysis (EFA)

The Kaiser–Meyer–Olkin test result was greater than .60 (.87) and that of the Bartlett's test of sphericity was significant ($\chi 2 = 504.92$, df = 78, $p < .001$). Both results indicated adequate sampling and a suitable correlation matrix for EFA (Pett et al., 2003). The item measures for sampling adequacy were all higher than .60, which also indicated adequate sampling (Pett et al 2003). In each subscale, all item loadings were greater than .40 and item–item and item–total correlations were all between .70 and .30; therefore, no items were deleted. The final solution was constructed based on the factors of communication, leadership, and cross-monitoring. Communication (five items) represented all attitudes, information, and skills related to team communication; leadership (four items) represented the leadership-related behavior of the leader; while cross-monitoring (four items) represented the team members' interaction behaviors. These three subscales accounted for 37.9%, 4.3%, and 4.1% of the variance respectively (see table 3)

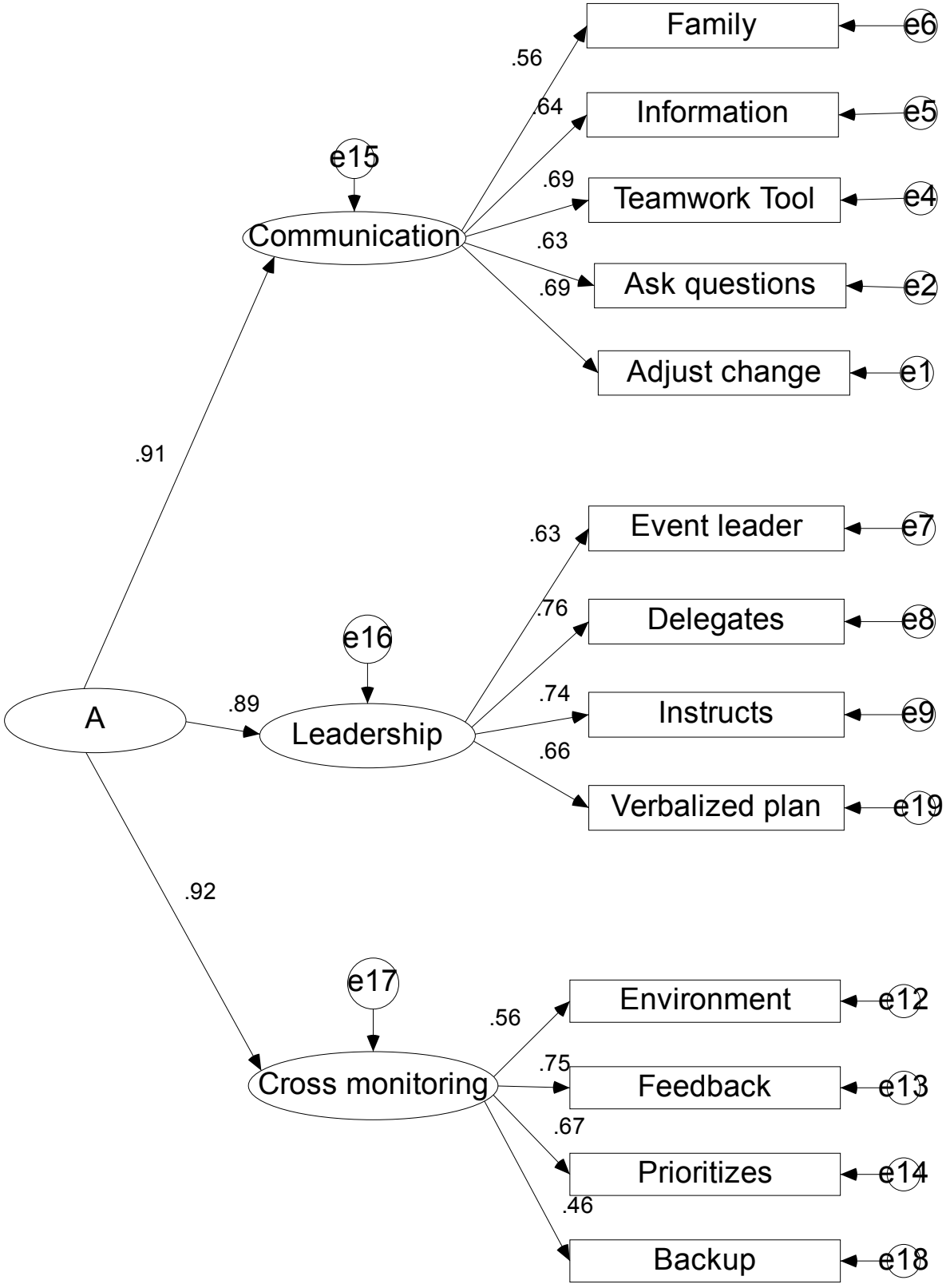
Table 3: Means, Standard deviation, and Pattern Factor Loadings of the TENTS

Original Factor	EFA factor	Mean	Standard deviation	Factor Loading	α
	Factor 1: Communication				.77
Communication	Utilizes teamwork tools	2.70	.78	.82	
Communication	Sends and receives appropriate information	2.75	.67	.64	
Communication	Sends and receives information to/ from patient/family	3.44	.77	.52	
Communication	Asks questions	3.51	.55	.45	
Situation monitoring	Verbalizes adjustments in plan as changes occur	3.13	.83	.43	
	Factor2 : Leadership				.79
Leadership	Instructs as appropriate	3.28	.68	.82	
Leadership	Delegates as appropriate	3.10	.73	.69	
Leadership	Establishes event leader	3.19	.73	.59	
Leadership	Verbalizes plan: States intentions, recommendations and timeframes	2.98	.82	.40	
	Factor 3:Cross monitoring				
Situation monitoring	Uses back-up behavior	3.48	.63	.63	
Situation monitoring	Visually scans environment	2.87	.90	.59	
Mutual support	Prioritizes appropriately	2.95	.71	.48	
Communication	Utilizes feedback between team members	3.05	.77	.41	.71
					.88

*The bold words of each item indicate the labels used in the CFA

The factor loading of "backup behavior" was lower than .50 (.46). All other items (12) were significant, with factor loadings greater than .50. The goodness-of-fit was determined using the NFI (.85), GFI (.91), CFI (.97), and Tucker–Lewis index (.96), all of which were close to or greater than .90 (figure 1).

Figure 1: A second-order confirmatory factor model of the Teamwork Evaluation of Non-Technical Skills Tool (TENTS)



Internal Consistency

The Cronbach's alpha coefficient was .88 for the overall scale, .77 for the first factor, .79 for the second factor, and .71 for the third factor. Thus, internal reliability was confirmed because all Cronbach's alpha coefficients were greater than .70.

DISCUSSION

This study evaluated the psychometric properties of the TENTS tool. Although the original design of the tool has four subscales (communication, leadership, situation monitoring, and mutual support), the EFA results in this study indicated the existence of only three because of the merging of mutual support and situation monitoring. Mutual support is defined by TeamSTEPPS™ as team members helping one another and is dependent on information obtained through situation monitoring, which is defined as the process of scanning to observe other team members and the environment. Although differentiating between mutual support and situation monitoring is simple, these concepts are related in that the interaction between situation monitoring and mutual support can be observed only when team members help or offer help. Therefore, the combination of mutual support and situation monitoring is similar to the concept of cross-monitoring, which refers to the process of scanning team members and their environment to assess their actions.

Three items—"speak up," "secure additional resources," and "support others"—all of which were in the subscale of mutual support in the Hohenhaus et al (2008) scale. "Speak up," was deleted because of the similarity with "ask questions", although "ask questions" was originally below "communication" subscale and "Speak up" was below the "mutual support/assertion" subscale. Hohenhaus et al. (2008) defined "ask questions" as team members feeling comfortable asking questions and "speak up" as team members' ability to express themselves in an appropriate manner. In the observations, a questioning sentence structure was often used to express differing views of the situation, therefore "speak up" was deleted.

"Secure additional resources" and "support others" were deleted because "backup behavior" represents these aspects of supportive behavior. In addition, "secure additional resources," "support others," and "backup behavior" were originally in the same subscale of "mutual support/assertion" and all involve asking for or offering help. "Secure additional resources" refers to asking other team members for help. "Support others" refers to providing help when help is required by another team member (Hohenhaus et al 2008), while "backup behavior" indicates team members' awareness of other team members' strengths and weaknesses and their provision of help in a timely manner (Hohenhaus et al 2008). With three slightly different concepts, team members engaged in cross-monitoring may accordingly backup each other, so "secure additional resources" and "support others" may not be necessary because team members directly offer help when required. Although the factor loading of the "back up" is .46 which is lower than .5, "back up" was retained in the model because it encompasses how team members perform situation monitoring and provide one another needed support. This is also considered an important factor related to cross-monitoring other team members' behaviors.

The CFA model identified similar underlying constructs as included in the original TENTS tool. The first construct was communication and it contained the 4 communication variables from TENTS and supported adding the additional "adjust change" variable that was originally included in situation monitoring. "Adjust change" is the behavior of team members thinking out loud to communicate while confirming a shared mental model as the event unfolds. The verbalization aspect of adjust change fits the communication construct. The construct of leadership contained the same variables as those in Hohenhaus et al (2008). The third construct, cross-monitoring, was similar to situation monitoring in the original TENTS. However, cross-monitoring considered not only situation monitoring but also all team members monitoring each other. Therefore, "prioritize" and "offer feedback" fit into this subscale.

TENTS has been successfully used to evaluate teamwork events in pediatric and surgical intensive care units and rapid response team events in a variety of hospital settings in real time. Although some items were deleted for being too similar to other items, the remaining items enabled the observer to better detect teamwork behaviors. During real-time events, a teamwork observer must immediately distinguish and score a team member's behaviors. This study's reduction of the number of items in TENTS enabled the observer to concentrate on team behavior performance rather than distinguish between various behaviors, thereby minimizing interrater bias and ensuring consistency. This study recruited only one observer and initially used interrater reliability to distinguish between the observer and program manager. The interrater agreement was .90 at the beginning and in the middle of this study.

LIMITATIONS

TENTS can only evaluate the performance of non-technical team skills and not that of clinical skills. Communication with patients or their family members is crucial for patient safety and can be enhanced through teamwork (Xu et al 2017). The original observation events were deleted when patient interaction was not possible and resulted in a smaller sample size. Most of the existing teamwork observational instruments were tested in intensive care units, the emergency care unit, or operating rooms (Hull et al 2016; Kolbe et al 2013; Weller et al 2011). TENTS also was tested mostly in intensive care units with a small number of events observed in general care units.

CONCLUSION

This paper reports on testing the TENTs using 109 event observations. A structure of content validity, reliability, EFA, and CFA was undertaken. To the best of our knowledge, this was the first study to use CFA to test a teamwork observational tool although the sample size was relatively small. The reduced number of items in the TENTS tool facilitated the observation of teamwork in this study. Findings indicate TENTS accurately measures the essential components of teamwork as described in the literature and emphasized in TeamSTEPPS™ and can be used in a variety of settings. A recommendation for future research is to test the use of TENTS as a measurement tool during interprofessional interactions with patients and their family members in general care settings.

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Workplace environment for nurses and healthcare assistants in residential aged care facilities in New Zealand

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KEYWORDS

Residential Aged Care Facility, environmental, noise, temperature, humidity, lighting

ABSTRACT

Objective
Continuous work under environmental and thermal discomfort such as cold, heat, and dim light has the potential to affect the health of nurses and healthcare assistants working in Residential Aged Care Facilities (RACF). The resulting health issues to workers from exposure to thermal discomfort include fatigue, concentration difficulty and work-related diseases such as cold and muscle tensions. Consequently, this often leads to higher labour absenteeism due to sick-leave which in turn correlates to poor nursing care quality for residents. This research investigated environmental factors which are temperature, humidity, noise, and lighting in nurse offices and resident lounges in RACFs in New Zealand and compared them with international standards.

Design
Quantitative study approach.

Setting
Seventeen Residential Aged Care Facilities (RACF) participated in this study, which were categorised in stand-alone (S-RACF), chain (C-RACF), and religious and charitable (RC-RACF) providers. The environmental measurements were conducted for 24 hours in the nurse offices and 12 hours in resident lounges.

Results
The findings demonstrated that the environmental factors, noise and humidity level met international standards predominately, but temperature and lighting levels failed to comply in nursing offices and resident lounges in RACF.

Conclusion
These findings indicate that nurses and healthcare assistants are working in environmental conditions that partially impedes the health and safety of nursing staff, and could affect their nursing care performance adversely for residents in RACF.

INTRODUCTION AND LITERATURE REVIEW

The World Health Organization (WHO) and the International Labour Organization (ILO) describe a workplace as a place surrounded by leadership engagement, worker involvement, common ethics, and culture. This means a workplace consists of a physical work environment, for instance, lighting, temperature, noise, and humidity. Working conditions are associated with work atmosphere, communication styles, job satisfaction, payment, training opportunities, work organisation, workload and stress factors (ILO 2019a; WHO 2010).

Research into occupational health and safety and related fields such as medicine is being conducted, and as a result, there are several environmental standards workplaces and working conditions published, for instance, for offices. These standards consist of definitions, measurement parameters, and recommendations to achieve healthy and safe workplaces and working conditions (ILO 2019b; Federal Institute for Occupational Safety and Health 2015, 2013, 2011, 2010a, 2010b; Accident Compensation Corporation 2010).

Temperature and humidity are significant factors in the well-being and health of employees at the workplace (Federal Institute for Occupational Safety and Health 2010a). The temperature in offices should be between 20 degrees Celsius and 22 degrees Celsius. However, it should not exceed more than 26 degrees Celsius unless the outside air temperature is higher and sun prevention measures are implemented to reduce the air temperature (Department of Labour Occupational and Safety and Health Service 2017; Federal Institute for Occupational Safety and Health 2010a, 2015). For a healthy and comfortable work environment, the physical correlation between the room temperature and the humidity level is essential (Safe Work Australia 2011). Humidity levels at the workplace should be between 40 and 60% because more than 70% humidity stimulates the growth of moulds and fungi (Department of Labour and Occupational Safety and Health Service 2017; Federal Institute for Occupational Safety and Health 2013). People who are sensitive or immunosuppressed could develop headaches, fatigue and concentration disorders. In many cases, if people are exposed to an unhealthy environment for too long, they could develop breathing difficulties and frequent coughing. Also, they can be more prone to respiratory tract related diseases (Canadian Centre for Occupational Health and Safety 2019).

Noise is another essential well-being factor at workplaces. Sound, measured in decibels (dBA), is a vibration that spreads in waves from the noise source. Loud sound equates to a high decibel level. In the workplace, the sound sources are often mixed, such as direct noise at the workstation, indirect noise from the background, and reflected noise (U.S. Department of Transportation 2017; Accident Compensation Corporation 2010). Sound with a decibel level of over 60 dBA is perceived as loud by the majority of people. Continuous loud noise is stressful for the human body and can cause illness and permanent hearing damage. Other adverse effects are fatigue, nervousness, tenseness, isolation and impairment of the performance (World Health Organization 2019; Swiss Federal Office for the Environment 2018; Federal Ministry for the Environment, Nature, Conservation, Building, and Nuclear Safety 2014).

The required level of lighting, measured in lux, correlates with the fundamental work activities, specific hazards and the work environment, for instance: natural or artificial light conditions, contrast, reflections or the transition of natural light over the day. The minimum recommended illumination level for simple work activities, for example, welcoming visitors in an entrance hall or waiting room, is approximately 150 lux and for regular or moderately easy work, and 250 lux should be provided, for instance, for food preparation. There are 300 to 400 lux suggested for low-risk work activities such as common office tasks. The nursing offices should have at least 500 lux and 500 to 1000 Lux are suggested for high-risk nursing activities such as dealing with excretion, human liquids or infectious instruments or with pointed, sharp, moving or hot instrument (ILO 2014; Federal Institute for Occupational Safety and Health 2011; Safe Work Australia 2011).

Employment is considered as health-promoting for an individual's well-being, but on the other side, it also can be pathogenic in an adverse work environment (Williams 2018). The correlation between the working environment and conditions and worker's health is in the interest of occupational science. Previous research has shown that continuous work under thermal discomfort has the potential to affect the health of nurses and healthcare assistants severely with resulting health issues such as fatigue, concentration difficulty, and colds (ILO 2019b; Department of Labour and Occupational Safety and Health Service 2017). As a consequence, this often leads to higher labour absenteeism due to sick-leave which correlates with poor nursing care quality for residents (Castle and Ferguson-Rome 2015; North et al 2013).

There is little knowledge on whether RACFs meet environmental standards for workplaces for nurses and healthcare assistants. This research assumes that the environmental workplace conditions for nursing staff in the nursing offices and resident lounges meet international standards. The research aims at developing a fundamental understanding of environmental related workplace condition for nursing staff in RACFs based on noise, temperature, humidity, and lighting.

STUDY DESIGN

This quantitative investigation in nursing offices and resident lounges in RACFs is part of a mixed method research with a sequential explanatory design to answer whether optimal workplace health, safety and working conditions in RACFs promote high-quality nursing care for residents.

PARTICIPANTS

The quantitative research was implemented in the Greater Auckland Region because more than a third of New Zealand's population lives there (Statistics New Zealand 2013). The three District Health Boards (DHB), Auckland, Waitemata, and Counties Manukau, organise and fund health care services in this area. In total, 183 RACFs with an average of 55 beds per facility provided long-term nursing care services for dependent and older people during the study time (Ministry of Health 2016). The managers of the RACFs in the defined research field received an invitation letter to participate voluntarily in the study based on a randomised list generated by a computer between September 2016 and January 2017. The sample size of this study comprised a total of 17 (1,022 residential beds) out of 183 RACFs (9,777 residential beds) from the determined research field. The RACFs are categorised in stand-alone (7 facilities), chain (6 facilities), and religious and charitable (4 facilities) RACFs (Ministry of Health, 2016).

ETHICS APPROVAL

This study is approved by the University of Auckland Human Participants Ethics Committee on 12 July 2016.

METHOD

The technical measurements were conducted in nurse offices (24-hour period measurement) and resident lounges (12-hour period investigation) in the participating RACFs between September 2016 to March 2017. One set of recording instruments were placed in a box which was located on the main desk in the nurse offices and the second one on a table in the resident lounges. The nursing staff and residents were informed at a prior staff meeting and the data collection day about the purpose of the instrument containers and advised not to touch, move, and unplug it. After the instruments were activated, they recorded autonomously.

The validity and reliability of measurement instruments that were purchased for this study undertaking are ensured by the manufacturer (PCE Instruments UK Ltd). The devices used for the environmental measurements and recordings are listed in table 1.

Table 1: Overview Technical Environmental Measurements and Pedometer Instruments

Environmental Indicator	Instrument	Measurement Intervals	Measurement Place
Temperature	PCE- HT110	Every minute	Nurse Offices, Resident Lounges
Humidity			
Noise	PCE-322	Every ten seconds	
Lighting	PCE-174	Every minute	

The recorded data was directly exported from the instruments to a Windows Excel 2016 sheet. After the data cleaning, a descriptive statistics analysis was conducted.

FINDINGS

Noise Results

Figure 1: Noise Levels in the Nursing Offices of all RACFs (n=17)

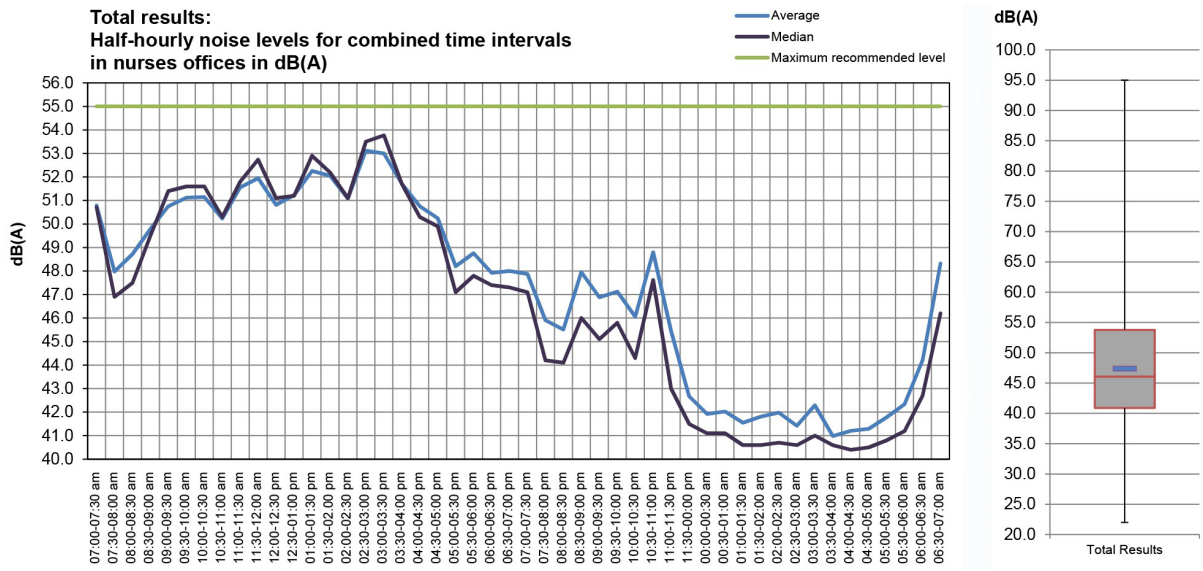
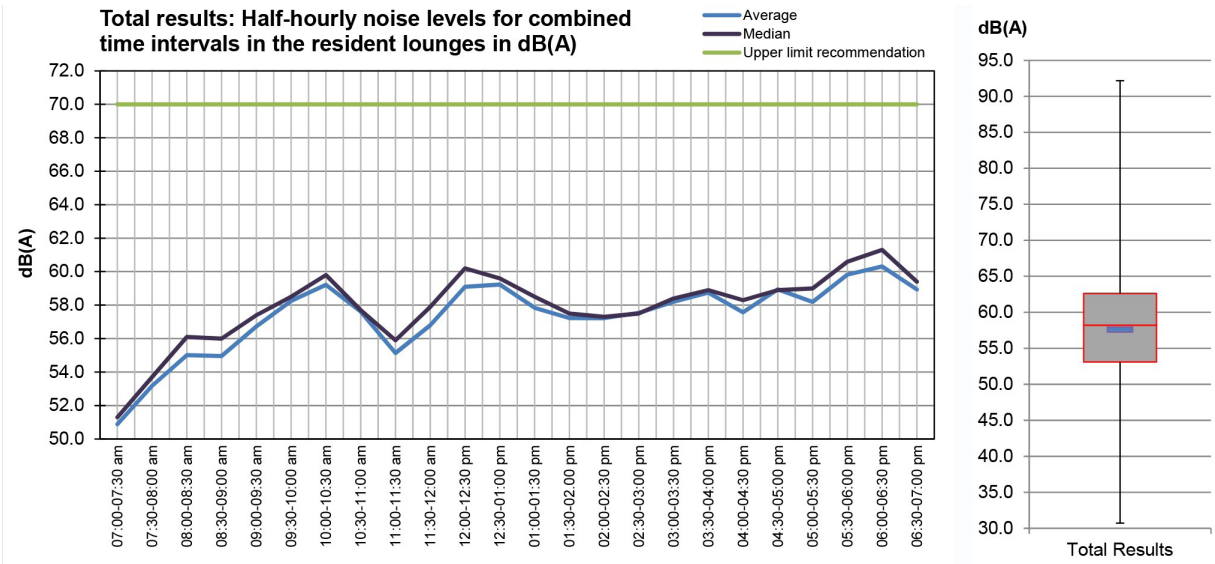


Figure 2: Noise Levels in the Resident Lounges of all participating RACFs (n=17)



In the 24-hour investigation period of noise in nursing offices, the average of 47 dB(A) and median of 46 dB(A) indicated a fairly quiet to a recommended level for the individual perception of noise. Also, in the 12-hour examination period in resident lounges, a normal level for the individual perception of noise within an average and median of 58 dB(A) was detected.

The noise volumes in nursing offices can be categorised as day-time (7am to 5.30pm), evening (5.30 pm to 11pm), and night-time (11pm to 7am) based on similar ranges of dB(A) levels. This means that the approximate average and median noise volumes during day-time ranged between 47 dB(A) and 54 dB(A), in the evening from 44 to 48 dB(A), and in the night-time 40 to 42 dB(A). The investigated time for noise volumes in resident lounges can be classified in the morning (7am to 12.30pm), and afternoon (12.30pm to 7pm). The noise volumes ranged from 51 to 60 dB(A) in the morning and between 60 to 61 dB(A) in the afternoon. The recommended noise limits of 55 dB(A) for offices and 70 dB(A) for resident lounges were not reached throughout the measurement periods. However, single volume measurement points peaked briefly up to 95 dB(A) (Federal Insitute of Occupational Safety and Health 2010b).

Taking all measurement points into account, the noise volumes were within the recommendation and under the maximum limit for offices for 20.57 hours (86% of a day) and in resident lounges for 10.02 hours (83% of 12 hours). In the comparison of the S-RACF, C-RACF, and RC-RACF providers results showed that noise levels were comparable in each noise category except for small and insignificant differences. The average and median noise measurements in nursing offices and resident lounges of all RACF complied with international environmental standards (Federal Insitute of Occupational Safety and Health 2010b).

Temperature and Humidity Results

Figure 3: Temperature and Humidity Results of the Nursing Offices of all RACFs (n=17)

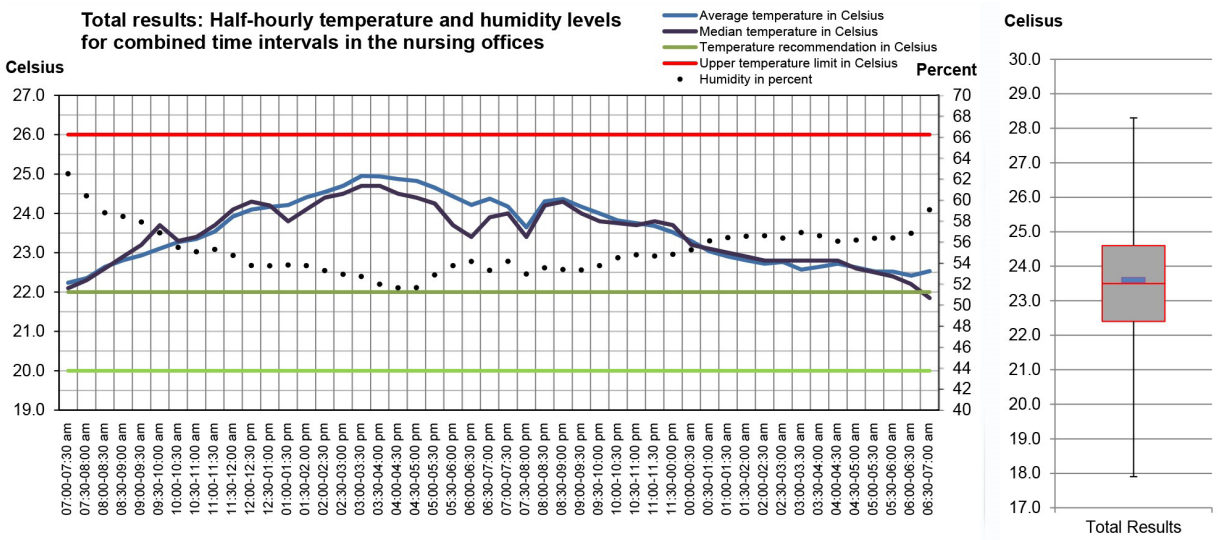
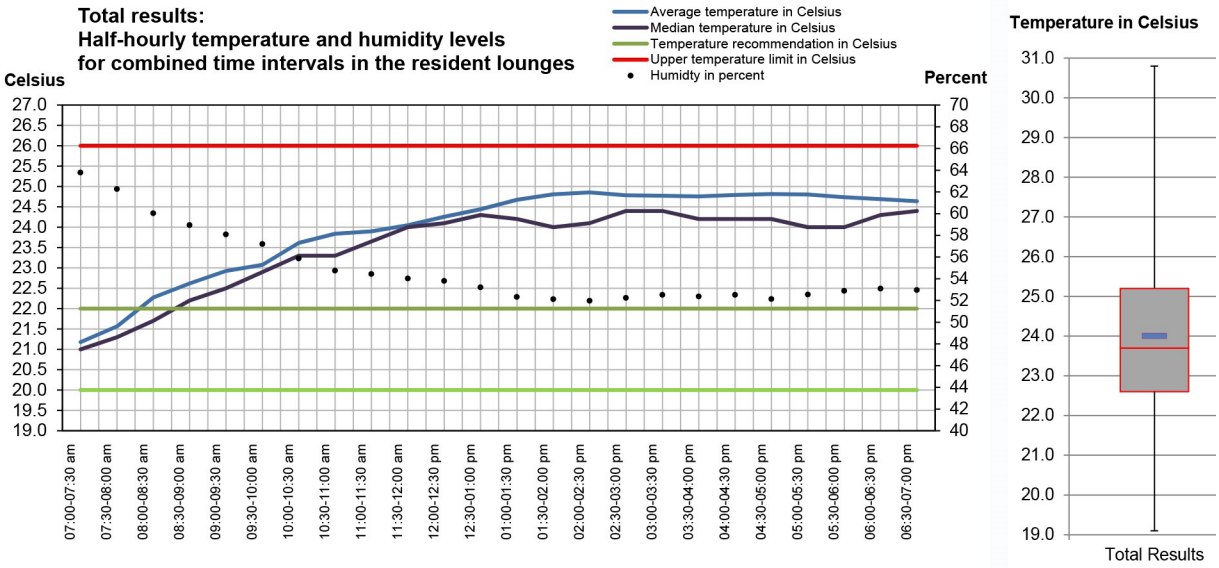


Figure 4: Temperature and Humidity Results in the Resident Lounges of all RACFs (n=17)



The temperature results in nursing offices in the 24-hour examination timeframe demonstrated an average of 23.6 degrees Celsius and a median of 23.5 degrees Celsius. The average temperature levels were continuously higher than the environmental recommendation from 20 to 22 degrees Celsius. The average humidity in nursing offices was 55% and within the recommended parameters of between 40% and 60%. Similar results were found for the temperature conditions in resident lounges during the 12-hour examination. The average temperature was 24 degrees Celsius, and the median was 23.7 degrees Celsius. Apart from two hours in the morning, the average temperature was always higher than the recommended environmental standards. The maximum temperature was measured at 30.8 degrees Celsius. The average humidity in the living room was 55% and met the recommended standards likewise (Department of Labour and Occupational Safety and Health Service 2017; Federal Insitute of Occupational Safety and Health 2013, 2010a).

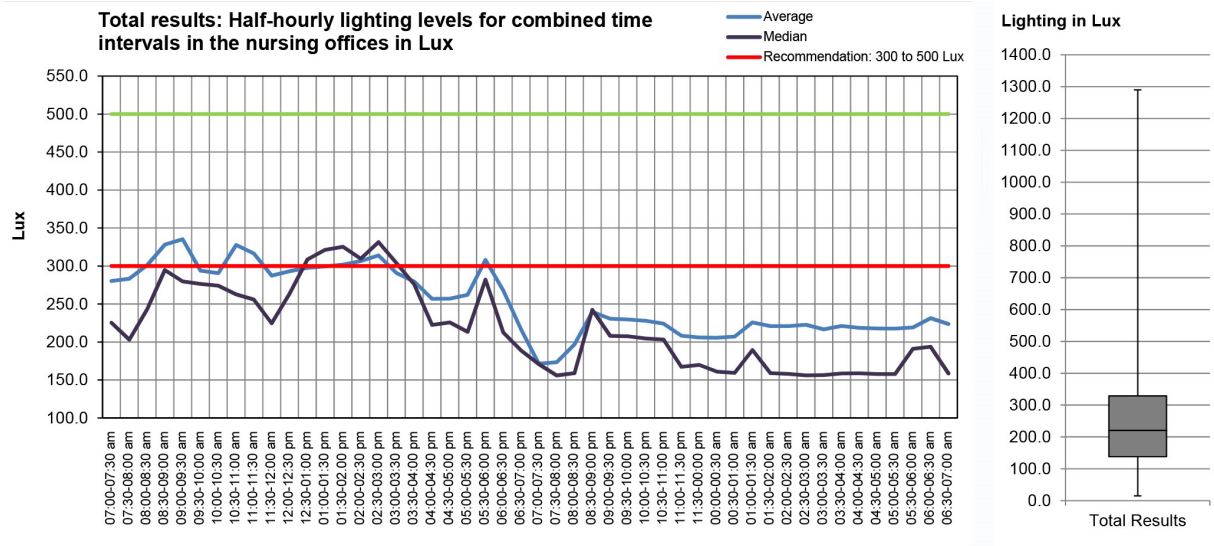
The temperature conditions in nursing offices can be categorised in 'day-time' (7am to 8.30pm) and 'night-time' (8.30pm am to 7am). During the day the average temperature was between 23 to 25 degrees Celsius and at night-time from 22 to 24 degrees Celsius. Single temperature measure points were higher than the upper temperature limit of 26 up to 2.3 degrees Celsius. The temperature recordings in resident lounges can be classified in 'morning' (7am to 1.30pm) and 'afternoon' (1.30pm to 7pm). In the morning the average temperature was 21 to 24 degrees Celsius while in the afternoon it was from 22 to 25 degrees Celsius. Single temperature measurements reach higher levels to a maximum of 30.8 degrees Celsius momentarily at times.

To summarise, the average temperature was within the environmental recommendation in offices for 3.51 hours (15% of a day) and in resident lounges for 1.5 hours (13% of 12 hours). The humidity levels in nursing offices were complied with environmental safety recommendations for 15.63 hours (65% of a day) and in resident lounges for 7.62 hours (64% of 12 hours).

In a comparison of the average exposition to temperature and humidity in nursing offices between S-RACF, C-RACF, and RC-RACF providers the findings demonstrated only moderate differences. In nursing offices and resident lounges, the temperature was predominately too high for more than three-quarters of the investigated time-frame, and only rudimentary met international environmental standards. The humidity levels in both areas complied with international standards approximately during two-thirds of the examined period (Department of Labour and Occupational Safety and Health Service 2017; Federal Insitute of Occupational Safety and Health 2013, 2010a).

Lighting Results

Figure 5: Lighting Results in the Nursing Offices of all RACF (n=17)



The lighting results in nursing offices in the 24-hour examination timeframe provided an average of 254 Lux and a median of 203 Lux. During the day the average and median light intensity reached the minimum recommended lighting of 300 Lux occasionally (Office work and low-risk nursing activities). At night the lighting condition was continuously under this level which also means that the recommended level of 500 Lux for high-risk nursing activities was not achieved (Federal Institute for Occupational Safety and Health 2015, 2011; International Labour Organization, 2014). The lighting condition can be separated in 'day-time' (7am to 6pm) and 'night-time' (6pm to 7am). During the hours of daylight, the average and median light was between 200 and 320 Lux. From early evening to morning the lighting levels were from 150 to 225 Lux. For a brief period, single lighting measure points could reach higher levels up to 1290 Lux.

The average and median lighting conditions were within the environmental recommendation for offices and low-risk nursing activities for 3.75 hours, (16% of a day) and 1.78 hours (7% of a day) for high-risk activities. In a comparison of the environmental lighting conditions in nursing offices across all RACF providers, the RC-RACF provided longest exposure of almost 18 hours to low levels of 0 to 300 lux. The C-RACF provider results were similar to the average levels in each lighting category. The lighting exposure of the S-RACF provider was under the average for each lighting level category.

In summary, the lighting situation in the nursing offices was almost throughout lower than the minimum lighting level recommendation for low and high-risk nursing activities according to the environmental standards (Federal Institute for Occupational Safety and Health 2015, 2011; ILO 2014).

STRENGTHS AND LIMITATIONS

One source of weakness of the technical measurements which could have affected the results was that the environmental instruments were occasionally unplugged, covered or moved by nursing staff and residents. This interference occurred despite attached signs on the container which contained the meters and prior verbal notice. Overall, the negative impact on the complete data was 13.6% (200,225 out of 1,468,800 measurement points) of missing noise values, 13.2% (3238 out of 24,480 measurement points) of missing temperature and humidity values, and 29% (212,680 out of 734,400 measurement points) of missing lighting values. Almost 30 per cent of the lighting values in nursing offices were missing. The reason for that was the

high number of measurement errors of the PCE Light-Meter-Instrument compared to the other environmental meters produced by the same company. The display of the light measurement instrument did not indicate any malfunction during the inspections rounds by the researcher. The missing data might be related to connection faults between the measurement sensor and integrated software of the PCE Light-Meter-Instrument. In order to develop reliable results based on valid measurements, a control calculation approach was implemented. No deviations for both methods were identified.

The PCE Noise-Meter-Instrument has an appearance similar to a microphone. It could be assumed that this optic caused nursing staff to hesitate to speak in a normal voice volume in fear of verbal recordings. This would result in lower noise results. However, the noise measurement results show no corresponding influences.

Also, it could be argued that the time of the year and changing weather conditions could compromise the temperature, humidity, and lighting results. However, this conclusion was not substantial because the environmental standards must be met regardless of seasonal weather conditions as per international environmental standards (Federal Institute for Occupational Safety and Health 2015, 2013, 2011, 2010b, 2010a).

DISCUSSION

The development of healthy and safe workplaces and working conditions is challenging due to their complex nature and a high number of influencing risk factors such as work culture, work organisation, and environmental conditions (ILO 2014; WHO 2010, 1994). The physical parameters for measuring the work environment such as noise, temperature, humidity, and lighting have been investigated comprehensively, and robust standards are developed (ILO 2014; Federal Institute for Occupational Safety and Health 2016, 2015, 2013, 2011, 2010a, 2010b; Accident Compensation Corporation 2010). Those standards are promoted on a macro-level by the WHO and national governments. On a micro-level, health and safety standards are implemented by management and health and safety representatives of organisations (ILO 2019b; WHO, 2010, 1994).

The noise findings of this research conducted in nursing offices and resident lounges in RACF complied with environmental standards. This result can be explained that nursing offices are usually restricted to nursing staff only with work-related conversation as the common noise source. On the other hand, nurses and healthcare assistants spend a considerable amount of time in the resident's rooms for treatment purposes and confidential conversations (Mallidou et al 2013). It seems that noise volumes in resident rooms do not affect the volume in nursing offices.

The noise results in resident lounges presented slightly higher volume levels than in nursing offices. One of the likely causes for the marginal higher noise levels in resident lounges is the gathering of residents and visitors to spent time together and take part in activities (Rindel 2012). These findings are typical when people meet and hold conversations (Federal Ministry for the Environment, Nature, Conservation, Building, and Nuclear Safety 2014; Accident Compensation Corporation 2010). However, even the higher noise levels in the resident lounges compared to the nursing offices were within the parameters of the recommended standards. There were no significant differences between RACF providers (Federal Institute for Occupational Safety and Health 2015, 2010b). This means that nursing staff in RACF was not exposed to health risks based on noise volumes. However, this research provides findings of the noise levels but not the type of noises. Further studies need to be carried out in order to develop an understanding of what types of noise in RACF can be stressful and how they affect the health and well-being of nurses and healthcare assistants.

The temperature in the nursing offices and resident lounges were too warm and barely met the recommended levels. One possible explanation for this finding in nursing offices might be that the rooms were often small and packed with of equipment, devices, and folders (Federal Institute of Occupational Health and Safety 2018; VGB 2018). Nurses and healthcare assistants working in the office releasing heat through their bodies and computers, printers, and fridges which are generating hot air increase the temperature further (VGB 2018; Marieb and Hoehn 2007).

Limited air circulation could also hinder the maintenance of cooler room temperature. Working in too hot rooms can lead to symptoms such as fatigue, and concentration problems, and diseases, for instance, a cold and conjunctivitis (Wittig-Goetz and Rundagel 2018; Department of Labour and Occupational Safety and Health Service 2017).

Even though average humidity levels in nursing offices and resident lounges were in accordance with environmental standards for two-thirds of the investigated period, there are hours in which the humidity was not within the recommended range. One reason behind this discrepancy could be non-insulated building structure and single-glazed windows. Another major influence can be poor air circulation (Canadian Centre for Occupational Health and Safety 2019; Federal Institute for Occupational Safety and Health 2013).

The type of RACF provider was not related to the humidity results. According to these findings, nursing staff should not physically experience headaches, fatigue and concentration disorders because of either excessively high or low humidity levels (Canadian Centre for Occupational Health and Safety 2019; Department of Labour and Occupational Safety and Health Service 2017; Federal Institute for Occupational Safety and Health 2013).

The lighting situations in the nursing offices did not meet environmental recommendations. This outcome can be due to offices lacking windows or their windows are inappropriately small. The number of light sources and their intensity in a room has a major influence on the lighting conditions (ILO 2014; Safe Work Australia 2011).

The lighting related findings of this study differed greatly between the RACF provider. Even the results between the facilities per RACF group were different and it seems that the lighting situations are strongly related to single RACF. This means that the nursing staff is facing health and safety risks such as eyestrain, fatigue, headaches, muscle tensions, and stress when they implement activities such as dealing with body fluids, body waste, and contaminated objects (VGB 2018; Federal Institute for Occupational Safety and Health 2015, 2011; ILO 2014).

The scope of this study is limited to four environmental factors. For a better understanding of how environmental related hazards affects nursing staff, some fragments are missing, for example, room air speed, air quality, and odours.

In order to develop a better understanding of how occupational-related hazards affect nursing staff, more insights into some fragments, such as room air speed, air quality, and personal perception of odour, are to be sought after.

CONCLUSION

This research investigated environmental workplace parameters which are noise, temperature, humidity, and lighting in RACFs and provided a comparison with international environmental standards.

The findings have identified that the noise levels in nursing offices and resident lounges of all participating RACFs complied with international environmental standards (Federal Institute for Occupational Safety and Health 2015, 2010b). The temperature in nursing offices and resident lounges were predominately too high and met international environmental standards just to a limited extent. The humidity levels were aligned

with international standards for approximately two-thirds of the respective examined period (Department of Labour and Occupational Safety and Health Service 2017; Federal Institute for Occupational Safety and Health 2015, 2013). The lighting situations in the nursing offices were predominately lower than the recommended minimum. This is a risk and an impediment to the implementation of nursing activities (Federal Institute for Occupational Safety and Health 2015, 2011; ILO 2014).

In other words, nurses and healthcare assistants are working in partially suboptimal environmental conditions which in turn could affect their health and nursing care performance for residents adversely (WHO 2019; Castle and Ferguson-Rome 2015; Woods 2015; North et al 2013). However, the individual environmental perception could differ from international standards and recommendations, for example, employees who are sweating excessively over 18 degree Celsius room temperature and workers who suffer from diseases such as hormone imbalance who prefer a cooler working space. This means that it may not be possible to meet recommended standards for workplaces as well as staff expectation at the same time (Department of Labour and Occupational Safety and Health Service, 2017).

The findings will be of interest to RACF employers and organisations who are committed to the provision of providing healthy and safe workplaces for nursing staff. It also contributes to the health sciences and enable a better understanding of the environmental workplace situation in RACF. Continued efforts are needed to generate a well-being environment at the workplace for nurses and healthcare workers in order to provide high-quality nursing care for residents in RACFs.

RECOMMENDATION

The results of this research demonstrated an environmental health and safety risk at workplaces for nursing staff in RACF. To minimise or avoid completely health-related risks at the workplaces a systematic approach is recommended. This includes the identification of relevant environmental standards, risk assessment, implementation of preventive actions, and evaluation of the effectiveness of those measures (WorkSafe New Zealand 2017; Johnson 2002; Deming 1986). At the same time, the workers' voice should be taken into consideration because they have a profound experience and awareness of potential risks at their workstation (WorkSafe New Zealand 2017). After identification of a potential health and safety risk, for example, throughout a workplace risk assessment, the preferred measure is to eliminate the hazard source, for instance, placing printers, copiers and other unnecessary electrical equipment not in nursing offices (Bux 2006). If this is not possible, then actions should be implemented to minimise the risk which includes structural changes such as, determining the optimal place for the light source and changing the location of the workstation, and providing personal safety equipment, such as disposable gloves, aprons, and masks (ILO 2014; Safe Work Australia, 2011).

The implemented preventive actions should be evaluated regularly. If the result is not sufficient according to the recommended standards, then a re-assessment of the workplace situation and environment should be conducted inclusive the implementation of further preventive actions (WorkSafe New Zealand 2017; Johnson 2002; Deming 1986).

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Evaluating the efficacy and impact of the Nursing and Midwifery Exchange Program: a study protocol

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ABSTRACT

Objective
The following research protocol evaluates the Queensland Health Nursing and Midwifery Exchange Program (NMEP) and evaluates how exposure to diverse clinical settings, may impact the nursing and midwifery workforce on individual and organisational levels.

Design
This protocol details a mixed methodology allowing for both quantitative and qualitative data. The study is being undertaken in three stages; a survey of the participating nurses and midwives; a systematic review; and a Delphi study with an expert review group.

Setting
The study is a Queensland wide study across rural/remote, regional and metropolitan locations.

Subjects
This study will follow approximately 70 nurses and midwives employed by Queensland Health from diverse areas and streams at various stages within their clinical career.

Interventions
Nurses and Midwives participate in a three or six-month professional exchange to a rural/remote or metropolitan location.

Main outcome measure(s)
This study will evaluate the impact and sustainability of the NMEP program through measurement of burnout, job embeddedness, job strain, job satisfaction and attrition through a series of surveys. In addition to this, a systematic review and Delphi with executive experts will be conducted to consider a future pathway/model for nursing and midwifery exchange.

Results
This study has commenced and will be completed September of 2019.

Conclusion
The NMEP program is one novel approach to nursing and midwifery workforce concerns and looks to present excellent opportunities for the crossover of skills and ideas related to clinical, professional and service integration between metropolitan and rural practice.

Conflicts of Interest and Course of Funding
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INTRODUCTION

Global concerns about current and impending nursing workforce shortages have necessitated innovative strategic approaches that incorporate a revision of cost allocations and a shift in service management. The complexities associated with these shortages include an ageing workforce, increasing patient acuity and escalating costs of care provision (Hudspeth 2016; Sherman et al 2013; Productivity Commission 2005). The pressures of cost and space associated with acute hospital admissions have placed an increasing focus on community services in an attempt to reduce unnecessary and avoidable admissions (Australian Health Minister's Advisory Council 2017). This has compounded existing challenges related to health service provision in areas geographically removed from major metropolitan centres, where the difficulties associated with recruitment and retention of the workforce and access to services require special consideration. In Australia, just under half of the nursing workforce is over the age of 45 years, of which only 8.2% are located in community settings (Australian Institute of Health and Welfare 2013). Rural and remote nursing and midwifery is not identified in these statistics, although work undertaken by Rural Health West (2014) showed that there was a ratio of one nurse per 150 to 500 population in rural and remote areas.

Community nursing, an area which rural/remote nurses work collaboratively across, is of particular importance to health service provision as it supports home care and hospital avoidance. In spite of this knowledge, community nursing is largely invisible, and is not seen as an attractive career choice because of its generalist nature (Gray et al 2011; Kennedy et al 2008). Exposure to living in regional, rural and remote areas is therefore fundamental to attracting a suitable nursing workforce. It is a well-known fact that nurses who have grown up in, or have clinical experience in a particular region, are more likely to engage with it, and return to it for work. Moreover, preparing nurses to deal with the diversity of care and the challenges of rural and remote life is not always adequate (Francis et al 2016) and detailed consideration must be given to providing opportunities for nurses at all levels to develop the necessary understandings.

This research study builds on work that is currently being undertaken in Queensland Health, to develop strategies that support early transition into specialty practice, professional development and the encouragement of life-long learning including experience in rural and remote health (Fox et al 2015). One such project is the Nursing and Midwifery Exchange Program (NMEP). NMEP was conceived in the South West Hospital and Health Service (SWHHS), developed in partnership with the Office of the Chief Nursing and Midwifery Officer, in response to continued nursing and midwifery recruitment, retention and professional development difficulties. NMEP commenced in August 2017 and will run until June 2019. NMEP was designed to be an innovative, low risk opportunity for nurses and midwives to engage in professional exposure to different geographic locations and clinical environments within a supportive and nurturing framework.

BACKGROUND

Nurses working in rural and remote locations may be generalist in nature with primary and preventative healthcare as core business. However, they need to be able to transition quickly to acute and emergency nursing as situations demand, often in the absence of support from medical and other nursing staff. Thus, in addition to their usual scope of practice, rural and remote nurses take on additional skills and tasks, accepting significant additional responsibility for the welfare of their patients (Knight et al 2016).

For rural/remote localities, considerations for access, environment, lifestyle and isolation, complicate the health services ability to recruit, retain and maintain nurses with the broad repertoire of skill required to provide safe and effective services (Productivity Commission 2005). The complex nature of rural and remote nursing can lead to increased work pressures, stress and burnout. Burnout is a real and prevalent issue for nurses, often leading to increased staff turnover and sick days, all factors that can spill over to clinical practice effectiveness resulting in patient dissatisfaction and potential patient safety concerns (Hegney et al 2014). Mitigating factors of the nursing work experience, such as the degree of embeddedness and job satisfaction perceived by nurses, have been identified as potential approaches to reducing nurse turnover (Reitz and Anderson 2011; Cohen 2006; Holtom and O'Neill 2004). Embeddedness, a construct that refers to a constellation of fit perceptions, social ties, and elements that would be sacrificed upon leaving a job (Lee et al 2004), has demonstrated relevance to the retention strategies directed towards rural nurses specifically (Chandra 2010). Preventative strategies to mitigate these concerns include engaging the current workforce through innovation and building capacity and capability in graduate and early career nurses (Health Workforce Australia 2012). Feeling valued is a significant factor in how nurses respond to workplace pressures. Therefore, the importance of supporting isolated staff through workplace incentives, professional development, education and ongoing learning opportunities cannot be excluded from strategic planning (Mbemba et al 2013).

AIMS OF THE STUDY

The aims of this study are to evaluate the efficacy and sustainability of NMEP and to develop a formal pathway for ongoing implementation across the health services. To do this, we want to explore the perceptions of the exchange program, as viewed by the nurses and midwives who have taken part in the exchange program; we want to identify if there are similar models that have been trialled in other countries and settings; and gain a consensus from the managers of health services as to what they view as a sustainable model.

The original NMEP concept centred on a reciprocal relationship between rural/remote and metropolitan nurses and midwives, fostering the cross translation of skills and experiences. The core concept was designed around exposure to different areas with the hypothesis that exposure could lead to future recruitment. The program was developed through a state-wide steering committee of nursing leaders from rural/remote and metropolitan health services, aiming to build a more sustainable nursing and midwifery workforce through the collective strength of the state's resources. Candidates are matched with a partner, typically one rural nurse/midwife with one metropolitan nurse/midwife, and a swap of substantive positions is facilitated. The timeframe for the exchange may be either a period of three or six months. Rural/remote nurses have the opportunity to expand their skills and experience through exposure to higher acuity services and reduced hospital length of stay. The metropolitan nurses are able to expand their skills in rural continuity of care, Indigenous health services and 'rural generalist' nursing. The anticipated outcomes are for each cohort to develop skills that will support ongoing learning and professional development; improve networking, communication and collaboration between health services; and foster leadership and mentorship across diverse practice locations. While rural/remote exposure is important to improve recruitment, the relationship between metropolitan exposure for current rural/remote staff and retention to their rural/remote locations is also considered within the context of this study.

RESEARCH QUESTIONS

1. Can exposure to clinical practice in alternate settings change future employment intentions as viewed by the nurses and midwives?
2. Is there evidence of:
    a) increased job satisfaction, and reduced burnout and job strain, amongst nurses and midwives who have completed an exchange placement?
    b) self-reported confidence in relation to clinical and professional practice?
    c) job and community embeddedness in practice?
3. Is NMEP financially sustainable in the long-term?
4. What is a sustainable model for NMEP, as viewed by experts?

METHODOLOGY

To facilitate inclusion of the variables the project uses a mixed methodology within a pragmatic research framework (Onwuegbuzie and Leech 2005). It allows for a systematic approach to exploring meanings in context and to examining "constructivist formulations, particularly those that theorize the role of agents in the creation of meanings, practices, structures, and institutions through their speech acts and communicative interactions (Duffy 2008, pp. 168). Pragmatic analysis allows for both qualitative and quantitative paradigms to be combined in a way that allows for the analysis of social phenomena, in real world situations that have not been fully explored.

The study is being undertaken in three stages; a survey of the participating nurses and midwives; a systematic review; and a Delphi study inviting executive directors of nursing to be a part of an expert review group (table 1).

Stage 1 – This stage has commenced and will run over 18 months (Completion September 2019). The survey consists of a series of questionnaires that address burnout, well-being, embeddedness, and job satisfaction, alongside questions rating nurses' and midwives' NMEP experience, with free text space to discuss their views of the program. The survey consists of the 12 item version General Health Questionnaire [GHQ-12] (Goldberg et al 1997), a short measure of turnover and attrition intentions adapted from Jaros (1997; Heritage et al 2018), the Short Burnout Measure (Malach-Pines 2005), the Abridged Job in General (Russell et al 2004) to measure job satisfaction, the community and workplace embeddedness measures of Lee et al (2004), and items generated by the authors specific to the NMEP project, which includes demographics such as place of employment, place of exchange, experience, age and education levels. The GHQ-12 has demonstrated good utility as a screening tool for minor psychological disturbance (e.g., anxiety) in general non-clinical populations (Goldberg et al 1997). Heritage et al (2018) have previously demonstrated acceptable reliability and use as outcome variables for both the job-based and occupation-based turnover measures (a = .82, a = .86, respectively) adapted from Jaros (1997). Malach-Pines (2005) has similarly demonstrated good evidence of reliability (a = .85-.92 across samples) and convergent validity with related burnout measures for the Short Burnout Measure. The Abridged Job in General has been previously demonstrated as a robust measure of global job satisfaction with adequate reliability and validity evidence by Russell et al (2004). Lee et al.'s (2004) job/community embeddedness measures have similarly demonstrated evidence of adequate reliability and validity (e.g., relationships with turnover intent).

Table 1: Research process

Research stage	Data collection	Inclusions/Exclusions	Analysis
Stage 1 – Survey of exchange staff	Survey on job strain, turnover intention, embeddedness, burnout, job satisfaction, and perceptions of NMEP. Analysis will determine whether or not there is a change to the way nurses perceive their work and if any of the above parameters have altered as a result of the exchange experience.	Inclusions: Nurses and midwives employed by Queensland Health and involved in NMEP. Exclusions: Nurses not employed by Queensland Health and not involved in NMEP.	Two sets of analyses will be conducted: Comparative analyses between exchange participants and non-exchange nurses on the study's measures (job satisfaction, job strain, embeddedness, burnout, and turnover intention) via MANCOVA will be conducted, following checks for analysis data assumption compliance. This analysis will provide pilot cross-sectional results on the differing facets of the cohorts on these variables, without placing undue burden on the non-exchange nurses to complete longitudinal measurement. The second set of analyses will be within-subject generalised linear mixed model analyses of the exchange program nurses, and whether their change in turnover intention over time is attributable to their perceived level of job satisfaction, job strain, burnout, and embeddedness at the pre/during/post/follow-up measurement periods.
Stage 2 – Systematic review	Search focuses on rural and remote recruitment and retention of nurses and midwives across UK, Australia, New Zealand, United States of America and Canada. Focus on types on gaps and common themes within this area.	As per PROSPERO registration	The systematic review will follow the international guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (PRISMA, 2018) and the Joanna Briggs Institute (Joanna Briggs Institute, 2014) approach for systematic reviews. Full details of the overall search strategy for the project can be found in the research protocol and will be registered with the International Prospective Register of Systematic Reviews (PROSPERO).
Stage 3 – Delphi with experts	Series of survey and interviews rounds to develop a consensus on a draft policy for the roll out of NMEP.	Inclusions: Executive directors of nursing and midwifery employed by Queensland Health and involved in NMEP. Exclusions: Executive directors of nursing and midwifery not employed by Queensland Health and not involved in NMEP.	A series of surveys will be sent out, followed by a final interview conducted over ZOOM™ in which the draft policy will be shared, and specific questions related to the model posed to a group of nursing managers

Stage 2 – A systematic review is underway which will explore similar models that have been trialled and/or are in practice and the context around current rural remote recruitment, retention and practice gaps. The search will include the United States of America, United Kingdom, New Zealand, Australia and Canada. The outcome of this stage will be to develop a model for NMEP based on the early analysis of data (first 6 months) from the surveys and the data synthesis from the review. This will be used as a baseline for the development of a draft model.

Stage 3 – A four round Delphi technique inquiry method will gather input from a draft model informed by the initial data analysis of the Stage 1 surveys and the outcomes of the systematic review. It will require feedback from a consenting panel of executive directors of nursing experts from Queensland Health. The first round Delphi questionnaires thus comprise a combination of open and closed questions using Survey Monkey™. Where closed questions are used, asking panellists to specifically rate through a 5-point Likert system some component of the NMEP formal pathway; panellists will be asked to explain their opinions. The second-round questionnaire will ask further questions on new issues that emerge from responses to previous open questions, plus iterated closed questions. Feedback on the opinions of panellists on the first two rounds along with summaries of the written arguments given by panellists will pre-empt Round 3, a consultative consensus meeting through as online meeting platform to allow discussion and debate of synthesised themes and agreement for further modelling. Comments, recordings, transcripts, and notes will be collated by the Delphi moderators, who are two of the researchers chosen for this purpose. Upon completing the analysis of the third round, we will merge the predictive statements into patterns based on common themes. Data will be thematically analysed to develop sub-themes around purpose, process, enablers, and evaluating outcome and impact of a NMEP formal pathway. Round 4 consists of a survey where synthesized themes will be incorporated into a Likert-type scale, and the expert panel participants will be asked to validate responses. Participants will be asked to rate statements, which will be both positively and negatively formulated, using a five-point Likert scale, effectively re-ranking components from strongly disagree (1) to strongly agree (5), with the option to include comments if desired. The standardised mean, median, as well as the interquartile range of all answers, will be computed. When statements meet more stringent criteria (IQR of ≤1 instead of ≤2); this will be regarded as strong consensus (Franklin et al 2007).

RECRUITMENT

Stage 1 – Nurses and midwives who have participated in the exchange program and are employed by Queensland Health. Over the period of the program, there will be an estimated 70 nurses and midwives who will have been involved in the exchange program. Participants will be provided with an information sheet at the beginning of their placement, on which is a link to an online anonymous survey. They will be invited to complete the survey four times, on commencement of the exchange; midway through the exchange; at the end of the exchange and three months post-exchange.

To better understand the impact of NMEP, a comparative cohort of nurses and midwives is included. This cohort consists of participants from health services involved in the exchange, but whom have not undertaken exchange themselves. Typically, these nurses/midwives' wards or services have seen someone engage in the program, hence being exposed to the program philosophy, but the nurses in the comparative group have not engaged in exchange themselves. They will be invited to complete the survey once only. Depending on sample size adequacy, *t*-tests with alpha corrections to account for multiple family-wise comparisons, or a multivariate analysis of variance that accounts for sociodemographic covariates (MANCOVA) will be conducted to examine differences between the NMEP participants and the comparison group. The outcome variables that will be compared are job satisfaction, job strain, burnout, embeddedness, and turnover intention.

The surveys for both groups are voluntary and submission of the survey is consent to participate. Ethical approval was provided by the academic institution conducting the surveys.

Stage 3 – Executive directors of nursing from 16 Queensland health services participating in the exchange program will be invited to participate in a Delphi Study round in which they will be asked to consider and comment on a draft policy for NMEP.

Ethical approval was provided by the Darling Downs Human Research Ethic Committee (HREC).

Data collection and analysis

The overview of data collection and analysis is outlined in table 1.

The survey uses a collection of questionnaires that support the review and analysis of the nurses/midwives' perceptions of the program related to job satisfaction, embeddedness (table 2), in addition to demographic questions and free text for participants to provide their views of the program. Analysis via generalised linear mixed models will be used to examine the unique variance in job-related turnover intentions, and profession-based attrition intentions, explained by the predictors outlined prior. This approach will allow for time-related change in these relationships to be examined without the stricter data requirements of comparable repeated-measures ANOVA-based approaches.

Table 2: Questionnaires used in the Survey

Construct Measured	Name of Measure	Description
Demographic questions	Related to age, location, experience	Establishment of context in normal practice
Questions related to NMEP experience	Questions aimed at finding out how well the exchange program worked for the participant (Likert scale and free text)	Questions aimed at collecting data related to the efficacy of the exchange program
Burnout	Burnout Measure –Short Version (Malach-Pines 2005)	10-item version of the original 21-item scale. Example item: 'Difficulties sleeping'.
Job Strain	General Health Questionnaire (Goldberg & William, 1988)	A 12-item measure that captures general psychological distress using a 4-point Likert Scale. Example item: 'Felt constantly under strain'.
Job Satisfaction	Abridged Job in General (Russell et al 2004)	8-item scale, a short version of the previous Job in General Scale.
Job and Community Embeddedness	Job Embeddedness Measure (Lee et al 2004)	Questions that examine the Fit, Links, and Sacrifice elements that contribute to the construct of embeddedness, reflected by both job-based and community-based factors. Example item: 'I feel like I am a good match for this organisation'.
Attrition	Three-item Turnover Intention Scale (Jaros 1997)	Three items using a five-point Likert scale measures how often respondents consider leaving their occupation, and likelihood of leaving their occupation in the future. Example item: 'How likely is it that you would leave your organisation in the next year?

Thematic analysis will be used to draw out the common themes that are found across all data sets (Braun and Clarke 2006). The focus of this will be to examine alternatives around a sustainable exchange program, using both peer reviewed literature and the views of nurses and midwives, and nursing managers.

The Delphi, a structured communication technique initially developed as a systematic, interactive forecasting method comprising a combination of open and closed questions with mixed methods analysis, allows for a series of rounds that support the refinement of a draft document. Experts in the field are used to provide discussion and the exploration of ideas based on expert knowledge and experience (O'Keefe et al 2012).

Content analysis is divided into three phases: pre-analysis; the exploration of the material, and the treatment of the results; inference and interpretation.

Validity and rigour

In terms of the quantitative analyses, generalised linear mixed models used to examine time-related change is a rigorous approach that allows for greater flexibility in the data assumptions in comparison to the traditional ANOVA-based approaches (e.g. data non-normality and missingness is tolerated to a greater degree (Heck et al 2014)). Repeated measures designs are additionally better representative of the relationship between predictor/outcome variables by safeguarding against traditional flaws in cross-sectional research (e.g., regression to the mean). While we acknowledge that the between groups comparisons (i.e. NMEP participants and non-participants) are limited to cross-sectional inferences, this analysis provides the basis for future comparisons across these participant groups that would benefit from future longitudinal analysis, the latter of which falls outside of the data-collection scope of the current investigation.

In terms of the qualitative analyses, thematic analysis will allow for the inclusion of participant perceptions against questions posed in the survey. Jagd (2011) argues that any organisation "is a space intersected by a multitude of disputes, critiques, disagreements and attempts to produce fragile local agreements" (pp. 345). Participants will reflexively justify and explain their situation within it, and it is this reflexivity that allows for the ordering of themes within the commentaries provided throughout the survey, ordered into pre-determined themes such as job security and satisfaction; job and community embeddedness; and burnout and compassion fatigue.

LIMITATIONS

This project was developed in two stages.

The first stage was a stand-alone project that set out to review the perceptions of nurses and midwives who had participated in NMEP. The exchanges are staggered across the program period between August 2017 and June 2019. This review was always going to have small numbers because of the limited number of placements available in rural and remote regions. Because the staffing compliment is small, it is not feasible to take away more than one experienced rural nurse/midwife at any one time, as it would leave the service at risk in relation to the skills mix of the staffing compliment. Although the service will have a metropolitan based nurse in exchange, as (Francis et al 2016) noted in their study, the probability of that nurse/midwife having the experience and necessary skills to deal with the additional lifespan issues in the rural context is small. This is in spite of careful selection in each exchange taking place.

Shortly after commencement, a request was made to have a procedure developed for ongoing roll out of NMEP by December 2018. This necessitated a systematic review to support the procedure development, in the light of the fact that the surveys of those involved with an exchange will not be complete. Ongoing opportunity though NMEP or a similar program is encouraging, as it supports recruitment and retention in the rural and

remote regions of the state. It does however mean that a systematic review is essential to support ongoing procedures around exposure and exchange, in light of the fact that the surveys of those involved within an exchange may not be complete.

CONCLUSION

This project started out reviewing the perceptions and experiences of a cohort of nurses and midwives who have been involved in a state-wide exchange program to experience different context of practice between rural and metropolitan regions. It was the brainchild of one rural health service to support recruitment of staff to the region and to offer the opportunity of expanding nursing/midwifery workforce professional and clinical skills by spending time in a metropolitan service. What has transpired is the state government seeing this as an opportunity to develop a formal exchange program to support recruitment, retention and opportunities for ongoing professional and clinical learning for their nursing and midwifery workforce across the state. The program is novel and looks to present excellent opportunities for the crossover of skills and ideas related to clinical, professional and service integration between metropolitan and rural practice. Health services are best positioned to identify and understand the specific challenges to providing quality healthcare in their unique settings. Further, the economic pressures of contemporary health care demand cost effective measures to address these challenges.

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Pressure injury point prevalence: state-wide survey to identify variability in Western Australian hospitals

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KEYWORDS

pressure injury, prevalence, risk factor, survey

ABSTRACT

Objective
A point prevalence survey was conducted across Western Australia to monitor adherence to national safety and quality health service standards, and to create baseline data on which to improve. The study identified significant areas for targeted interventions.

Design
A state-wide point prevalence survey of patients and their medical records.

Setting
Public hospitals in Western Australia (WA).

Subjects
Data was collected from 2,281 inpatients.

Main outcome measure(s)
The aim of the study was to determine pressure injury prevalence and characteristics, adherence to guidelines, significant related factors and their attributable burdens.

Results
8.7% of patients had pressure injuries. 6.3% were hospital-acquired (HAPIs). Over 1,000 HAPIs per year were attributed to being older, a long-term patient, having acute renal failure or volume depletion. 65% of patients had a skin inspection; less likely in birthing mothers and long-term patients. 70% of patients were screened with a risk assessment tool. 36% of patients were identified as at risk of a pressure injury; and of these, 71% had prevention plans in place. One third of all adults with HAPIs were not identified as at risk using current practices.

Conclusion
The prevalence and characteristics of pressure injuries and HAPIs was comparable with prior state-wide results. The survey identified variations in rates of: skin inspections, using risk assessment tools; and applying plans for those at risk of pressure injuries. Multivariable logistic regression identified areas for improvement: the main groups at risk of pressure injuries; and patient groups with lower rates of skin inspections and screening.

INTRODUCTION

Pressure injuries are frequent and largely preventable injuries of the skin and subcutaneous tissue that increase morbidity and mortality (National Pressure Ulcer Panel et al 2014). Pressure injuries significantly reduce quality of life, increase length of stay in hospital and cost approximately 1.9% of all public hospital expenditure (Nguyen et al 2015). There has been substantial research to support improved clinical practice to ameliorate pressure injuries, such as the development of the International Prevention and Treatment of Pressure Ulcers: Clinical Practice Guidelines.

The Australian Commission on Safety and Quality in Health Care (ACSQHC) introduced National Safety and Quality Health Service Standards and include guidelines to prevent and manage pressure injuries (ACSQHC 2012). In relation to these standards, a multi-focused point prevalence survey was conducted to assess the current situation in Western Australia (WA). Prior surveys had been conducted and the rate of HAPIs in 2011 was 6.3%, a 17% increase since 2009 (Mulligan et al 2011). Subsequently, state-wide pressure injury prevention strategies were implemented and this current survey would determine rates, proportion related to medical devices, and using multivariable logistic regression determine factors associated with HAPIs and gaps in screening.

The aim of the study was to determine the prevalence and characteristics of pressure injuries and to use logistic regression to determine significant factors associated with HAPIs and adherence to guidelines, in order to identify areas where improvements can be made.

METHOD

Participation

Hospitals were included in the audit if they had at least 40 acute and/or subacute beds and admitted public patients. Accordingly, 14 metropolitan and 6 regional hospitals throughout the state were included in the study. Participants included multiday-stay public in-patients from acute and subacute wards in the hospitals on survey days in May 2014. Exclusions: dialysis patients, mental health wards, unqualified newborns, hospital in the home, and day surgery/procedure patients.

Ethics approval: The study attained ethical approval from the Department of Health Human Research Ethics Committee (#12/2014).

Audit tool and data collection

The project methodology was built on previous wound prevalence surveys (Mulligan et al 2011; Prentice et al 2009). Qualitative and quantitative data were collected by over 400 surveyors who attended educational sessions and passed a competency test. Each audit was conducted by a hospital-based clinician with an external surveyor.

Survey teams examined medical records for each patient. In addition, a full body skin inspection was conducted on consenting patients. The pressure injury audit tool consisted of the following elements:

1. The presence and details of pre-existing and hospital-acquired pressure injuries from the medical records and/or on inspection of the participants' skin.
2. Determination of whether patients had a skin inspection for pressure injuries within 8 hours of presentation.
3. Documented use of a validated pressure injury risk assessment tool (Braden scale©, Braden Q or Western Australian Health Glamorgan Pressure Injury Tool) within 8 hours of presentation.

4. If at risk, whether preventative measures and a management plan had been implemented.
5. Whether the patient/carers had been involved in pressure injury prevention or management discussions.
6. If the patient had one or more pressure injuries the following were recorded:
    a. location of the pressure injury(s)
    b. whether it was hospital acquired or present on admission
    c. whether it was medical device related
    d. classification by stage
    e. if preventative equipment was in place
    f. if a management plan was in place.

Data analysis

Data analysis included testing the statistical significance of differences between groups using the Pearson's Chi-squared test for categorical data. Data was supplemented using data linkage to extract previous diagnoses and admissions, and the Australian Bureau of Statistics data on socio-economic status and hospital accessibility. Univariable and multivariable logistic regression models were fitted to test for significantly different outcome percentages between hospitals and patient characteristics. Odds rations (ORs) were obtained from the models to compare outcomes against the reference hospital (hospital 11 – with the largest group of audited patients). Attributable burden was calculated for an annual basis to estimate the number of patients potentially affected by any significant factors.

FINDINGS

Participants

Of the 3,181 patients who were hospitalised on the day of the pressure injury audits, 2,288 consented to having a skin inspection (table 1). Data for seven patients was missing, leaving a final cohort of 2,281 patients (71.7%). Paediatric patients were significantly less likely to consent to a skin inspection than adults, OR=0.5 (95% CI: 0.4-0.8).

Slightly more females (52%) than males (47.8%) participated in the audit, and just under half of all participants were aged 65 years or older (49%). The majority of hospitals were from the Perth metropolitan area (14 of 20 hospitals), which also comprised 91% of the final patient cohort.

Pressure injuries

Overall, 8.7% of patients (207 patients) were identified as having at least one pre-existing or hospital-acquired pressure injury (HAPI).

6.3% (142) of patients had one or more HAPIs (table 2). The prevalence of HAPIs ranged from 0-11% across the 20 hospitals. Nearly three quarters of patients (73%) had only one HAPI, with a further 17% (25 patients) having two pressure injuries and 9% (13 patients) having three pressure injuries.

The frequency of having at least one HAPI was approximately three times greater for older adults compared with young adults and adults, and five times greater than for children.

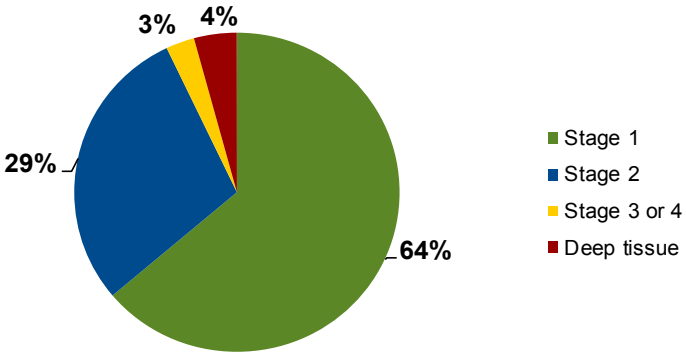
Table 1: Patient and hospital characteristics, point prevalence survey

Patient demographics	patients	%
Total number of patients admitted on survey day	3,181	100.0
Patients consenting to having a skin inspection	2,288	71.9
Sex		
Female	1,191	52.2
Male	1,090	47.8
Age group		
Child (0 to 15yrs)	214	9.4
Young adult (16 to 24yrs)	120	5.3
Adult (25-64yrs)	825	36.2
Older adult (65yrs and over)	1,122	49.2
Total	2,281	100.0
Hospital location		
Metropolitan hospitals (14)	2,073	90.9
Regional hospitals (6)	208	9.1
Total	2,281	100.0

Table 2: Characteristics of pressure injuries, point prevalence survey

Characteristics	Number of patients	Percentage of patients
Pressure injuries		
Patient does not have a PI	2,074	91.3
Patient has one or more PIs	198	8.7
Patient has one or more HAPIs	142	6.3
HAPIs by age group		
Child (0 to 15 years)	4	1.9
Young adult (16 to 24 years)	4	3.4
Adult (25 to 64 years)	28	3.4
Older adult (65 years and over)	106	9.9
Hospital location of patients with HAPI		
Metropolitan	131	6.5
Country	11	5.4
Number of HAPIs		
Patients with one	104	73.2
Patients with two	25	17.6
Patients with three	13	9.2
Three most common locations		
Sacrum	43	24.9
Buttock	21	12.1
Heel	21	12.1
Risk assessment for pressure injuries		
Skin inspection undertaken within 8 hours of presentation	1,483	65.2
Screened with a risk assessment tool within 8 hours of presentation	1,596	70.3
Identified as at risk of developing a pressure injury	711	36.6
If at risk, management plan in place (N=711)	507	71.3
If at risk, patients (or carer) input into a management plan (N=711)	310	44.3
Medical device related pressure injury	49	18

Figure 1: Pressure injuries by stage, with severity increasing from 1 to 4, or deep tissue.



HAPIs were staged using the National Pressure Ulcer Advisory Panel (2016) pressure injury definitions. The majority of HAPIs were assessed as stage 1 (64%) or stage 2 (29%), 3% were stage 3 or 4, and a further 4% were suspected deep tissue pressure injuries (no HAPIs were unstageable pressure injuries) (figure 1).

The percentage of patients with at least one HAPI was significantly higher than the average percentage of HAPIs found within this survey in two distinct populations: older adults (9.9%) and in patients with a stay of six or more days (9.9%).

Conversely, the percentage of patients with at least one HAPI was significantly lower than the percentage of HAPIs found within this survey in the adult population (3.4%); paediatrics (1.9%); and patients with a length of stay between zero and five days (3.5%).

Using a multivariable logistic model of the probability of a patient having at least one HAPI, older adult patients were significantly more likely to have at least one HAPI than adults, OR = 2.4 (95% confidence interval, CI: 1.5-3.7). Similarly, patients with a stay of six or more days were significantly more likely to have at least one HAPI than patients with a stay of between zero and five days, OR = 2.2 (CI: 1.5-3.2). Patients with an additional diagnosis of acute renal failure were significantly more likely to have at least one HAPI than patients without that diagnosis, OR = 2.6 (CI: 1.7-4.2), and similarly for patients with an additional diagnosis of volume depletion, OR = 2.5 (CI: 1.5-4.1).

The estimated burden attributable for each significant risk factor was calculated (table 3). The table shows the estimated annual change in the number of individuals with at least one HAPI when the risk factor is absent from the population. For example, the presence of at least one HAPI among an estimated 1,505 individuals each year can be attributed to being an older adult (>65yrs) as opposed to being adult (25-64yrs). This corresponds to 5% (3-8%) of the estimated annual number of older adult hospitalisations in all WA hospitals examined.

Table 3: Multivariate logistic model of the probability of a patient having at least one HAPI and the estimated attributable burden if applied to the annual number of patients in Western Australia.

Patient Characteristic	Reference Group	Adjusted OR (LCI, UCI)	Change in the number of patients with the outcome (LCI, UCI)	Annual change in the number of patients with the outcome (LCI, UCI)	Annual change as a percentage of the estimated annual number of patients with the risk factor (LCI, UCI)
Older adults	Adults	2.4 (1.6, 3.7)	-58 (-84, -29)	-1505 (-2186, -761)	-5 (-8, -3)
Stay 6+ days	Stay 0-5 days	2.2 (1.5, 3.2)	-48 (-69, -26)	-752 (-1076, -405)	-5 (-8, -3)
Acute renal failure	-	2.6 (1.7, 4.2)	-20 (-31, -10)	-369 (-565, -180)	-11 (-18, -6)
Volume depletion	-	2.5 (1.5, 4.1)	-14 (-23, -5)	-277 (-457, -101)	-10 (-17, -4)

In addition, 18% (49) of pressure injuries were identified as medical device related and the cases were distributed across most hospitals.

Prevention strategies were in place for the majority of patients, with bed and/or chair support surfaces to prevent pressure injuries in use, and over 400 adjunct devices in use, such as limb elevator or foam wedges.

Risk Assessment

The audit identified differences in patient care processes across the hospitals.

Documented evidence of a full body skin inspection within 8 hours of presentation (65%).

A larger proportion of patients from metropolitan (65.9%) than regional (58.5%) WA hospitals had the evidence of a skin inspection within 8 hours of presentation (p=0.03). At the individual hospital level, rates of assessment ranged from 38.8% to 90% (p<0.01). A multivariable logistic regression model of the probability of having documented evidence of an initial skin inspection was fitted. This identified that patients staying over 6 days and adults having single, live births, were significantly less likely to have documented evidence of an initial skin inspection. The attributable burden of these factors is estimated in table 4.

Table 4: Multivariable logistic model of the probability of a patient having documented evidence of a skin inspection conducted within 8 hours of presentation. Odds ratios and 95% confidence intervals.

Patient Characteristic	Reference Group	Adjusted Odds ratio (OR) and confidence intervals	Estimated annual change in the number of patients with the outcome	Estimated annual change in the number of patients with the outcome	Estimated annual change as a percentage of the estimated annual number of patients with the risk factor
Length of stay: 6+ days	LCA 0-5 days	0.6 (0.5-0.7)	99 (58-142)	1562 (914-2228)	8 (5-12)
Additional diagnosis: adults with single live birth	-	0.1 (0.07-0.16)	87 (74-100)	6691 (5685-7666)	47 (40-54)

Patients with documented use of pressure injury risk assessment tool within 8 hours of presentation.

Use of a pressure injury assessment tool within 8 hours of presentation was documented for 70% of patients (Table 2), ranging from 42% to 95% across the 20 hospitals, (p<0.01). Risk assessments were conducted on a larger proportion of males (73%) than females (67.8%), p=0.01. In addition, larger proportions of adults (67.4%) and older adults (76.9%), were assessed compared with children and young adults (both 55%), p<0.01.

Patients identified as at risk of developing a pressure injury

Of the 1,945 patients who were risk assessed for pressure injuries, 36.6% were found to be at risk of developing a pressure injury. Almost half of children (49.6%) and older adults (45.5%) assessed were identified as being at risk, compared with one fifth of young adults (19.8%) and one quarter of adults (22.8%). There was significant variation at the hospital level with proportions of at risk patients ranging from 10% to 61.4% (p<0.01).

All children and young adults who had one or more HAPIs were identified as being at risk, while only two thirds of adults (62.5%) and older adults (66.4%) with HAPI's were identified as at risk.

The majority of patients (92%) were assessed with the Braden scale. To determine the accuracy in this population the prediction values were calculated (table 5). Screening sensitivity was 63.4% for patients aged 65 years and over compared with 100% for patients aged 16 to 24 years.

Table 5: HAPI prevalence and respective prediction of pressure injuries using the Braden Scale.

Age groups	patients screened	HAPIs	Rate	Sens 1	Spec 2	PPV 3	NPV 4
Young adults (16 to 24 yrs)	70	3	4.3	100.0	82.1	20.0	100.0
Adults (25 to 64 yrs)	574	21	3.7	66.7	78.3	10.4	98.4
Older adults (65 yrs and over)	798	71	8.9	63.4	94.3	13.2	94.3
All ages 16 yrs and over	1442	95	6.6	65.3	68.2	12.6	96.5

Sensitivity, 2. Specificity, 3. Positive predictive value, 4. Negative predictive value

Patients identified as at risk who have a pressure injury prevention and management plan insitu

Over two thirds (71.3%) of patients who were deemed at risk of developing a pressure injury had a bedside pressure injury management plan. The proportions of at risk patients who had a plan did not differ significantly by age, sex or hospital location (metropolitan or regional). At the individual hospital level, the rates of at risk patients who had a bedside plan ranged from 54% to 100%.

Limitations of the study include: data was collected from a large number of surveyors recruited across WA Health with varying levels of clinical and audit experience; the preventative strategies which were in place for pressure areas were reviewed on management plans but not necessarily viewed in practice at the time of the survey. To mitigate this a number of data verification steps were applied both on the day and during the data entry, including entries being double checked.

DISCUSSION

Early last decade, prevalence estimates for pressure injuries for in-patients in acute and subacute health care facilities in Australia ranged from 5.6-48.4% (mean 25.5%) and 29-38.5% in New Zealand (Australian Wound Management Association 2012). In 2003, Victoria reported a state-wide prevalence of 26.5%, of which two thirds were HAPIs. Following the introduction of a number of interventions the prevalence of pressure injuries declined to 17.6% (Victoria Health 2006). The prevalence of HAPIs in Queensland subsequently declined from 12.4% (2008) to 4% (2012) (Miles et al 2013).

This surveys rates for HAPIs (6.3%) remains unchanged from a previous survey in 2011 (Mulligan et al 2011). The survey had identified a 17.5% increase in the prevalence of HAPIs compared with 2009. State-wide prevention and management strategies were subsequently implemented in accordance with the national standards. This surveys prevalence of HAPI was slightly above New South Wales rates (2015: 6% and 2016: 5.3%), and over two times higher than for Queensland (2014: 3%) (Coyer et al 2017; Clinical Excellence Commission 2016; Clinical Excellence Commission 2015).

Jull et al (2016) reported an average prevalence rate of 6.3% for HAPIs over a three-year period between 2012-13 and 2014-15 in New Zealand. Over 97% of their patients were reported to have stage 1 or 2 HAPIs, which is higher than in this survey (93%).

This survey found that HAPIs were significantly higher amongst adults aged 65 years and older and longer stay patients; this would be consistent with decreased mobility associated with advanced age and extended bed rest (Rondinelli et al 2018; Coleman et al 2013). The main sites of pressure injuries were consistent with the most frequent sites reported in the literature. With the use of logistic regression to identify key risk factors

patients with additional diagnoses of either acute renal failure or volume depletion were also significantly more likely to have pressure injuries. Impaired renal function is associated with poor wound healing and co-morbidities increasing the risk of pressure injuries, and volume depletion also reduces skin turgor (Maroz and Simman 2013). This identifies a group of patients whom it may be important to ensure pressure injury strategies are in place. Table 3 estimates the attributable burden of each significant risk factor for pressure injuries. By identifying the factors with high numbers of patients affected, interventions can be focused to potentially prevent hundreds of pressure injuries.

In addition, increased focus on prevention in patients with medical devices is required. 18% (49) of the pressure injuries were identified as being medical device related. This is within the range from published studies of 12%-35% (Dyer 2015; Black et al 2010), in which medical device related pressure injuries are not always considered as preventable. Whilst the risk factors for developing a medical device related pressure injuries are the same as for traditional pressure injuries, medical devices increase the risk of a pressure injury by more than 2.4 times (Black et al 2010) and develop faster than traditional pressure injuries - often on the face and head region, linked with tubing and masks (Kayser et al 2018).

The literature identifies the value of early assessment and prevention (National Pressure Ulcer Panel 2014). This current survey highlighted variations in rates of skin inspections and the use of a pressure injury risk assessment tool within the first 8 hours of presentation. Documented skin inspection rates by hospital ranged from 38 to 90%, and the use of a risk assessment tool ranged from 42 to 95% by hospital. Long-term patients were significantly less likely to have a documented initial skin inspection. The reason for this could not be identified, and needs further investigation.

The odds ratio of a patient having documented evidence of an initial skin inspection were almost ten times lower for birthing mothers. Both groups are at risk of pressure injuries due to reduced mobility and the use of anaesthesia in some birthing mothers (Milne et al 2009; Prior 2002).

This audit identified gaps in practices: just over two thirds of patients (70.3%) were reviewed with a pressure injury risk assessment tool within 8 hours of presentation; and of those identified at risk, 71.3% had a pressure injury management plan in place. In comparison, in New South Wales only 58% of patients had a risk assessment within 8 hours of presentation to a hospital or community nursing service and 44% of patients with a pressure injury were reported to have a wound management plan (Clinical Excellence Commission 2015). This wide variation in rates between hospitals for all of the measures highlights hospital wide differences in adherence to best practice.

The main risk assessment tool used (92.3%) was the Braden Scale for predicting pressure injuries. 36% of patients were identified as at risk. This is considerably different to surveys across New South Wales, with rates of 65% (Clinical Excellence Commission 2016; Clinical Excellence Commission 2015). The Braden scale in this audit was found to have 65% sensitivity, in contrast to other studies with 83% (Chen et al 2017). Only two thirds of adults (62.5%) and older adults (66.4%) with HAPI's were identified as at risk, therefore, one third of adults who develop pressure injuries are not being detected with current screening tools in this population. This may relate to either the tool or its application, or a combination of these factors.

CONCLUSION

The overall prevalence of pressure injuries and HAPIs for WA was comparable to previous state surveys and higher than published for other Australian states. The analysis of compliance with the national standards revealed variability in clinical practice across the 20 hospitals. Significantly higher rates of pressure injuries were found in: the elderly; long-term patients; patients with acute renal failure; or volume depletion.

The audit findings also showed that although pressure injury risk assessment tools were being used, the outcome of these assessments was not always being translated into management plans. Subsequently, the importance of ensuring that high risk groups are reviewed, processes support expertise in the application of skin assessments, is vital to reduce preventable HAPIs.

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Side effects of chemotherapy in children with cancer: effects of nursing training administered to caregivers

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KEY WORDS

caregiver, chemotherapy, child, education, nurse

ABSTRACT

Objective
The present study aimed to assess the consequences of providing nursing training to caregivers of children with cancer on the side effects associated with chemotherapy.

Design
The present study used a pre-test-post-test experimental design.

Setting
The study was conducted in a paediatric hematological oncology hospital in Ankara, Turkey

Subjects
This study was conducted with 40 caregivers responsible for looking after child patients, all of which had been recently diagnosed with cancer, but who had not started chemotherapy.

Primary argument
The knowledge scores of the caregivers on issues related to infection and bleeding risk, nutrition and oral care and total scores were significantly higher than their pre-test scores before undergoing training ($p<0.05$).

Conclusion
Planned training on the problems that may arise due to the side effects of chemotherapy was found to be effective in increasing the knowledge level of caregivers. The authors suggest that training in this subject should be provided before initiating a chemotherapy program, before the occurrence of side effects, and visual and written materials should be used.

INTRODUCTION

Chemotherapy for the treatment of cancer is associated with a wide range of side effects (Carelle et al 2002; De Boer-Dennert et al 1997; Griffin et al 1993). A multidisciplinary approach that involves nurses and other healthcare personnel is recommended for the management of cancer treatment processes and potential complications, and the importance of the caregiver responsible for the care of the child has been emphasised (Kutulu et al 2007; Holm et al 2003).

Patients must be prepared, and training must be provided by the attending nurse before initiating a chemotherapy program (Aranda et al 2012). As caregivers bear the primary responsibility for looking after the child, they should be trained in the prevention, detection and control of side effects associated with the chemotherapy (Kutlu et al 2007). The most significant symptoms and side effects seen in cancer patients could be prevented or minimised through effective and conscious nursing interventions and training programs (Aslan et al 2006). It has, however, been reported that the requirements of the patient are not sufficiently fulfilled despite the patients and their caregivers being given training from the nurses and other healthcare personnel on the side effects of chemotherapy (Aranda et al 2012; Kutlu et al 2007). Training programs that detail the possible side effects of chemotherapy in paediatric cancer patients, as well as preventive measures, may contribute to symptom control.

METHODS

Single-group pre-test-post-test experimental design was planned between 1 December 2014 and 1 December 2015 at a paediatric hematological oncology hospital located in the city center of Ankara. This study aims to assess the consequences of providing nursing training to the caregivers of children with cancer on the side effects associated with chemotherapy.

Participants

This study was conducted after obtaining the voluntary consent of the caregivers responsible for looking after child patients, all of which had been recently diagnosed with cancer, but who had not started chemotherapy and who were not terminally ill.

Study Sample

The study sample comprised the caregivers of 60 children with cancer who were admitted to the study center for cancer therapy during the study period. Twenty caregivers were excluded from this study as they did not fall within the study limitations. Consequently, the final study sample comprised 40 caregivers.

Ethical Considerations

Before starting this study, the ethical approval (Ankara Pediatric Oncology and Hematology Training and Research Hospital: 30.03.2015/2015-007) and the informed consent of the caregivers were obtained.

Research Hypothesis

The provision of planned nursing training on the side effects of chemotherapy provided to caregivers of hospitalised children undergoing chemotherapy can be considered effective.

Limitations

Recent diagnosis of cancer, no previous chemotherapy course, the exclusion of terminally ill patients and the voluntary participation of caregivers were the limitations of this study.

Preparation of the Training Manual

The training manual was compiled into two sections. The first section provided explanations of cancer, the chemotherapy process, the side effects of the drugs and the administration of chemotherapy, and contained

a total of seven explanatory diagrams. Details were given on the risks of infection and bleeding associated with chemotherapy, nutritional principles and oral care practices, as well as important considerations, which were explained with a total of 21 explanatory diagrams. The Training Manual was printed using the Arial 14 point font, and bold text was used in key sections to attract attention. The text was supported by explanatory color diagrams. The manual comprised 24 pages of A3-sized paper.

Provision of Training

Training was provided during a single-session face-to-face interview that lasted for 50-60 minutes in a separate room at the clinic, two weeks before the initiation of chemotherapy. Only one caregiver underwent training on a single day.

Before beginning the training session, the training manual was explained and handed to the caregiver for review. Each component of the training was explained practically (using an oral care set, port reservoir, port needle), and the caregiver participated actively in the hands-on training.

Data Collection

Data and sociodemographic characteristics were collected using a caregiver interview questionnaire that contained 52 closed-end questions related to chemotherapy, infection risk, bleeding risk, nutrition and oral care. The pre-test was performed immediately before the training session, and the post-test was performed one month after the training of the relevant caregiver, using a caregiver interview questionnaire. Before starting this study, a preliminary study was conducted with five caregivers with similar characteristics to the study group.

Data Analysis

The statistical analysis included mean, number, percentage, Kruskal Wallis test, Wilcoxon test and in paired comparisons. A Bonferroni test was used with median (interquartile range: IQR), minimum and maximum values, and the level of statistical significance was set at $p<0.05$ (IBM SPSS Statistics 21.0 [IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.] and MS-Excel 2007).

Expected and correct responses given by the caregivers before and after training were coded as 2.5 points, and incorrect and irrelevant responses were coded as 0 points, and a knowledge score was then calculated for each caregiver from the results. The significance of the difference in knowledge scores before and after training was evaluated.

RESULTS

Of the children with cancer, 52.5% were male, 40% were aged 1-5 years, 27.5% were aged 6-10 years, 22.5% were aged 11-15 years, and 10% were aged 16-17 years; 37.5% had AML, 27.5% had ALL, 25% had CML, and 10% had neuroblastoma radiocarcinoma.

All caregivers were female, 32.5% were aged 25–30 years, 47.5% were aged 31–36 years, and 20% were aged 37 years and older; 72.5% were primary school graduates, 20% were high school graduates, and 7.5% were undergraduate or postgraduate students; 85% were housewives, 15% were employed, 95% were the patients mother, 5% were the patients sister, and 15% had another family member with cancer (table 1).

Table 1: Sociodemografic features of caregivers and children with cancer (n=40)

CAREGIVER	n	%
Age		
25-30	13	32.5
31-36	19	47.5
25-30	13	32.5
37 and upper	8	20.0
Education		
Primary school	29	72.5
High school	8	20
Undergraduate	2	5.0
Postgraduate	1	2.5
Profession		
Employed	6	15.0
Housewives	34	85.0
Relationship to child		
Mother	38	95.0
Elder sister	2	5.0
CHILDREN WITH CANCER		
Gender		
Female	19	47.5
Male	21	52.5
Age		
1-5	16	40.0
6-10	11	27.5
11-15	9	22.5
16 -17	4	10.0
Diagnosis		
ALL	11	27.5
AML	15	37.5
CML	10	25.0
Neuroblastoma, radiocarcinoma	4	10.0

The knowledge scores of the caregivers on issues related to infection and bleeding risk, nutrition and oral care and total scores were significantly higher than their pre-test scores before undergoing training ($p<0.05$) (table 2).

Table 2: The correct answers and knowledge scores of caregivers after and before education (n=40)

Education subjects	Before education		After education	
	Correct answer (n)	Score	Correct answer (n)	Score
Infection Risk				
Using mask	40	100	40	100
Ventilation of room	39	97.5	40	100
Taking baths every other day	34	85	40	100
Changing the bed linen	27	67.5	40	100
Separating personal items	26	65	40	100
Bathroom / toilet cleaning	26	65	40	100
Ironing of clothes	17	42.5	40	100
Reporting of IV/port catheter changes	26	65	40	100
Hand washing	25	62.5	40	100
Proper hand washing	26	65	39	97.5
Do not enter other patient rooms	32	32	39	97.5
Do not accept visitors	23	23	39	97.5
Choosing the right toy	8	20	39	97.5
Chaning clothes when return from outside the hospital	25	15	36	90
Total		**805**		**1380**
Bleeding risk				
Do not bath glove	22	55	40	100
Using moisturizer after bathing	20	50	40	100
Daily gaita follow-up	24	60	40	100
Keeping the bed locked	22	55	40	100
Do not toothbrush	14	35	39	97.5
Report changes in the body (bruise, redness, etc.)	24	60	39	97.5
Do not give foods that can cause oral irritation	20	50	38	95
Report blood presence in urine / stool	20	50	38	95
Observing changes in the anal region	21	52.5	37	92.5
Learning thrombocyte value before procedures that can disrupt skin integrity	16	40	35	87.5
Total		**507.5**		**965**
Nutrition				
Reporting when undernutrition	18	45	40	100
Often and often, little by little eating	19	47.5	39	97.5
Reporting factors influencing eating	23	57.5	39	97.5
Report diarrhea / constipation	22	55	39	97.5
Consumption of plenty of water	9	22.5	39	97.5
Fruit washing right	5	12.5	39	97.5
Fruit-feeding with the knowledge of the health team	2	5	38	95
Do not buy ready food	18	45	36	90
Total		**290**		**772.5**

Oral care				
Observation of mouth and oral mucosa	1	2.5	40	100
Time for oral care	1	2.5	39	97.5
Swallowing the fungostat while oral care	2	5.0	39	97.5
Making oral care within half an hour after eating	1	2.5	39	97.5
Using mouthwash in oral care	0	0.0	38	95
Make the mouthwash for 30 seconds	1	2.5	38	95
Do not give food / drink for 30 minutes after oral care	0	0.0	37	92.5
Reporting when oral care can not be done	0	0.0	35	87.5
Total		**15**		**762.5**
FINAL TOTAL		**1617.5**		**3880**

Table 3: The knowledge scores of the caregivers about infection risk, bleeding risk, nutrition and oral care before and after education.

Education subjects	Median score		Test	
	Before education	After education	Z*	p
Infection Risk	23.7 (7.5)	35.0 (7.5)	5.182	0.001
Bleeding Risk	12.5 (10.0)	25.0 (7.5)	5.385	0.001
Nutrition	7.5 (10.0)	20.0 (0.0)	5.533	0.001
Oral care	0.0 (0.0)	20.0 (0.0)	5.785	0.001
Total	43.7 (19.4)	100 (5.0)	5.514	0.001

* Wilcoxon test

DISCUSSION

Neutropenia is a common side effect of cancer therapy (Lustberg 2012). Compliance with hand and general hygiene principles in neutropenic areas (WHO; Gencer 2008), wearing face masks (Raad et al 2002) and providing easily disinfectable toys available in childrens rooms (Randle et al 2006) are recommended approaches to reduce infection rates. Isolation is another means of preventing infections, and has been reported to be successful in the prevention of nosocomial infections (Ostrowsky et al 2001). Invasive interventions and the presence of an indwelling IV/port catheter increase the risk of infection (Lustberg 2012) and it is important to provide training in catheter care to families (Gordon et al 2003). The rooms of patients with neutropenia must be arranged in accordance with hygiene principles, and particular measures must be put in place, such as limiting the number of visitors (Gonderen et al 2009). Providing training to caregivers in infection risks increased the level of knowledge in all sections, particularly on isolation and toy selection, and the training proved to be effective (table 1, table 2).

Chemotherapeutic drugs may predispose to bleeding by decreasing the platelet count. It was suggested that preventing the patient from engaging in activities in which there is a risk of soft tissue injury, using a soft toothbrush, avoiding the use of nail clippers and the monitoring of bleeding are recommended during periods when the patient has a low platelet count (Can 2005). The knowledge scores of the caregivers on bleeding risk increased in all training sections (table 1), and the difference between the scores before and after training was statistically significant (table 2). Findings suggest that increasing the knowledge level of caregivers on bleeding risks and prevention and protection measures may facilitate the protection of the child.

Nutritional problems may have unfavorable consequences in cancer patients (Andreyev et al 1998), and chemotherapy may affect the child's nutritional status by causing nausea, vomiting, taste changes and diarrhea (Can 2005). Furthermore, 66 % of children experience fluid volume deficit, although fluid resuscitation is important in the treatment (Gonderen et al 2009). Although no relationship has been identified between a neutropenic diet and infection (DeMille et al 2006; Wilson 2002), a neutropenic diet is administered in most hospitals when a patient is undergoing chemotherapy (Jubelirer 2011). Certain rules are applied in the center associated with the present study which the caregivers and children are asked to comply with.

A significant increase in awareness in all training sections has been noted after training, particularly on the consumption of plenty of water, washing, and eating fruit, which was relatively unknown before training (table 1). The difference between the scores before and after training were statistically significant (table 2).

Oral complications may occur in children within 1–2 weeks after initiating a chemotherapy program (Chen et al 2004). Following oral care protocols during courses of chemotherapy has been reported to reduce incidences of mucositis (McGuire et al 2006; Chen et al 2004). A daily check of the oral mucosa (Harris 1980) and oral care at night (Sweeney et al 1995) are recommended. Oral care is important for the prevention of mucositis, pain, loss of taste and difficulty in swallowing (Kıkınc 2012), however informing the caregivers about correct oral care practices is important to prevent complications, as the child will be unable to perform these activities unattended.

The knowledge level of the caregivers on oral care was low before training but showed a significant increase after training. Of all the training sections, the most remarkable increase was noted in the oral care segment. Before the training, caregivers had little knowledge about oral care solutions, the time required to avoid consumption of food/beverages after oral care and informing the healthcare team when mouth care is not performed. These were training themes, the level of knowledge was higher after the training (table 1). This was thought to be related to the chemotherapy having not commenced, and that caregivers had not performed oral care. The difference between the oral care scores before and after training was statistically significant (table 2).

The findings showed that training proved to be effective in all training subjects, and that the level of knowledge and the knowledge scores increased after training (table 1). A significant difference was noted between the scores before and after training (table 2).

CONCLUSION

Planned nursing training on the problems that may arise as side effects of chemotherapy was found to be effective in increasing the knowledge level of caregivers. The authors suggest that training in this subject should be provided before initiating a chemotherapy program, before the occurrence of side effects, and visual and written materials should be used. The knowledge levels of nurses working in paediatric oncology clinics regarding the side effects of chemotherapy should be increased, and the training should be provided by the specialist nurses.

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Exploring life history methodology in chronic illness: a study in Relapsing Remitting Multiple Sclerosis

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KEY WORDS

Relapsing Remitting Multiple Sclerosis, chronic illness, lived experience, life history, ethnography

ABSTRACT

Objective
The aim of this study was to gain insights into the lived experience of a chronic disease, Relapsing Remitting Multiple Sclerosis (RRMS). Selecting the most effective methodology to reflect the life span proved challenging. However, the life history approach proved to be a data-rich methodology for this study and is explored in detail in this paper as a qualitative nursing tool.

Setting
This study recruited participants through a state based Multiple Sclerosis organisation in the community.

Subjects
Thirteen participants living with RRMS were purposively recruited, ten female and three male, to discuss their lived experience. Participants were from diverse backgrounds and were at various stages of disease progression.

Primary argument
Ethnography and life history is an under-utilised methodology in nursing research. However, the life history approach was used effectively to collect data to explore the life trajectory of living with a chronic illness. Semi-structured interviews and Braun and Clarke's (2006) method of thematic data analysis ensured a systematic, robust exploration of the lived experience of RRMS. The study developed eight key themes and over 70 subthemes, providing clarity into the experience of living with RRMS.

Conclusion
Employing the life history approach to living with RRMS reflected the ebbs and flows of life, themes intertwining and changing positions of importance according to life events, whether directly or indirectly related to RRMS. Life history proved to be an effective method to gain a greater understanding of chronic illness and although often overlooked in nursing research, may represent an excellent methodology choice for nurse researchers working in other areas of chronic illness.

INTRODUCTION

Multiple Sclerosis (MS) is a progressive inflammatory disease of the central nervous system (CNS) with the most common form of MS at diagnosis being RRMS, affecting 85% of people living globally with the disease (Compston and Coles 2008). Recent data from Multiple Sclerosis Research Australia (MSRA) suggests that there may be 25,600 people living in Australia with MS (MSRA 2018). RRMS is characterised by unpredictable relapses (exacerbations or attacks), which usually last several weeks before the individual returns to baseline functioning (Lublin et al 2014). There is currently no curative treatment for RRMS, although recently there have been major advances in more efficacious treatments called disease modifying therapies (DMTs) to control relapses and possibly prevent future disability (Stuve and Racke 2016). Aside from a highly variable disease state and multitude of possible neurological symptoms, MS can also cause numerous secondary and tertiary effects. Issues may develop in highly personal areas of intimacy and sexuality, mental health, relationships and employment.

Although there exists an abundance of literature examining many different aspects of MS and MS symptoms, there is a paucity of literature exploring the whole life experience of living with MS, and more specifically, RRMS. The aim of this study was to gain insights and understanding into the lived experience of RRMS, so that nurses may have a deeper understanding of the patient experience and be able to plan and adjust their nursing care accordingly. To address these specific aims, the study sought to answer the research question ***"What is the experience of living with Relapsing Remitting Multiple Sclerosis?"***

Exploring the literature for a suitable method for data collection and later data analysis that would span as much of the life trajectory as possible proved challenging. Using a qualitative approach to understand the experience of living with RRMS would ensure the participant remained at the centre of the research process, and their lived experience the focus of the research. However, beyond that, there were very few studies (especially in recent times), which replicated methods in data collection and analysis in the speciality of MS. The aim of this paper is to explore life history as an interesting and effective methodology for qualitative nursing research in chronic illness. Full study results from the research have been published elsewhere (Burke 2019).

The study most alike the current study in terms of participant numbers and focus (Miller 1997) was published prior to any disease modifying therapies being available and reflected a completely different prognosis than in modern times. Miller's (1997) study asked 10 participants living with RRMS "What is it like for you living with RRMS?". Hermeneutic phenomenology was used to analyse the transcripts and 12 themes were developed to describe the experiences of living with RRMS including the importance of social networks, coping with RRMS, control, uncertainty and conflict. Miller's (1997) study however, only concentrated on the present time of living with their illness, not the entire life trajectory, posing questions as to whether previous life events influenced this chronic illness and vice versa.

Other studies have used various methodologies in phenomenology to explore single cases of women living with RRMS (Fawcett and Lucas 2006; Finlay 2003), or most recently a study exploring the life world of six young women living with RRMS (Beshears 2010). However, the focus of the research was centred on the present time, and no male participants were included in the studies. There was only one narrative found in the literature review for the current study which explored living with MS using a life history approach (de Chesnay et al 2008). This short narrative presented an abbreviated story to teach others about overcoming obstacles in chronic illness (de Chesnay et al 2008).

DISCUSSION

Choosing a research methodology for the current study

The research question in the current study required a methodology that would gain deep, rich insights and understanding of the experience of living with RRMS. In seeking to understand and interpret meaning within context, the study also sought to be inductive (develop findings directly from the study data) and to seek both patterns and differences in data. The individual voices were important to hear, as well as the group voice of the entire data set. Finding individual meaning and understanding in stories from patients is fundamental to the caring and compassionate culture of nursing, and something nurses strive for in daily practice (Munhall 2012). Additionally, nurses are often attracted to qualitative research as they value the richness of deep understanding and the perspective of the individual living with chronic illness. Finding a data collection method which considered the people living with RRMS as the experts (Windle 2011) was also important to consider as a component of the ontology and epistemology beliefs underpinning the current study.

Ethnography methodology

Ethnography is a research methodology which involves the process of learning about people by learning from them (Roper and Shapira 2000) and has its historical roots embedded in social and cultural anthropology (Holloway and Todres 2003). The goals of ethnography are to describe, interpret and understand characteristics of a particular social setting, taking into consideration the diversity and multiplicity of voices from key informants, the experts who have rich knowledge of the subject under research (Holloway and Todres 2003). Essentially key informants who represent the culture under study discuss their lives, so that others can better understand the culture (de Chesnay 2014). Ethnography has a place in health research, particularly with its focus on the emic, or the patient perspective (Morse 2012), being holistic, contextual and reflexive (Boyle 1994).

Ethnography takes on many forms and has been adapted for use in different settings, depending on the goals of the research. Early ethnographers spent long amounts of time in the field, known as 'fieldwork', getting to know the study participant/s and encouraging them to share their life stories, often forming personal relationships in the process (de Chesnay 2014). Often in recent times, economic and time constraints are considered to inhibit such long encounters between researchers and study participant/s, especially in the field of nursing. In keeping with the important aspects of traditional ethnography (insights, understanding and culture), focused ethnography developed, wherein researchers attempt to learn about certain conditions by asking about the experiences of those living with the condition (de Chesnay 2014; Cruz and Higginbottom 2013).

Life history as a form of focused ethnography

The life history is a "retrospective account by the individual of his or her life in whole or part, in written or oral form, that has been elicited or prompted by another person" (Watson and Watson-Franke 1985, pp.2). This involves a person choosing to tell about the life he or she has lived, told as completely and honestly as possible (Atkinson 1998). The terms life history and life story are sometimes used interchangeably (Plummer 2001), but there is a subtle difference. Life history is defined as the life account told by a person to the researcher (de Chesnay 2014) whilst life story is the narrative analysis created of the person's life from the life history told to the study researcher (Atkinson 1998). Focused ethnography, in particular life history, has recently become more popular in health research generally, as it is an effective method to gain information from a culture that may not necessarily have direct contact with one another (Morse 2012), as is often the case with people living with a chronic illness.

Life history in nursing

Life history in general is an underused methodology in nursing, but is perfectly suited to the profession, as nurses have always valued the stories and insights patients are able to provide to improve understanding of their world (de Chesnay 2014). Hagemaster (1992) advocated the use of life history in nursing research, and although still developing, more nurse researchers have used life history over the last two decades to investigate social, psychological and illness inspired phenomenon. Nursing studies using focused ethnography have been used to explore illness in homeless youth (Ensign and Bell 2004), investigate health in immigrant adolescents (Garcia and Saewyc 2007), explore recovery from eating disorders (Patching and Lawler 2009), report the experiences of community mental health nurses (Spiers and Wood 2010) and to examine the experiences of a rare chronic health condition, lymphangioleiomyomatosis (Haylen 2015; Haylen and Fisher 2014).

Given its ability to provide a comprehensive holistic examination of the subjective life experience, the life history approach was chosen as the most appropriate design for the current study, for the purpose of identifying important themes experienced by individual people living with RRMS, which may also be experienced by their peers in similar situations (Field and Morse 1985). A great advantage of life history is that it retains the whole individual story and locates it in a wider social, cultural and historical moment (Plummer 2001). Life history examines events and how they impact individuals and their life trajectory, revealing turning points, epiphanies and transformations that may occur over the course of the life living with disease (Haylen and Fisher 2014). It also provides a way of understanding the meaning of illness and how this meaning might change over time.

Using life history in researching chronic illness reflects the complexity of the human experience it is examining (de Chesnay 2014), presenting an ideal methodology to gain insights and understanding. Being less time consuming than traditional ethnography, focused ethnography in the form of life history, is more practical for most nurse researchers. However, there are challenges inherent in using this methodology, including deeply personal narratives which may affect the researcher/s emotionally, and the fact that the interviews and follow-up can be time consuming and prolonged.

Conceptualising life history in the current study

As suggested by de Chesnay and Fisher (2014), the purpose of the life history is to collect a focused history around a disease to document the story of each participant, but being careful not to frame this within a broader ethnography of all people living with a disease. The life history approach in the current study reflected the cultural and social contexts of each participant, allowing them to approach their life history in any way they chose, not necessarily in chronological order or centred only on their RRMS diagnosis. Interestingly, many participants talked of other events in their lives being just as pivotal or more so, than their RRMS illness diagnosis. Others revealed life events and happenings which later played a significant part in coping with their chronic illness.

In life history, the researcher and the participant come together as collaborators, composing and constructing a story (Atkinson, 1998). This was consistent with the ontology and epistemology of the current study with a strong focus on the emic (patient) perspective. Fostering a good relationship between the researcher and study participant is important in life history research, as it involves establishing a close relationship between the two (Plummer 2001). Developing a trusting environment and good rapport early in the process is essential to a successful study outcome.

Life history and study methods

Study participants were purposively recruited through a local, state based MS organisation using a flyer to contact the researcher if people living with RRMS were interested in participating in the study. Fourteen people expressed interest and requested further information, thirteen people were subsequently enrolled into the study and interviewed, and one person declined further involvement without giving a reason. Study recruitment followed the natural preponderance of RRMS, with ten females and three males agreeing to be interviewed. Participants were asked to choose a pseudonym for the study process to protect their identity and any potentially identifiable information (about significant others and health care professionals) was removed from the study transcripts. Approval for the research was obtained from the University of Notre Dame Human Research Ethics Committee (reference number 016002) with particular attention to participant confidentiality and managing potential distress to participants recalling past life events.

Semi-structured interviews have the purpose of obtaining descriptions of the life world of the participant with respect to interpreting the meaning of the described phenomena (Kvale and Brinkmann 2007), making it especially suited to life history research. Semi-structured interviews have some pre-defined questions built-in to the interview, however the researcher is also permitted to probe further and ask additional questions as the participant responds, often leading to the collection of powerful data in the form of insights, experiences and perceptions (Peters and Halcomb 2015). Semi-structured interviews were the chosen data collection method for the life history approach, performed in person and individually, with just the researcher and study participant present.

Interviews were performed at a location of the participant's choosing, and mostly occurred in the home of the participant and less commonly in a public location such as a park or café. At the commencement of the interview, participants were provided with a verbal overview of the study, outlining the study aims. Each participant was then invited to tell their life history, in any order they wished, and covering anything they wished to, with particular thought to the question "What is the experience of living with RRMS?". This consistent approach ensured the information gathered was rich and participant centred. Although predominately unstructured in nature, the interviews were categorized as semi-structured for two reasons. Firstly, reflection questions were provided to study participants a week prior to the interview to give some direction to the information that was sought. Secondly, the RRMS component of the research question gave particular direction about the topic to be explored as part of the interview.

Reflexivity in the study as a component of ethnography

Reflexivity fits into the wider perspective of ontology and epistemology (Berger 2015) examining the role of the researcher in the generation and construction of knowledge and assisting the researcher to act without bias (Holloway and Galvin 2016). Unlike quantitative research where an objective stance is necessary, in qualitative research the active role of the researcher is valued and appreciated as an important research tool (Braun and Clarke 2013). However, it is important that the researcher makes visible personal reflexivity as a form of quality control within the research (Braun and Clarke 2013), where the aim is for "empathic neutrality" (Ormston et al 2014).

The majority of study participants had been cared for by an MS Nurse as part of their life journey with RRMS, with the MS Nurse valued by participants for their skills, knowledge and support. Belonging to the 'MS Nurse club' most likely held some definite benefits for the principal researcher in terms of rapport and trust, gaining instant entry into their life-world. Participants felt comfortable to discuss any issue they wished disclosing insights into sensitive issues, such as parenting, sexuality, relationships, hopelessness, mental health, compromised care and fear. This enabled new understanding into living with RRMS and exposure of concepts

that have been reported infrequently, or have not been reported at all in the specialty. Additionally, having an understanding of the symptoms of MS (particularly participant fatigue) helped to manage the interviews by organising breaks and rest when necessary.

At times, the life history interviews contained highly emotive content and there was difficulty for the principal researcher to disengage from the data, with vulnerable feelings surfacing as interview transcripts were re-listened to and re-read many times as the thematic analysis progressed. Several of the interviews were emotionally intense, some participants had suffered neglected childhoods or had been subjected to tragedy, and others suffered mistreatment by health professionals. Constantly re-living these discussions to develop codes and themes often invoked sad and heart-rending emotions for the researchers. However, an earlier article by Tanner (2009) exploring experiences listening to sad situations during qualitative doctoral work proved very helpful in facilitating an effective mental health plan for the study researchers during this process.

Life history and the study findings

As a chronic illness, the life journey of RRMS takes many twists and turns; it is never a linear journey, but rather one of continual flux, which is mainly due to the innate unpredictability and uncertainty that comes with the diagnosis of RRMS. This is also the case for many other forms of chronic illness. The great advantage of using the life history approach is that it reflects the entire life journey; with and without disease. Using this process uncovered many aspects of each participant's life, which may have had an impact on their later journey with RRMS. In particular, many participants described events in childhood, which gave rise to their later development of resilience, such as childhood neglect, other illness and migration from non-English speaking countries. This resilience was then helpful to the study participants in later life, drawing on coping skills to help them through the difficult and challenging times of RRMS. The process of telling the life history to the researcher also helped participants to understand themselves in a different way, with many participants openly recognising their achievements in overcoming difficulty and challenge.

Study themes were developed from the data, with eight key themes telling the story of living with RRMS as a chronic illness over the life span. Commencing with "Piecing Together the Puzzle" of symptoms at the beginning of the RRMS journey in the years prior to and during diagnosis, followed by "(Re)defining ME now that I have RRMS" and coping with the diagnosis, "Battling the Demons" that followed diagnosis, relapses and symptoms, for some the experiences of "Surplus Suffering" from others, and negotiating "High (In) visibility" of the symptoms. Eventually study participants were able to gain control by "Taming the Beast", learning "The DMT Dance" managing their medications and side effects, and ultimately "Holding Hands with Hope", expressing hope and practising purposeful positivity. Although presented theme by theme in a logical succession, the study findings did not always follow in sequence and definitely did not always "end up" with hope and positivity. Instead, the eight key themes intermingled with each other to reflect the ebb and flow of life. They tell the story of possible stops along the life journey of RRMS and the constant moving backwards and forwards when negotiating and managing living with a chronic illness. Nurses involved in all areas of nursing care from community, surgical care, other medical specialities, emergency, midwifery and mental health may encounter patients living with MS and benefit from insights into understanding the journey of patients to plan care which is patient centred, individualised and holistic. Specific clinical recommendations have been published elsewhere to comprehensively address specific areas of care (Burke 2019). The nurse can also experience greater job satisfaction and fulfilment with a deeper understanding and insight into illness.

As noted life history author Plummer (2001, pp.7) reflects, "life is in fluctual praxis, always in flow and ever messy." Using ethnographic methodology, and the life history method in particular, to uncover the study themes worked skilfully with the "messy" life trajectory of RRMS, a chronic but unpredictable disease. Additionally,

the inclusion of subthemes in the data analysis gave the added ability to "drill down" even further into each theme, identifying more specific features of a theme under the same central organising concept, but with subtle differences. This helped to give the study findings more structure and subsequently guided the development of recommendations for clinical practice (Burke 2019).

CONCLUSION

Using life history methodology to explore the lived experience of a chronic illness gave this study much more emotion and insight than would have been achieved by simply asking pre-determined interview questions in a structured format, or by presenting participants with a survey or questionnaire of topics that the researchers felt were important. Instead, life histories flowed naturally for the study participants, forming stories and presenting an abundance and wide range of themes.

Life history gives voice to the ordinary members of a culture as they cope on a daily basis with the joys and challenges of life (de Chesnay and Fisher 2014), and was embraced by thirteen participants living with RRMS in the current study. The use of this focused ethnographic methodology worked cleverly with the ebbs and flows of living with a chronic illness, to reveal many themes and subthemes exploring the lived experience of RRMS. As RRMS is most commonly diagnosed in young adults, it represents a long period of time to live with a chronic illness. Using the life history approach generated rich and detailed data about the experiences of living with RRMS and unearthed some extraordinary insights, which subsequently led to the development of clinical recommendations for nursing practice. This under-used ethnographic methodology could be very useful to consider in other nursing studies researching chronic illness in the future.

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Workplace environment for nurses and healthcare assistants in residential aged care facilities in New Zealand

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KEYWORDS

Residential Aged Care Facility, environmental, noise, temperature, humidity, lighting

ABSTRACT

Objective
Continuous work under environmental and thermal discomfort such as cold, heat, and dim light has the potential to affect the health of nurses and healthcare assistants working in Residential Aged Care Facilities (RACF). The resulting health issues to workers from exposure to thermal discomfort include fatigue, concentration difficulty and work-related diseases such as cold and muscle tensions. Consequently, this often leads to higher labour absenteeism due to sick-leave which in turn correlates to poor nursing care quality for residents. This research investigated environmental factors which are temperature, humidity, noise, and lighting in nurse offices and resident lounges in RACFs in New Zealand and compared them with international standards.

Design
Quantitative study approach.

Setting
Seventeen Residential Aged Care Facilities (RACF) participated in this study, which were categorised in stand-alone (S-RACF), chain (C-RACF), and religious and charitable (RC-RACF) providers. The environmental measurements were conducted for 24 hours in the nurse offices and 12 hours in resident lounges.

Results
The findings demonstrated that the environmental factors, noise and humidity level met international standards predominately, but temperature and lighting levels failed to comply in nursing offices and resident lounges in RACF.

Conclusion
These findings indicate that nurses and healthcare assistants are working in environmental conditions that partially impedes the health and safety of nursing staff, and could affect their nursing care performance adversely for residents in RACF.

INTRODUCTION AND LITERATURE REVIEW

The World Health Organization (WHO) and the International Labour Organization (ILO) describe a workplace as a place surrounded by leadership engagement, worker involvement, common ethics, and culture. This means a workplace consists of a physical work environment, for instance, lighting, temperature, noise, and humidity. Working conditions are associated with work atmosphere, communication styles, job satisfaction, payment, training opportunities, work organisation, workload and stress factors (ILO 2019a; WHO 2010).

Research into occupational health and safety and related fields such as medicine is being conducted, and as a result, there are several environmental standards workplaces and working conditions published, for instance, for offices. These standards consist of definitions, measurement parameters, and recommendations to achieve healthy and safe workplaces and working conditions (ILO 2019b; Federal Institute for Occupational Safety and Health 2015, 2013, 2011, 2010a, 2010b; Accident Compensation Corporation 2010).

Temperature and humidity are significant factors in the well-being and health of employees at the workplace (Federal Institute for Occupational Safety and Health 2010a). The temperature in offices should be between 20 degrees Celsius and 22 degrees Celsius. However, it should not exceed more than 26 degrees Celsius unless the outside air temperature is higher and sun prevention measures are implemented to reduce the air temperature (Department of Labour Occupational and Safety and Health Service 2017; Federal Institute for Occupational Safety and Health 2010a, 2015). For a healthy and comfortable work environment, the physical correlation between the room temperature and the humidity level is essential (Safe Work Australia 2011). Humidity levels at the workplace should be between 40 and 60% because more than 70% humidity stimulates the growth of moulds and fungi (Department of Labour and Occupational Safety and Health Service 2017; Federal Institute for Occupational Safety and Health 2013). People who are sensitive or immunosuppressed could develop headaches, fatigue and concentration disorders. In many cases, if people are exposed to an unhealthy environment for too long, they could develop breathing difficulties and frequent coughing. Also, they can be more prone to respiratory tract related diseases (Canadian Centre for Occupational Health and Safety 2019).

Noise is another essential well-being factor at workplaces. Sound, measured in decibels (dBA), is a vibration that spreads in waves from the noise source. Loud sound equates to a high decibel level. In the workplace, the sound sources are often mixed, such as direct noise at the workstation, indirect noise from the background, and reflected noise (U.S. Department of Transportation 2017; Accident Compensation Corporation 2010). Sound with a decibel level of over 60 dBA is perceived as loud by the majority of people. Continuous loud noise is stressful for the human body and can cause illness and permanent hearing damage. Other adverse effects are fatigue, nervousness, tenseness, isolation and impairment of the performance (World Health Organization 2019; Swiss Federal Office for the Environment 2018; Federal Ministry for the Environment, Nature, Conservation, Building, and Nuclear Safety 2014).

The required level of lighting, measured in lux, correlates with the fundamental work activities, specific hazards and the work environment, for instance: natural or artificial light conditions, contrast, reflections or the transition of natural light over the day. The minimum recommended illumination level for simple work activities, for example, welcoming visitors in an entrance hall or waiting room, is approximately 150 lux and for regular or moderately easy work, and 250 lux should be provided, for instance, for food preparation. There are 300 to 400 lux suggested for low-risk work activities such as common office tasks. The nursing offices should have at least 500 lux and 500 to 1000 Lux are suggested for high-risk nursing activities such as dealing with excretion, human liquids or infectious instruments or with pointed, sharp, moving or hot instrument (ILO 2014; Federal Institute for Occupational Safety and Health 2011; Safe Work Australia 2011).

Employment is considered as health-promoting for an individual's well-being, but on the other side, it also can be pathogenic in an adverse work environment (Williams 2018). The correlation between the working environment and conditions and worker's health is in the interest of occupational science. Previous research has shown that continuous work under thermal discomfort has the potential to affect the health of nurses and healthcare assistants severely with resulting health issues such as fatigue, concentration difficulty, and colds (ILO 2019b; Department of Labour and Occupational Safety and Health Service 2017). As a consequence, this often leads to higher labour absenteeism due to sick-leave which correlates with poor nursing care quality for residents (Castle and Ferguson-Rome 2015; North et al 2013).

There is little knowledge on whether RACFs meet environmental standards for workplaces for nurses and healthcare assistants. This research assumes that the environmental workplace conditions for nursing staff in the nursing offices and resident lounges meet international standards. The research aims at developing a fundamental understanding of environmental related workplace condition for nursing staff in RACFs based on noise, temperature, humidity, and lighting.

STUDY DESIGN

This quantitative investigation in nursing offices and resident lounges in RACFs is part of a mixed method research with a sequential explanatory design to answer whether optimal workplace health, safety and working conditions in RACFs promote high-quality nursing care for residents.

PARTICIPANTS

The quantitative research was implemented in the Greater Auckland Region because more than a third of New Zealand's population lives there (Statistics New Zealand 2013). The three District Health Boards (DHB), Auckland, Waitemata, and Counties Manukau, organise and fund health care services in this area. In total, 183 RACFs with an average of 55 beds per facility provided long-term nursing care services for dependent and older people during the study time (Ministry of Health 2016). The managers of the RACFs in the defined research field received an invitation letter to participate voluntarily in the study based on a randomised list generated by a computer between September 2016 and January 2017. The sample size of this study comprised a total of 17 (1,022 residential beds) out of 183 RACFs (9,777 residential beds) from the determined research field. The RACFs are categorised in stand-alone (7 facilities), chain (6 facilities), and religious and charitable (4 facilities) RACFs (Ministry of Health, 2016).

ETHICS APPROVAL

This study is approved by the University of Auckland Human Participants Ethics Committee on 12 July 2016.

METHOD

The technical measurements were conducted in nurse offices (24-hour period measurement) and resident lounges (12-hour period investigation) in the participating RACFs between September 2016 to March 2017. One set of recording instruments were placed in a box which was located on the main desk in the nurse offices and the second one on a table in the resident lounges. The nursing staff and residents were informed at a prior staff meeting and the data collection day about the purpose of the instrument containers and advised not to touch, move, and unplug it. After the instruments were activated, they recorded autonomously.

The validity and reliability of measurement instruments that were purchased for this study undertaking are ensured by the manufacturer (PCE Instruments UK Ltd). The devices used for the environmental measurements and recordings are listed in table 1.

Table 1: Overview Technical Environmental Measurements and Pedometer Instruments

Environmental Indicator	Instrument	Measurement Intervals	Measurement Place
Temperature	PCE- HT110	Every minute	Nurse Offices, Resident Lounges
Humidity			
Noise	PCE-322	Every ten seconds	
Lighting	PCE-174	Every minute	

The recorded data was directly exported from the instruments to a Windows Excel 2016 sheet. After the data cleaning, a descriptive statistics analysis was conducted.

FINDINGS

Noise Results

Figure 1: Noise Levels in the Nursing Offices of all RACFs (n=17)

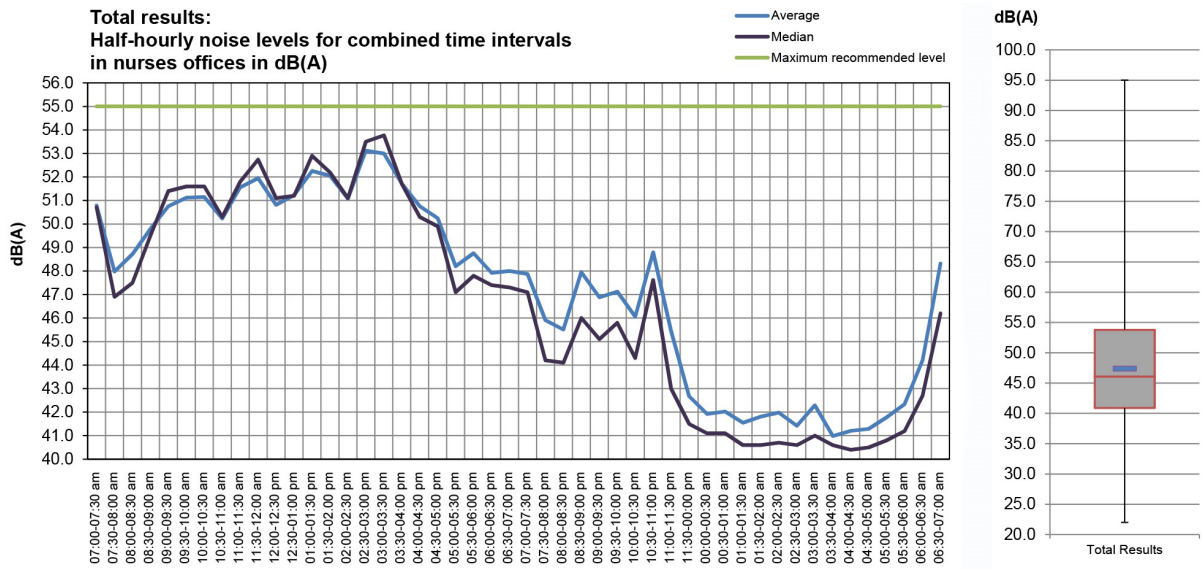
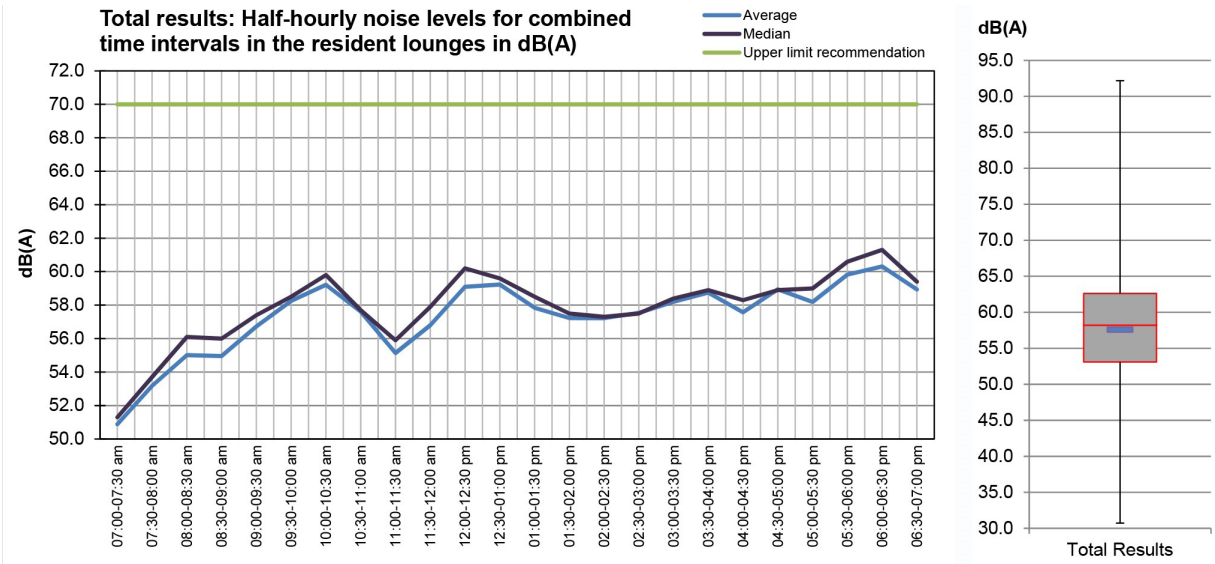


Figure 2: Noise Levels in the Resident Lounges of all participating RACFs (n=17)



In the 24-hour investigation period of noise in nursing offices, the average of 47 dB(A) and median of 46 dB(A) indicated a fairly quiet to a recommended level for the individual perception of noise. Also, in the 12-hour examination period in resident lounges, a normal level for the individual perception of noise within an average and median of 58 dB(A) was detected.

The noise volumes in nursing offices can be categorised as day-time (7am to 5.30pm), evening (5.30 pm to 11pm), and night-time (11pm to 7am) based on similar ranges of dB(A) levels. This means that the approximate average and median noise volumes during day-time ranged between 47 dB(A) and 54 dB(A), in the evening from 44 to 48 dB(A), and in the night-time 40 to 42 dB(A). The investigated time for noise volumes in resident lounges can be classified in the morning (7am to 12.30pm), and afternoon (12.30pm to 7pm). The noise volumes ranged from 51 to 60 dB(A) in the morning and between 60 to 61 dB(A) in the afternoon. The recommended noise limits of 55 dB(A) for offices and 70 dB(A) for resident lounges were not reached throughout the measurement periods. However, single volume measurement points peaked briefly up to 95 dB(A) (Federal Insitute of Occupational Safety and Health 2010b).

Taking all measurement points into account, the noise volumes were within the recommendation and under the maximum limit for offices for 20.57 hours (86% of a day) and in resident lounges for 10.02 hours (83% of 12 hours). In the comparison of the S-RACF, C-RACF, and RC-RACF providers results showed that noise levels were comparable in each noise category except for small and insignificant differences. The average and median noise measurements in nursing offices and resident lounges of all RACF complied with international environmental standards (Federal Insitute of Occupational Safety and Health 2010b).

Temperature and Humidity Results

Figure 3: Temperature and Humidity Results of the Nursing Offices of all RACFs (n=17)

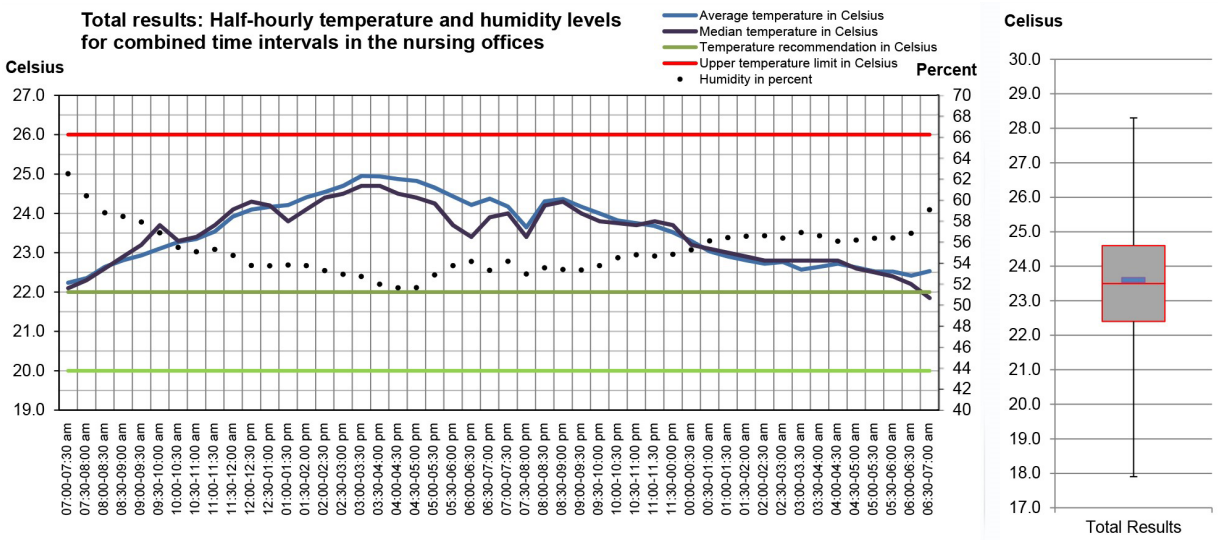
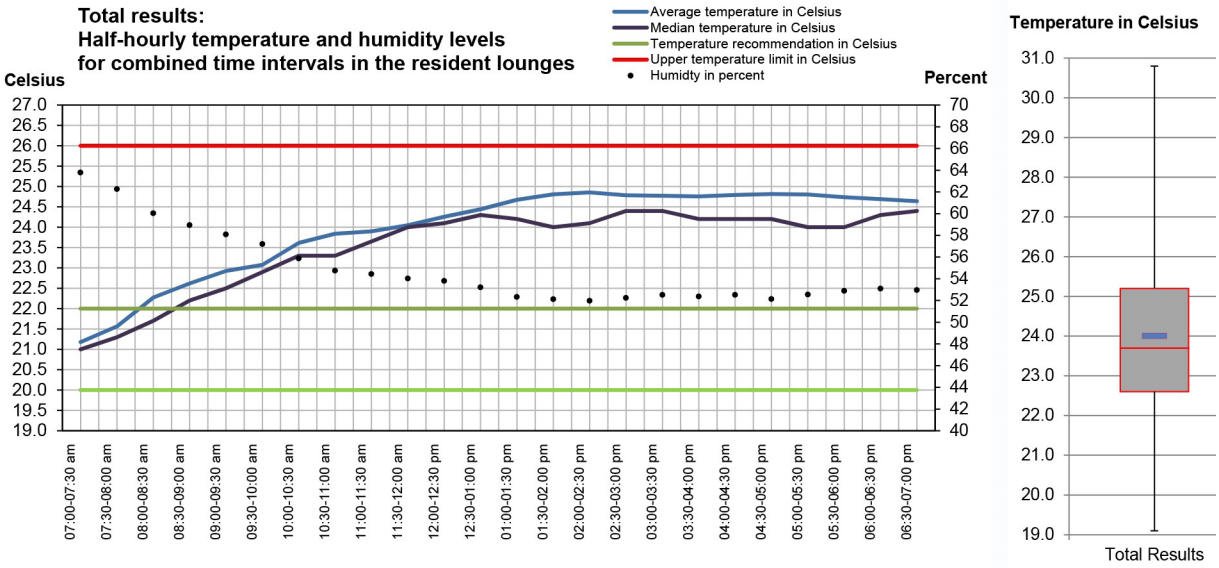


Figure 4: Temperature and Humidity Results in the Resident Lounges of all RACFs (n=17)



The temperature results in nursing offices in the 24-hour examination timeframe demonstrated an average of 23.6 degrees Celsius and a median of 23.5 degrees Celsius. The average temperature levels were continuously higher than the environmental recommendation from 20 to 22 degrees Celsius. The average humidity in nursing offices was 55% and within the recommended parameters of between 40% and 60%. Similar results were found for the temperature conditions in resident lounges during the 12-hour examination. The average temperature was 24 degrees Celsius, and the median was 23.7 degrees Celsius. Apart from two hours in the morning, the average temperature was always higher than the recommended environmental standards. The maximum temperature was measured at 30.8 degrees Celsius. The average humidity in the living room was 55% and met the recommended standards likewise (Department of Labour and Occupational Safety and Health Service 2017; Federal Insitute of Occupational Safety and Health 2013, 2010a).

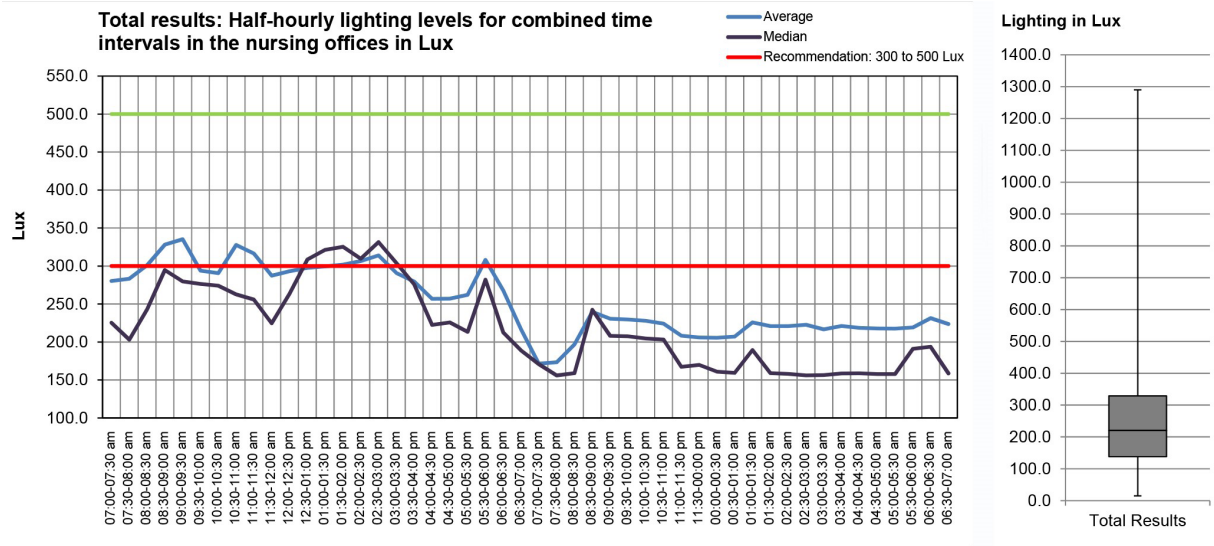
The temperature conditions in nursing offices can be categorised in 'day-time' (7am to 8.30pm) and 'night-time' (8.30pm am to 7am). During the day the average temperature was between 23 to 25 degrees Celsius and at night-time from 22 to 24 degrees Celsius. Single temperature measure points were higher than the upper temperature limit of 26 up to 2.3 degrees Celsius. The temperature recordings in resident lounges can be classified in 'morning' (7am to 1.30pm) and 'afternoon' (1.30pm to 7pm). In the morning the average temperature was 21 to 24 degrees Celsius while in the afternoon it was from 22 to 25 degrees Celsius. Single temperature measurements reach higher levels to a maximum of 30.8 degrees Celsius momentarily at times.

To summarise, the average temperature was within the environmental recommendation in offices for 3.51 hours (15% of a day) and in resident lounges for 1.5 hours (13% of 12 hours). The humidity levels in nursing offices were complied with environmental safety recommendations for 15.63 hours (65% of a day) and in resident lounges for 7.62 hours (64% of 12 hours).

In a comparison of the average exposition to temperature and humidity in nursing offices between S-RACF, C-RACF, and RC-RACF providers the findings demonstrated only moderate differences. In nursing offices and resident lounges, the temperature was predominately too high for more than three-quarters of the investigated time-frame, and only rudimentary met international environmental standards. The humidity levels in both areas complied with international standards approximately during two-thirds of the examined period (Department of Labour and Occupational Safety and Health Service 2017; Federal Insitute of Occupational Safety and Health 2013, 2010a).

Lighting Results

Figure 5: Lighting Results in the Nursing Offices of all RACF (n=17)



The lighting results in nursing offices in the 24-hour examination timeframe provided an average of 254 Lux and a median of 203 Lux. During the day the average and median light intensity reached the minimum recommended lighting of 300 Lux occasionally (Office work and low-risk nursing activities). At night the lighting condition was continuously under this level which also means that the recommended level of 500 Lux for high-risk nursing activities was not achieved (Federal Institute for Occupational Safety and Health 2015, 2011; International Labour Organization, 2014). The lighting condition can be separated in 'day-time' (7am to 6pm) and 'night-time' (6pm to 7am). During the hours of daylight, the average and median light was between 200 and 320 Lux. From early evening to morning the lighting levels were from 150 to 225 Lux. For a brief period, single lighting measure points could reach higher levels up to 1290 Lux.

The average and median lighting conditions were within the environmental recommendation for offices and low-risk nursing activities for 3.75 hours, (16% of a day) and 1.78 hours (7% of a day) for high-risk activities. In a comparison of the environmental lighting conditions in nursing offices across all RACF providers, the RC-RACF provided longest exposure of almost 18 hours to low levels of 0 to 300 lux. The C-RACF provider results were similar to the average levels in each lighting category. The lighting exposure of the S-RACF provider was under the average for each lighting level category.

In summary, the lighting situation in the nursing offices was almost throughout lower than the minimum lighting level recommendation for low and high-risk nursing activities according to the environmental standards (Federal Institute for Occupational Safety and Health 2015, 2011; ILO 2014).

STRENGTHS AND LIMITATIONS

One source of weakness of the technical measurements which could have affected the results was that the environmental instruments were occasionally unplugged, covered or moved by nursing staff and residents. This interference occurred despite attached signs on the container which contained the meters and prior verbal notice. Overall, the negative impact on the complete data was 13.6% (200,225 out of 1,468,800 measurement points) of missing noise values, 13.2% (3238 out of 24,480 measurement points) of missing temperature and humidity values, and 29% (212,680 out of 734,400 measurement points) of missing lighting values. Almost 30 per cent of the lighting values in nursing offices were missing. The reason for that was the

high number of measurement errors of the PCE Light-Meter-Instrument compared to the other environmental meters produced by the same company. The display of the light measurement instrument did not indicate any malfunction during the inspections rounds by the researcher. The missing data might be related to connection faults between the measurement sensor and integrated software of the PCE Light-Meter-Instrument. In order to develop reliable results based on valid measurements, a control calculation approach was implemented. No deviations for both methods were identified.

The PCE Noise-Meter-Instrument has an appearance similar to a microphone. It could be assumed that this optic caused nursing staff to hesitate to speak in a normal voice volume in fear of verbal recordings. This would result in lower noise results. However, the noise measurement results show no corresponding influences.

Also, it could be argued that the time of the year and changing weather conditions could compromise the temperature, humidity, and lighting results. However, this conclusion was not substantial because the environmental standards must be met regardless of seasonal weather conditions as per international environmental standards (Federal Institute for Occupational Safety and Health 2015, 2013, 2011, 2010b, 2010a).

DISCUSSION

The development of healthy and safe workplaces and working conditions is challenging due to their complex nature and a high number of influencing risk factors such as work culture, work organisation, and environmental conditions (ILO 2014; WHO 2010, 1994). The physical parameters for measuring the work environment such as noise, temperature, humidity, and lighting have been investigated comprehensively, and robust standards are developed (ILO 2014; Federal Institute for Occupational Safety and Health 2016, 2015, 2013, 2011, 2010a, 2010b; Accident Compensation Corporation 2010). Those standards are promoted on a macro-level by the WHO and national governments. On a micro-level, health and safety standards are implemented by management and health and safety representatives of organisations (ILO 2019b; WHO, 2010, 1994).

The noise findings of this research conducted in nursing offices and resident lounges in RACF complied with environmental standards. This result can be explained that nursing offices are usually restricted to nursing staff only with work-related conversation as the common noise source. On the other hand, nurses and healthcare assistants spend a considerable amount of time in the resident's rooms for treatment purposes and confidential conversations (Mallidou et al 2013). It seems that noise volumes in resident rooms do not affect the volume in nursing offices.

The noise results in resident lounges presented slightly higher volume levels than in nursing offices. One of the likely causes for the marginal higher noise levels in resident lounges is the gathering of residents and visitors to spent time together and take part in activities (Rindel 2012). These findings are typical when people meet and hold conversations (Federal Ministry for the Environment, Nature, Conservation, Building, and Nuclear Safety 2014; Accident Compensation Corporation 2010). However, even the higher noise levels in the resident lounges compared to the nursing offices were within the parameters of the recommended standards. There were no significant differences between RACF providers (Federal Institute for Occupational Safety and Health 2015, 2010b). This means that nursing staff in RACF was not exposed to health risks based on noise volumes. However, this research provides findings of the noise levels but not the type of noises. Further studies need to be carried out in order to develop an understanding of what types of noise in RACF can be stressful and how they affect the health and well-being of nurses and healthcare assistants.

The temperature in the nursing offices and resident lounges were too warm and barely met the recommended levels. One possible explanation for this finding in nursing offices might be that the rooms were often small and packed with of equipment, devices, and folders (Federal Institute of Occupational Health and Safety 2018; VGB 2018). Nurses and healthcare assistants working in the office releasing heat through their bodies and computers, printers, and fridges which are generating hot air increase the temperature further (VGB 2018; Marieb and Hoehn 2007).

Limited air circulation could also hinder the maintenance of cooler room temperature. Working in too hot rooms can lead to symptoms such as fatigue, and concentration problems, and diseases, for instance, a cold and conjunctivitis (Wittig-Goetz and Rundagel 2018; Department of Labour and Occupational Safety and Health Service 2017).

Even though average humidity levels in nursing offices and resident lounges were in accordance with environmental standards for two-thirds of the investigated period, there are hours in which the humidity was not within the recommended range. One reason behind this discrepancy could be non-insulated building structure and single-glazed windows. Another major influence can be poor air circulation (Canadian Centre for Occupational Health and Safety 2019; Federal Institute for Occupational Safety and Health 2013).

The type of RACF provider was not related to the humidity results. According to these findings, nursing staff should not physically experience headaches, fatigue and concentration disorders because of either excessively high or low humidity levels (Canadian Centre for Occupational Health and Safety 2019; Department of Labour and Occupational Safety and Health Service 2017; Federal Institute for Occupational Safety and Health 2013).

The lighting situations in the nursing offices did not meet environmental recommendations. This outcome can be due to offices lacking windows or their windows are inappropriately small. The number of light sources and their intensity in a room has a major influence on the lighting conditions (ILO 2014; Safe Work Australia 2011).

The lighting related findings of this study differed greatly between the RACF provider. Even the results between the facilities per RACF group were different and it seems that the lighting situations are strongly related to single RACF. This means that the nursing staff is facing health and safety risks such as eyestrain, fatigue, headaches, muscle tensions, and stress when they implement activities such as dealing with body fluids, body waste, and contaminated objects (VGB 2018; Federal Institute for Occupational Safety and Health 2015, 2011; ILO 2014).

The scope of this study is limited to four environmental factors. For a better understanding of how environmental related hazards affects nursing staff, some fragments are missing, for example, room air speed, air quality, and odours.

In order to develop a better understanding of how occupational-related hazards affect nursing staff, more insights into some fragments, such as room air speed, air quality, and personal perception of odour, are to be sought after.

CONCLUSION

This research investigated environmental workplace parameters which are noise, temperature, humidity, and lighting in RACFs and provided a comparison with international environmental standards.

The findings have identified that the noise levels in nursing offices and resident lounges of all participating RACFs complied with international environmental standards (Federal Institute for Occupational Safety and Health 2015, 2010b). The temperature in nursing offices and resident lounges were predominately too high and met international environmental standards just to a limited extent. The humidity levels were aligned

with international standards for approximately two-thirds of the respective examined period (Department of Labour and Occupational Safety and Health Service 2017; Federal Institute for Occupational Safety and Health 2015, 2013). The lighting situations in the nursing offices were predominately lower than the recommended minimum. This is a risk and an impediment to the implementation of nursing activities (Federal Institute for Occupational Safety and Health 2015, 2011; ILO 2014).

In other words, nurses and healthcare assistants are working in partially suboptimal environmental conditions which in turn could affect their health and nursing care performance for residents adversely (WHO 2019; Castle and Ferguson-Rome 2015; Woods 2015; North et al 2013). However, the individual environmental perception could differ from international standards and recommendations, for example, employees who are sweating excessively over 18 degree Celsius room temperature and workers who suffer from diseases such as hormone imbalance who prefer a cooler working space. This means that it may not be possible to meet recommended standards for workplaces as well as staff expectation at the same time (Department of Labour and Occupational Safety and Health Service, 2017).

The findings will be of interest to RACF employers and organisations who are committed to the provision of providing healthy and safe workplaces for nursing staff. It also contributes to the health sciences and enable a better understanding of the environmental workplace situation in RACF. Continued efforts are needed to generate a well-being environment at the workplace for nurses and healthcare workers in order to provide high-quality nursing care for residents in RACFs.

RECOMMENDATION

The results of this research demonstrated an environmental health and safety risk at workplaces for nursing staff in RACF. To minimise or avoid completely health-related risks at the workplaces a systematic approach is recommended. This includes the identification of relevant environmental standards, risk assessment, implementation of preventive actions, and evaluation of the effectiveness of those measures (WorkSafe New Zealand 2017; Johnson 2002; Deming 1986). At the same time, the workers' voice should be taken into consideration because they have a profound experience and awareness of potential risks at their workstation (WorkSafe New Zealand 2017). After identification of a potential health and safety risk, for example, throughout a workplace risk assessment, the preferred measure is to eliminate the hazard source, for instance, placing printers, copiers and other unnecessary electrical equipment not in nursing offices (Bux 2006). If this is not possible, then actions should be implemented to minimise the risk which includes structural changes such as, determining the optimal place for the light source and changing the location of the workstation, and providing personal safety equipment, such as disposable gloves, aprons, and masks (ILO 2014; Safe Work Australia, 2011).

The implemented preventive actions should be evaluated regularly. If the result is not sufficient according to the recommended standards, then a re-assessment of the workplace situation and environment should be conducted inclusive the implementation of further preventive actions (WorkSafe New Zealand 2017; Johnson 2002; Deming 1986).

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