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Moral distress of oncology nurses and morally distressing situations in oncology units

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KEY WORDS

moral distress, nurses, oncology

ABSTRACT

Objective
The purpose of this study was to evaluate the intensity and frequency of moral distress and determine clinical situations leading to moral distress in oncology units. The study also examined the relationship between moral distress scores and demographic characteristics of oncology nurses.

Design
This descriptive study was performed between 25 January 2012 and 29 June 2013.

Setting
The study was conducted in the oncology units of eight training hospitals in Tehran, Iran.

Subjects
One hundred and forty eight nurses (131 females, 17 males; mean age 32.5 years; range 24 to 52 years) who had worked in oncology units of training hospitals in Tehran were included in the study.

Main outcome measure(s)
The main outcome measures included intensity and frequency of moral distress, which were assessed by the Moral Distress Scale – Revised (MDS-R).

Results
Most of the 148 nurses had high to moderate scores. Nurses had experienced higher moral distress when receiving informed consent forms from patients and asking patients to carry out physicians' order for unnecessary tests in patients' last stages of life.

Conclusion
Moral distress exists in oncology nurses and interventions will be developed and tested to decrease and prevent it.

INTRODUCTION

Nurses' actions and behaviours are influenced by their personal moral beliefs and ethical values. In addition they are taught and expected to adhere to the values of their profession (Momennasab et al 2015; Cohen and Erickson 2006). Every day nurses make great moral decisions in their workplace, but in practice they cannot always act according to their moral obligations. An unpleasant experience titled as 'moral distress' is one of the major issues that nurses are faced with (Wilkinson 1987; Jameton 1984). Jameton (1984) defines moral distress as a phenomenon in which one knows the right action to take, but is constrained from taking it. Moral distress experienced by nurses and other health care professionals depends on the environment of care (Pauly et al 2009; Hamric and Blackhall 2007; Corley et al 2005). With the increase of technology in health care, oncology nurses are often involved in ethical discussions regarding the best use of aggressive interventions for patients (Shepard 2010). Due to the physical and psychological stress that cancer patients are faced with, the oncology unit can be considered a challenging and unique setting for nurses (Wittenberg-Lyles et al 2014; Ekedahl and Wengstrom 2007). Findings of Rice et al (2008) indicated the level of moral distress in nurses caring for cancer patients is higher than the level of moral distress among other nurses. In Iran, much has been written about moral distress that Iranian critical care nurses experience. For example, the results of a study conducted by Shoorideh et al (2014) revealed that Iranian intensive care unit nurses suffered greatly from moral distress. Joolaee et al (2012) in their study conducted on nurses working in internal, surgical, intensive care, critical care units and the emergency rooms of medical and training centres of Tehran University of Medical Sciences found nurses suffered a moderate severity of moral distress. Based on a search of the databases in Iran using 'moral distress', 'nurses', and 'oncology' as keywords and also using the English equivalent of these keywords in databases it was concluded that moral distress in oncology wards in Iran has not been studied. If ethical issues remain unknown and unresolved in clinical contexts, they will lead to nurses instability, confusion, depression and finally end in a burnt-out and depleted workforce (Trautmann et al 2015; Hamaideh 2014; Shoorideh et al 2014; Cohen and Erickson 2006; Elpern et al 2005). Therefore, this cross-sectional study was designed and implemented with the following aims:

- assess the level of moral distress in nurses who work in oncology units at teaching hospitals in Tehran;
- identify clinical situations associated with significant moral distress; and
- evaluate possible associations among demographic characteristics of oncology nurses and the level of moral distress.

METHOD

Sample and setting

All nurses working in the oncology units of eight training hospitals in Tehran who met the criteria were included in this cross-sectional study. Participants had a Bachelor degree or higher; were employed in an adult oncology unit and had at least one years clinical experience in an oncology unit. Of the 156 eligible nurses 148 nurses participated in this study.

Procedures

Shahid Beheshti Medical Sciences University Research Ethics Board in Tehran approved this study. After coordinating with relevant hospitals, the researcher commenced collecting data in each hospital. Participants were assured their information would remain confidential before the questionnaires were distributed. Nurses were asked to participate by completing the questionnaires anonymously and returning them to a locked drop box placed in the units.

INSTRUMENTS

In order to collect data a questionnaire including demographics and MDS-R was used. Demographic information included age, gender, academic level and years of experience in oncology units. MDS-R measures moral distress intensity and frequency based on a five-point Likert scale from NEVER (zero) to DAILY (four) to measure frequency and NEVER (zero) to VERY HIGH (four) to measure intensity. A composite score for each item was calculated as the scores of moral distress intensity is multiplied by scores of moral distress frequency. Composite scores have a range of 0 – 16 and the total score has a range of 0 - 336. The scores of moral distress frequency and intensity of the total scale were classified into four categories: low (0-1), medium (1.01-2), high (2.01-3) and very high (3.01-4). The composite score was also classified into four categories: low (0-4), medium (4.01-8), high (8.01-12) and very high (12.01-16). A higher score indicates more moral distress.

Prior to use, official permission was obtained from Professor Hamric and the scale was translated into Farsi using a forward/backward method. Content validity was used to determine the validity of the instrument. The questionnaire was reviewed and evaluated by 10 faculty members of the Nursing and Midwifery Faculty at Shahid Beheshti University of Medical Sciences. Considering a score of 85% for content, all questionnaire items met the minimum requirements of validity. Using the Cronbach's alpha, reliability coefficient of the questionnaire was estimated at 0.88.

Data Analysis

In order to analyse the data, descriptive statistical methods were used to determine the level of moral distress. The appropriate correlation statistic was used to examine relationships among variables.

FINDINGS

In this study, 131 subjects (88.51%) were female and 17 (11.48%) were male. Participants ages ranged from 24 to 52 years; the mean age and the Standard Deviation were 32.5 and 5.8 respectively (see table 1).

Table 1: Sample Characteristics (n=148)

Characteristic	n
Age(years)	
20-29	62
30-39	73
40-49	11
50-59	2
Gender	
Female	131
Male	17
Experience in oncology (years)	
1-2	32
3-5	46
6-10	56
11-20	10
Greater than 20	4

Mean scores for items on the moral distress frequency scale ranged from 1.06 to 3.36, with an overall mean score of 2.13± 0.44 and Mean scores for items on the moral distress intensity scale ranged from 1.74 to 3.86, with an overall mean score of 2.08± 0.36. The two highest scoring items for moral distress frequency were '*Ignore situations in which patients have not been given adequate information to ensure informed consent*' (mean, 3.36± 0.61) and '*Carry out the physician's order for what I consider to be unnecessary tests and treatments*' (mean, 3.33± 0.71). The two highest scoring items for moral distress intensity were '*Work with nurses or other healthcare providers who are not as competent as the patient care requires*' (mean, 3.86± 1.12) and '*Provide care that does not relieve the patients suffering because the physician fears that increasing the dose of pain medication will cause death*' (mean 3.74 ± 1.11). Tables 2 and 3 show the top 10 detailed results for frequency and intensity.

The lowest scoring item for moral distress frequency was '*Increase the dose sedative/opiates for an unconscious patient that I believe could hasten the patients' death*' (mean 1.32 ± 1.1) and the lowest scoring item for moral distress intensity was '*Avoid taking action when I learn that a physician or nurse colleague has made a medical error and does not report it*' (mean, 1.50 ± 0.88).

Table 2: Moral Distress Scale items associated with top 10 items for frequency

Moral Distress Scale Items	Mean±SD
Ignore situations in which patients have not been given adequate information to ensure informed consent.	3.36 ± 0.61
Carry out the physician's orders for what I consider to be unnecessary tests and treatments.	3.33 ± 0.71
Witness diminished patient care quality due to poor team communication.	3.01±1.04
Assist physician who, in my opinion, is providing incompetent care.	2.87 ± 1.13
Take no action about an observed ethical issue because the involved staff member or someone in a position of authority requested that I do nothing.	2.77 ± 1.14
Follow the physician's request not to discuss the patient's prognosis with the patient or family.	2.72 ± 0.87
Initiate extensive life-saving actions when I think they only prolong death.	2.61 ± 1.45
Witness medical students perform painful procedures on patients solely to increase their skill.	2.43 ± 1.25
Avoid taking action when I learn that a physician or nurse colleague has made a medical error and does not report it.	2.14 ± 0.43
Watch patient care suffer because of a lack of provider continuity.	2.12 ± 1.07

Table 3: Moral Distress Scale items associated with top 10 items for intensity

Moral Distress Scale Items	Mean±SD
Work with nurses or other healthcare providers who are not as competent as the patient care requires.	3.86 ± 1.12
Provide care that does not relieve the patient's suffering because the physician fears that increasing the dose of pain medication will cause death.	3.74 ± 1.11
Ignore situations in which patients have not been given adequate information to insure informed consent.	3.24 ± 0.9
Watch patient care suffer because of a lack of provider continuity.	3.18 ± 1.28
Witness diminished patient care quality due to poor team communication.	2.95±0.84
Take no action about an observed ethical issue because the involved staff member or someone in a position of authority requested that I do nothing.	2.93 ± 1.12
Increase the dose of sedatives/opiates for an unconscious patient that I believe could hasten the patient's death.	2.62 ± 1.13
Provide less than optimal care due to pressures from administrators or insurers to reduce costs.	2.55 ± 1.26
Be required to care for patients I do not feel qualified to care for.	2.30 ± 1.38
Witness healthcare providers giving "false hope" to the patient or family.	2.24 ± 1.18

Composite scores revealed situations, most associated with moral distress. The highest item score was '*Ignore situations in which patients have not been given adequate information to ensure informed consent*' (10.12 ± 3.02). Table 4 shows the top 10 detailed results for composite score.

Table 4: Moral Distress Scale items associated with highest levels of moral distress (composite score)

Moral Distress Scale Items	Mean±SD
Ignore situations in which patients have not been given adequate information to insure informed consent.	10.12 ± 3.02
Carry out the physician's orders for what I consider to be unnecessary tests and treatments.	9.38 ± 2.01
Witness diminished patient care quality due to poor team communication	9.01± 3.78
Provide care that does not relieve the patient's suffering because the physician fears that increasing the dose of pain medication will cause death	7.45 ± 3.47
Watch patient care suffer because of a lack of provider continuity	7.05 ± 2.84
Witness healthcare providers giving "false hope" to the patient or family	6.37 ± 3.69
Witness medical students perform painful procedures on patients solely to increase their skill.	6.15 ± 3.49
Take no action about an observed ethical issue because the involved staff member or someone in a position of authority requested that I do nothing	6.03 ± 3.60
Assist physician who, in my opinion, is providing incompetent care	4.73 ± 3.08
Work with nurses or other healthcare providers who are not as competent as the patient care requires.	4.42 ± 2.82

Demographic characteristics analysed in relation to the moral distress scores. Only years of experience in oncology unit were positively correlated with composite scores (p=0.01, r= 0.24) (see table 5).

Table 5: Correlation between demographic characteristics and moral distress frequency intensity composite

Characteristics	***Frequency***		***Intensity***		***Composite***	
	Correlation	P	Correlation	P	Correlation	P
Age	0.12	0.24	0.06	0.09	0.16	0.06
Experience in oncology	0.09	0.11	0.11	0.08	0.24	0. 01

DISCUSSION

In this study, mean score for moral distress was similar to scores found for critical care nurses in previous studies (Shoorideh et al 2014). In addition, mean score for moral distress was higher in this study than the scores found in other studies on oncology nurses (Sirilla 2014). Limitations in previous studies involving oncology nurses had participants from one institution (Sirilla 2014; Rice et al 2008). This study included oncology nurses from eight hospitals. Therefore the results can apply to oncology nurses in other hospitals.

According to this study the highest scores for frequency, intensity and level of oncology nurses' moral distress was related to receiving informed consent forms from patients, which demonstrated failure to be fully informed. Nurses in other studies also experienced high moral distress in such situations (Aft 2011; Lunardi et al 2009). As cancer patients need to undergo diagnostic and therapeutic procedures (Mobley et al 2007), and due to unknown and unexpected side effects of many diagnostic and therapeutic procedures in oncology wards (Ferrell 2006), it is necessary to obtain informed consent from patients before giving any treatment. However, it is also important to provide the patient with the necessary information about such diagnostic and therapeutic procedures before obtaining any consent. As patient education and emotional support in times of crisis and making medical decisions are among legal responsibilities of nurses, it is natural that nurses feel responsible for giving patients enough information to fill in consent forms. Patient's informed consent to undertake medical tests and to receive treatment is a patient's right (Grace and McLaughlin 2005).

Conducting unnecessary diagnostic and laboratory tests in clinical situations with ‘futile care’ (Mobley et al 2007) were sources of high moral distress in this study. Rice et al (2008), also report that futile care can also bring about high intensity and frequency for moral distress. In this area, Ferrell (2006), believes that nurses’ moral distress issues which are associated with futile care and treatment have mostly been studied in the intensive care units. Having talked to oncology nurses Ferrell (2006) reached the conclusion it was necessary that futile care in oncology nursing be studied. According to the mean score of moral distress intensity in clinical situations of ‘incompetent nurses or other health care providers, considering the important role of nurses in the care for cancer patients (Izumi et al 2010), research that identify factors leading to poor nursing care in oncology wards seems to be necessary. Pelton et al (2015) also indicated that incompetent nursing is one of the two main themes of situations leading to moral distress in surgical oncology unit.

In this study, the clinical situation in which the nurse observed a patient’s suffering and pain as well as a failure to control the pain properly caused high moral distress in nurse. Maningo-Salinas (2010) and LeBaron et al (2014), also reported that failure to control the pain of the patient was among the situations with high moral distress for oncology nurses.

Positive correlation between experience in oncology and composite score was consistent with several studies (Shoorideh et al 2014; Rice et al 2008; Elpern et al 2005). However, Abbasi et al (2014) found that more experienced nurses experienced lower levels of moral distress.

LIMITATIONS OF THE STUDY

The only limitation of this study was nurses who work in oncology units of training hospitals in Tehran were busy and it took a long time to return the completed questionnaire.

CONCLUSION

According to the results of this study and the importance of reducing moral distress in clinical situations, moral distress in oncology nurses should be considered and addressed as a priority for further investigation. It seems interventions such as establishing Ethics Committees, and having nurses as members of such committees can improve discussion about clinical situations leading to moral distress, consultation, training, and proposing strategies for nurses to cope with moral distress. The results obtained in this study can be useful for nurse leaders, oncology nurses, managers of medical institutes, and education providers in order to propose strategies to cope with moral distress. This research will also be helpful in conducting studies on reducing or eradicating moral distress in oncology wards.

RECOMMENDATIONS

- Since moral distress reduces the quality of nursing care, it is necessary to identify clinical situations which lead to experiencing moral distress among nurses in order to increase the quality of nursing care.
- It is recommended that Ethics Committees be established and nurses be included on such committees to provide expertise about clinical situations which lead to moral distress.
- Head nurses should motivate and morally support their staff.
- Nurses should be trained and provided with strategies to cope with moral distress.

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A prospective comparison of the AUSDRISK and HbA1c for persons with spinal cord injury

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KEYWORDS

AUSDRISK, type 2 diabetes, spinal cord injury, diabetes screening tools, preventative health

ABSTRACT

Objective

The primary object of this study was to determine the validity of the Australian Type 2 Diabetes Risk Assessment Tool (AUSDRISK) for predicting the development of type 2 diabetes in persons with spinal cord injury (SCI).

Design and setting

The prospective comparative study (December 2013-March 2014) collected data on AUSDRISK and haemoglobin A1c (HbA1c) in participants' homes.

Participants

Participation rate was 67% (n=79). Study criteria: over 18 years of age, a SCI for more than 12 months, living at home, wheelchair dependant and no diabetes diagnosis.

Main outcome measures

AUSDRISK sensitivity and specificity in predicting incident type 2 diabetes in persons with SCI.

Results

Of the 79 participants, 81% were male, mean age was 53 years (SD 14.14) with 23.2years (median 23; SD +/- 13.2yrs) since injury. There was a positive correlation between length of time since SCI and risk score (AUSDRISK) ($r = .242$, $p = .032$). Participants with high AUSDRISK scores had higher HbA1c% (5.38 versus 5.2, $p = .026$) level. The high risk classification explained a moderate amount of HbA1c % (area under curve = .651; 95% CI .53 - .77). The level of HbA1c which had the highest sensitivity (.59) and specificity (.73) for risk classification was 5.25%. Waist circumference and physical activity items require further powered studies to determine if appropriately weighted.

Conclusion

Comparing the AUSDRISK with HbA1c assays, the AUSDRISK can predict type 2 diabetes risk in a person with SCI, although further powered studies are needed to be undertaken, to refine the predictive capacity of the tool.

INTRODUCTION

More than one million Australians are diagnosed with diabetes, the majority of whom (84.9%) have type 2 diabetes (Australian Institute of Health and Welfare 2012; Diabetes Australia and The Royal College of General Practitioners 2011). This proportion is escalating. With 275 people being diagnosed with type 2 diabetes every day it is anticipated that 3.3 million Australians will be living with the disease by 2031(Vos et al 2004).

Persons with spinal cord injury (SCI) are at higher risk for type 2 diabetes than the general population, primarily due to abnormalities of carbohydrate and lipid metabolism disorders common among persons with SCI (Raymond et al 2010; Banerjea et al 2008; LaVela et al 2006; Bauman and Spungen 2001). It has been demonstrated that SCI is independently associated with 2-fold increased odds of type 2 diabetes not explained by known risk factors for the disorder (Cragg et al 2015).

Due to adverse changes in body composition, metabolic rate and autonomic function, all known as consequences of SCI, physical health and functional ageing changes occur earlier in this population (LaVela et al 2012; Charlifue et al 2010; Banerjea et al 2008; Bauman and Spungen 2001; Soden et al 2000). Hence, early identification of type 2 diabetes is essential to limit associated microvascular and macrovascular complications (LaVela et al 2012; Gore and McGuire 2009; Middleton et al 2008; World Health Organisation and International Diabetic Federation 2006).

The Australian Type 2 Diabetes Risk Assessment Tool (AUSDRISK), based on nine risk factors was developed for predicting incident diabetes and promoted across the nation in 2008 (Chen et al 2010; Australian Government Department of Health and Ageing and Baker IDI Heart and Diabetes Institute 2009). The survey tool provides a simple way to classify adults as low, intermediate or high risk of developing diabetes (Chen et al 2010). Australian general practitioners have been encouraged to use AUSDRISK for patients who are at risk of developing diabetes; however awareness and application in general practice is low (Wong et al 2011). Individuals who are classified as high risk on the tool are recommended to be tested for diabetes (Colagiuri et al 2009).

The AUSDRISK has been validated for the population as a whole (Chen et al 2010), with limited testing in population subgroups (Fernandez and Frost 2013; Sathish et al 2013; Pasco et al 2010). When compared to multiple other risk assessment methods in a rural Asian population, the AUSDRISK performed equal to most other tools in predicting risk of diabetes, dysglycaemia and metabolic syndrome (Sathish et al 2013). To date there is no published evidence that the AUSDRISK has been used on persons with SCI to predict incident diabetes. Therefore, the primary aim of this study was to determine the validity of the AUSDRISK for predicting the development of type 2 diabetes in persons with SCI.

METHODS

This was a prospective comparative study set in one of Sydney's metropolitan local health districts. Data were collected between December 2013 and March 2014 using convenience sampling. Participants were identified using a university tertiary hospital database. From the database there were 118 people identified as eligible for the study. Persons were eligible if they were residents of the local health district, older than 18 years of age, had sustained a SCI for more than 12 months, lived at home, were wheelchair dependent and had not been diagnosed with diabetes. All 118 persons were mailed an information sheet and invited to contact the lead investigator.

Data were collected at participants' homes by the principal author. Data included: AUSDRISK screening tool, a haemoglobin A1c (HbA1c) assay and an eight item interview tool, based on available literature, was developed by the authors. AUSDRISK items relate to risk factors including: age, gender, ethnicity/country of birth, antihypertensive medication usage, smoking, waist measurement, physical activity level, familial history of diabetes, fruit and vegetable intake and high blood glucose history. Each answer was scored and the sum total classified the participant as low risk (less than 5 points), intermediate risk (between 6-11 points) or high risk (more than 12 points) of developing diabetes. The interview tool questions included the classification of the neurological level and severity of the each injury according to the American Spinal Injury Association (ASIA) Impairment Scale (AIS) and recorded the individuals' weight, vital signs, and general practitioner contact details. During the home visit, to support health promotion, all participants were offered diabetes education and resource material.

To measure the HbA1c, Point of Care Diagnostics sponsored the loan blood analyser (Afinion AS100™). The company manager trained the principal author in the use of the equipment. A HbA1c assay was obtained using a small capillary lancet finger prick of 1.5 μ which took three minutes to analyse. Infection control precautions were adhered to throughout the procedure. The point of care analysing device was quality tested each month (externally) to confirm reliability and validity. For the purposes of this study, a level of HbA1c 6.0% was considered the cut-off point for high risk of the presence of diabetes.

The data were analysed using IBM SPSS program (IBM SPSS v.21, Chicago IL USA). Data were summarised using frequencies, percentages, means and standard deviations. Associations between continuous score and variables and HbA1c were conducted using Pearsons or Spearman's r correlation and characteristics. Associations between categorical variables and HbA1c were conducted using Pearsons Chi-Square (X^2) test. Receiver Operating Characteristics (ROC) was used to assess sensitivity and specificity of the AUSDRISK tool and HbA1c. Statistical significance was considered met at p=0.05 and 95% confidence interval.

The study was approved by the local Human Research Ethics Committee (HREC 1305-160M) and operated according to the guidelines of the National Health and Medical Research Council of Australia.

FINDINGS

From the 118 mailed invitations, 24 were 'returned to sender', eight persons had diagnosis of diabetes, and seven declined participation. The participation rate was 66.9% (n=79). Of the 79 participants, 81% were male and the mean age was 53 years (SD 14.14) (table 1). The mean number of years since injury was 23.2years (median 23; SD +/- 13.2yrs). The most common (58%) neurological levels of SCI were within the cervical region and almost two-thirds (65.8%) of all the participants were graded as AIS A (complete injury).

The most frequent risk factors identified were insufficient exercise (58.2%) and taking anti-hypertensive medication (21.5%). The average waist circumference was 112.1cm; with males having an average waist circumference of 113.4cm compared to 106cm for females. Sixty-four (81%) participants had the maximum point score available for waist circumference. There was no statistical difference when comparing waist measurement with gender (X^2 p=.402).

There was also no difference in the predicted risk of diabetes or the presence of diabetes (HbA1c % and mmol/mol) according to the extent of the neurological deficit arising from the SCI (table 2).

Table 1: Participant Characteristics (n = 79)

Characteristic	**N**	**%**
Age (years, mean, SD)	53	14.14
Male	64	81
Females	15	19
Ethnicity		
Australian born	74	93.6
Born outside Australia	3	3.7
Pacific Islander	2	2.5
Level of spinal cord injury		
Tetraplegia (C3-8)[a]	44	55.7
High paraplegia (T1-T6)[b]	14	17.7
Low paraplegia (T7-L2)[c]	21	26.6
Completeness of spinal cord injury		
AIS[d]-A (Complete)	52	65.8
AIS-B and C (Incomplete)	27	34.1
Risk factors for diabetes		
Family history of diabetes	9	11.3
History of hyperglycaemia	7	8.9
Antihypertensive medications	17	21.5
Current smoker	7	8.9
Insufficient daily intake of fruit and vegetables	15	18
Insufficient exercise of < 150 mins/week	46	58.2
Waist circumference (cms, mean, SD)	112.1	19.9
Weight (kgs, mean, SD)	82.5	18.4

a Cervical neurological injury
b Thoracic neurological injury
c Lumbar neurological injury
d American Spinal Injury Association Impairment Scale: A B C

Table 2: Classification of risk of diabetes (AUSDRISK) for spinal cord injury deficit

Characteristic	**Overall**		**Complete AIS A (n = 52)**		**Incomplete AIS B/C (n = 27)**		**P value***
	N or mean	**% or SD**	**N or mean**	**% or SD**	**N or mean**	**% or SD**	
AUSDRISK score	***14.7***	***5.3***	***14.67***	***4.57***	***14.78***	***6.59***	***.93***
Low risk <5	7	8.9	3	6	4	15	.34
Intermediate Between 6-11	19	24	14	27	5	19	
High risk ≥ 12	53	67.1	35	67	18	66	
HbA1c %	5.3	3.3	5.28	.33	5.39	.35	.16
HbA1c mmol/mol	34.42	3.68	33.98	3.58	35.26	3.80	.14

*t-test, chi-squared or Fishers' exact test used

There was a positive and statistically significant correlation between length of time since SCI and risk score (AUSDRISK) (r = .242, p = .032) but not with HbA1c% (r = -.004, p = .97) or mmol/mol (r = -.041, p = .72). There were trends towards a correlation between risk score and HbA1c % (r = .210, p = .063) and mmol/mol (r = .215, p = .058).

The AUSDRISK classified 53 (67%) participants as high risk of developing diabetes, having a score greater than 12 points. These participants also had higher levels of HbA1c% (5.38 versus 5.2, p = .026) and higher HbA1c mmol/mol (35.08 versus 33.08, p = .022) (table 3). Two (2.5%) participants had HbA1c of 6% or above.

Table 3. Comparison of HbA1c % and mmol/mol for risk classification (AUSDRISK)

Characteristic	AUSDRISK low/intermediate < 12 points (n = 26)		AUSDRISK high ≥ 12 points (n = 53)		P level*
	Mean	SD	Mean	SD	
HbA1c %	5.2	.21	5.38	.37	.026
HbA1c mmol/mol	33.08	2.13	35.08	4.10	.022

*T-test

The high risk AUSDRISK classification explained a moderate amount of HbA1c % (area under curve = .651; 95% CI .53 - .77) (figure 1). The level of HbA1c, which had the high risk classification with the highest sensitivity (.59) and specificity (.73) was 5.25%.

Figure 2: Receiver operating curve for HbA1c mmol/mol versus high riskclassification on AUSDRISK

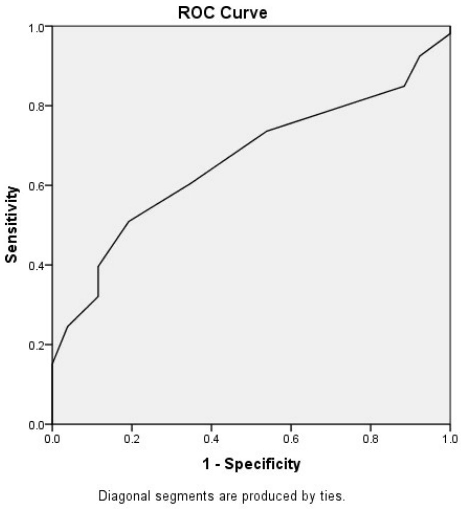
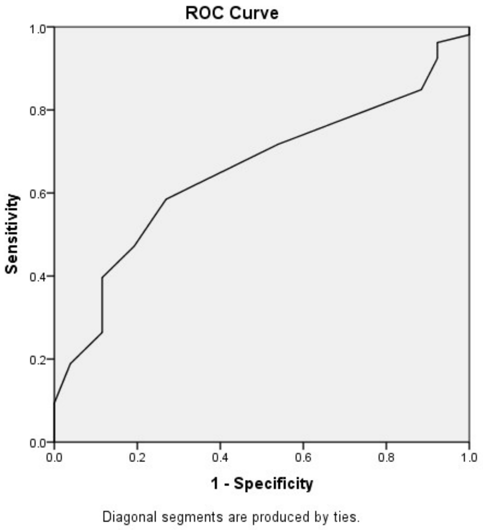


Figure 1: Receiver operating curve for HbA1c percent versus high risk classification on AUSDRISK



Similar results occurred for HbA1c mmol/mol as the AUSDRISK high risk classification explained a moderate amount of HbA1 mmol/mol (area under curve = .66; 95% CI .54 - .78) (figure 2). The level of HbA1c mmol/mol which had the highest sensitivity (.60) and specificity (.65) for high risk classification was 33.50 mmol/ mol. AROC analysis identified a moderate correlation with HbA1c and a high AUSDRISK score.

There were limitations to this study. The hospital database was reliant on all fields being up to date. However, addresses may have been incorrect reducing the potential sample size. As a result, the study may have underestimated the number of eligible people residing within the local health district. This was not a powered study and so sample size limits the generalisability. For the purposes of this study, medical screening for pre-existing conditions (e.g. abnormalities of red blood cell structure) known to interfere with HbA1c blood analysis were not undertaken, and may have influenced the findings. Future powered studies need to be conducted to determine the validity of the AUSRISK tool for people with SCI.

DISCUSSION

The AUSDRISK is a useful screening tool for predicting incident diabetes in the SCI population. The discriminatory ability of the AUSRISK was moderate when compared with HbA1c. There was a positive correlation between length of time since injury and diabetes risk. Diabetes rates are likely to increase in the SCI population given the improvement in life expectancy and anthropometric and physiologic changes associated with ageing with a SCI (Charlifue et al 2010; Banerjea et al 2008). Given the strong association between SCI and type 2 diabetes (Cragg et al 2015), there is an urgent need to monitor diabetes risk factors in this vulnerable patient group. The AUSDRISK can provide a dual function firstly by identifying type 2 diabetes risk factors, while providing an opportunity for health promotion and education. AUSDRISK screening should begin in the acute setting and continue in the primary health care setting. Further research needs to explore the screening frequency rate of AUSDRISK in the SCI population.

Due to the AUSDRISK high risk classifications, the AROC findings suggested the HbA1c threshold should be lowered to 5.25% (33.5mmol/mol) in a SCI cohort. This is in contrast to evidence that a HbA1c level of 6.0%-6.4% (42-47mmol/mol) should be recognised as high risk for the presence of diabetes (International Expert Committee 2009) or a HbA1c of 6.5% (48mmol/mol) being diagnostic of diabetes (World Health Organization 2011) in the normal population. Further powered studies need to be conducted to validate HbA1c sensitivity and specificity levels for persons with SCI.

This study identified that 21.5% of participants were on antihypertensive medication. Persons with a SCI level, which results in high paraplegia or tetraplegia, experience hypotension due to their blood pressure control being impaired, leading to lower resting blood pressures (Middleton et al 2008). This study supports the recent findings by Cragg et al (2015) that with improved treatment resulting in longevity that many are now having to be managed for chronic cardiovascular disease.

This study sample identified the majority had a large waist circumference, which supports the anatomical changes related to chronic SCI. The anatomical changes include: a decrease in muscle mass below injury level; weakened abdominal wall; a sunken chest; and, a lower positioned liver. Additionally chronic SCI results in an increase in visceral fat (Cragg et al 2015) and an enlarged colon. This study is the first to test the AUSDRISK in a SCI population, hence the AUSDRISK has only been validated in populations able to stand for waist circumference measurement. However, for persons who are wheel chair dependant and cannot weight bear, waist circumference often needs to be measured when seated or in supine position. Therefore, research is needed to validate the optimal waist circumference assessment method and scoring system for persons with SCI who are wheelchair dependant.

The AUSDRISK also scores a physical activity item. People need to undertake regular and sufficient exercise to improve insulin sensitivity. It has been identified that physical activity is a greater determinant of glucose concentration than neurological lesion level (Raymond et al 2010). For a person with SCI exercising may be a challenge and was reflected in the findings of these results. The AUSDRISK scoring system for physical activity needs further validation to determine whether adjusted scores for the SCI population are needed.

The AUSDRISK also scores ‘ethnicity/country of birth’. This item (Australian born, Aboriginal, Torres Strait Islander, Pacific Islander, Maori descent, Asian, Middle Eastern, North African, Southern European) may need to be further explored to determine what the meaning of ‘Australian born’ is in a multicultural society. A better definition of ‘Australian born’ is required to ensure that scores are appropriately weighted to identify risk in all ethnically diverse sub-populations. This may be an important factor in determining diabetes risk.

This study demonstrated that for primary healthcare providers, the use of screening tools and point of care testing equipment in the home has the potential to enhance the patient experience, and reduce the burden on sub-groups that are challenged in seeking traditional health care assessments. Further studies need to be conducted with portable point of care technologies to improve the detection of preventable diseases within the Australian community.

CONCLUSION

This study provides evidence that when comparing the AUSDRISK risk classification to HbA1c assay, the tool can predict incident type 2 diabetes risk in persons with a SCI. The discriminatory ability of the AUSDRISK was moderate when compared with HbA1c. Further powered studies are needed to be undertaken to refine the predictive capacity of the tool and the frequency rate for screening. Utilising the AUSDRISK could prove useful as a screening tool and a health promotional opportunity to monitor and meet the ongoing health needs of people with SCI living in the community.

RECOMMENDATIONS

- AUSDRISK can be used to screen for type 2 diabetes in persons with SCI, although screening frequency rate requires further investigation.
- The HbA1c level for predictive risk of diabetes should be lowered in the spinal cord injured population.
- Further powered studies need to be undertaken to test the AUSDRISK tool to determine predictability for wheelchair dependent groups.
- The scoring for waist circumference and exercise activity items in the AUSDRISK tool require multi-centred powered studies to determine weighting for persons with SCI.

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Why such success? Nursing students show consistently high satisfaction with bioscience courses at a regional university

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KEYWORDS

bioscience, education, nursing, satisfaction, learning, effective teaching

ABSTRACT

Background
An understanding of anatomy, physiology and pathophysiology is considered essential for graduate nurses, but many nursing students find such courses difficult and anxiety-provoking. This was contrary to the authors' experiences, so student perceptions were studied at the survey institution.

Objective
This paper examines nursing students' satisfaction with bioscience and nursing courses in the first two years of a Bachelor of Nursing at an Australian university, in order to suggest strategies for effective bioscience teaching.

Design
Quantitative data for student satisfaction, measured on the Likert scale, were collected for three bioscience and 11 nursing courses from 2010 – 2012. Mean satisfaction was compared among courses and offerings by ANOVA, with offerings nested within courses, and correlation analysis was used to examine the relationship between student satisfaction and pass rate. Qualitative data were sourced from open questions, emails and forum posts and examined for recurrent themes.

Results
Students rated the three bioscience courses in the top four of the 14 courses. There was no relationship between satisfaction and pass rate. Qualitative responses showed satisfaction with the course content, the learning materials, the delivery style and lecturer support.

Conclusion
It is possible to deliver bioscience courses that are appreciated by nursing students. Four principles are suggested in this paper that may improve student satisfaction with bioscience courses and, therefore, result in more effective learning and better prepared nursing graduates.

INTRODUCTION

Nurses often spend the most time with a patient and a well-informed nurse may be the first to detect a change in their health status. Therefore, an understanding of human anatomy, physiology and pathophysiology (often collectively called 'bioscience') is essential to good nursing practice (Whyte et al 2011; Friedel and Treagust 2005; Jordan and Reid 1997; Karch and Kent 1990) and also helps a practitioner understand the rationale for patient care (Jordan and Reid 1997). A positive relationship has been found between the level of knowledge of bioscience among nurses and patient care outcomes (Prowse and Heath, 2005; Prowse and Lyne, 2002; Jordan and Hughes, 1998). Bioscience is taught as a range of distinct courses in 25 of 28 nursing programs in Australia.

Although an understanding of bioscience is clearly important, several studies have shown that nursing students are often anxious about studying anatomy and (especially) physiology, but nevertheless appreciate the importance and relevance of it to their careers (Friedel and Treagust 2005; Gresty and Cotton 2003; Jordan et al 1999). Two recent Australian studies have also found that nursing students have negative attitudes towards bioscience.

Birks et al (2011) surveyed 163 first year students at one university. At the end of each semester the students were asked to indicate which of the four units of study they found (a) the most and (b) the least enjoyable; (c) the most valuable and (d) the least valuable. For the first (introductory) bioscience unit, 25% rated it as the most enjoyable but 20% as the least; in relation to its perceived value 31.5% rated it as the most valuable and only 2.9% rated it as the least valuable. For the second (advanced) bioscience unit, only 8.7% rated it as the most enjoyable and 32% the least, but nevertheless 16% rated it as the most valuable and 11.6% the least. Birks et al (2011) suggested the discrepancy between enjoyment and value of the more advanced unit may have been because students had lost interest in science or lacked the background to cope with new material.

Craft et al (2013) surveyed 273 nursing students at one university and found over 50% were anxious about studying bioscience but 93% understood why it was necessary for their careers. Therefore, in both cases, nursing students had negative perceptions of the process of studying bioscience but nevertheless appreciated the importance of the content to their career. Such perceptions may be because they (a) lack basic biological knowledge (McKee 2002), (b) have attempted but failed science in high school (McKee 2002) or (c) view nursing as a caring profession (Lumb and Strube 1993) but science as inherently 'non-caring' and, therefore, lacking relevance to nursing (Dawson 1994; Walker 1994).

Considering the discrepancy between the perceived value and the enjoyment of studying bioscience courses, it is argued that strategies for making bioscience more enjoyable are likely to improve learning outcomes. Furthermore, in contrast to the findings given above, the authors' experiences of teaching an integrated sequence of bioscience courses to health science students during the past 20 years have been extremely positive. Case studies of success can be used to suggest strategies for effective learning and teaching: in this paper evidence is given for successful teaching, student feedback is analysed and used to reflect on practice. This has identified four principles that appear to contribute to extremely high student satisfaction with bioscience courses at a regional Australian university.

A three year undergraduate Bachelor of Nursing has been offered by the regional university (henceforth called RU) where the authors are employed, since the late 1980s. Bioscience courses in the nursing program have always been delivered by staff with science qualifications, which is also the case for the majority of Australian and international nursing programs (Logan and Angel 2014); this is at least partly because of concerns that nursing academics might not have sufficient discipline knowledge to teach science or to help students apply it to practice (Wharrad et al 1994; Courtenay 1991).

Many RU nursing students are mature age, study by distance, have low tertiary entry scores, and lack writing and study skills. Some have transferred from vocational programs offered by technical colleges. Classes are relatively large, with over 750 new students enrolling in the program in each of 2011 and 2012.

METHODS

This was a confirmatory study to examine student satisfaction with three bioscience and 11 nursing courses within the first and second year of the Bachelor of Nursing at RU where student feedback has been solicited through the online learning platform (Moodle) for every offering of all undergraduate courses since 2010. Voluntary responses of less than 100% of the solicited population are unlikely to be representative or random (Liu 2006), but in this case the data consistently represent students who were sufficiently motivated to complete the questionnaire.

Evaluations open in the latter part of each term and close before results are released to ensure that responses reflect the student's learning experience and are not biased by their level of achievement. Summary numerical data for each course are made available to all university staff and students. The three bioscience courses are scheduled in the first and second years of the nursing program so these were compared with all first and second year nursing courses. Data were used for the three most recent offerings of each course as these had the highest response rates (table 1).

Table 1: The nursing (code NURS) and bioscience (code BIOH) courses offered in the first two years of the Bachelor of Nursing at RU.

Course name	Course code	Year of study
Introductory Anatomy and Physiology	BIOH11005	1
Professional Nursing Identity	NURS11146	1
Foundations of Nursing Practice 1	NURS11149	1
Therapeutic and Professional Communication	NURS11152	1
Advanced Anatomy and Physiology	BIOH11006	1
Holistic Nursing Assessment	NURS11150	1
Beginning Nurse Practice	NURS11151	1
Health and Behaviour	NURS 11153	1
Human Pathophysiology	BIOH12008	2
Acute Nursing Management	NURS12147	2
Pharmacology for Nurses	NURS12151	2
The Psychiatric Consumer	NURS13113	2
Person Centred Approach to Chronic Disease	NURS12146	2
Legal and Ethical Issues in Health Care	NURS12148	2

Students were asked to respond to six statements about learning resources and assessment by choosing Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree, and these categories assigned scores from 1 to 5 respectively on the Likert scale. The first statement, “Overall, I was satisfied with the quality of this course”, provided the opportunity to obtain reliable, robust and comparative data for student satisfaction across courses. Opportunity for comment was also provided by two free response questions: “What are the best aspects of your course?” and “What aspects of your course are most in need of improvement?” Responses to these questions for two courses (BIOH11006 and BIOH12008) gave considerable insights into factors that contributed to student satisfaction. Comments from students made in unsolicited email or Moodle forum posts were also examined.

When completing course evaluation surveys, students are advised that no student may be identified but that aggregated data may be used for research purposes. To ensure anonymity, no comments from the course evaluations were used in this report. Open, voluntary student comments from other sources (forums and emails) have been de-identified and reported below. The data for satisfaction were analysed by nested ANOVA (Zar 2010), with courses as a fixed factor and offerings as a random factor nested within each course. Sample sizes were at least 200 per course (table 2) and since they were constrained by the number of voluntary responses power was calculated retrospectively, using the effect size from the empirical data. Correlation analysis was used to examine the relationship between student satisfaction and pass rate.

Table 2. Mean student satisfaction on a Likert scale of 1 to 5 where 1 indicates strongly dissatisfied, 3 neutral and 5 strongly satisfied. n = total responses for the last three offerings of each course. The three left hand columns give the results of a posteriori Tukey tests in relation to each of the three bioscience courses. Course codes in bold italic show no significant difference between each bioscience course and the others in the program. For example, BIOH 12008 was not significantly different to NURS 11149 or BIOH11006, but had significantly greater satisfaction than all other courses in the program.

BIOH 12008	BIOH 11006	BIOH 11005	Mean satisfaction	*n*
NURS11149	NURS11149	NURS11149	4.66	452
BIOH12008	***BIOH12008***	BIOH12008	4.59	347
BIOH11006	***BIOH11006***	***BIOH11006***	4.37	383
BIOH11005	***BIOH11005***	***BIOH11005***	4.24	399
NURS11153	***NURS11153***	***NURS11153***	4.17	316
NURS12147	NURS12147	NURS12147	3.98	337
NURS12151	NURS12151	NURS12151	3.96	460
NURS12148	NURS12148	NURS12148	3.96	463
NURS13113	NURS13113	NURS13113	3.82	396
NURS11151	NURS11151	NURS11151	3.79	238
NURS12146	NURS12146	NURS12146	3.75	393
NURS11152	NURS11152	NURS11152	3.73	275
NURS11150	NURS11150	NURS11150	3.52	405
NURS11146	NURS11146	NURS11146	3.50	314

RESULTS

Mean student satisfaction among courses and the sample size for each are in table 2; response rates ranged from 21% to 67%. There was a highly significant difference in student satisfaction among courses ($F_{13, 25}=9.173$, $P < 0.001$, power=1.00) and among offerings nested within each course ($F_{25, 5139}=5.67$, $P < 0.001$, power=1.00). The three bioscience courses were rated in the top four for satisfaction, with scores above 4.0, and *a posteriori* Tukey analysis showed the three bioscience courses had significantly greater satisfaction than nine of the eleven nursing courses (table 2). The significant variation among the random factor of successive offerings of the same courses was not further investigated but is likely to reflect that (a) different lecturers taught some offerings of some courses and (b) enhancements were made in response to student feedback. There was no correlation between student satisfaction and mean pass rate (r=0.006, n=14, P=0.98) (figure 1).

The data are robust in that satisfaction was measured on the Likert scale, which provides a quantifiable measure on an interval scale that is independent among courses, which is a more realistic and reliable measure of student attitude than comparative studies where students are asked to rank courses against each other (Birks et al 2011). Comparative ranking only provides ordinal scale data; differences between ranks are not necessarily equivalent and the same rank does not necessarily indicate equivalence among courses across different terms or years a course is offered.

Qualitative responses to the open ended questions also demonstrated high student satisfaction with bioscience courses. In 2012, 90% of respondents for BIOH12008 and 75% for BIOH11006 nominated the lecturers and teaching methods as the best aspects of the course and 78% and 40% of respondents, respectively, did not identify any aspect of these courses that needed improvement.

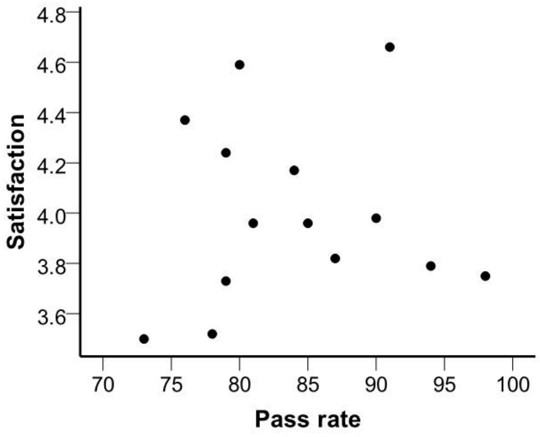

Figure 1: No correlation between pass rate (percentage) and satisfaction scores for courses in the Bachelor Nursing at Regional University (*r*=0.006, *n*=14, *P*=0.98).

DISCUSSION

All courses in the nursing program scored well for student satisfaction and it is notable that none had mean satisfaction scores below 3.5 of a possible 5. This may, in part, be due to a concerted effort by the RU learning and teaching community to reflect on teaching practice and respond to student feedback. Statistical comparison showed nursing students were highly satisfied with the bioscience courses at RU, even though pass rates in these were within the lower range of the courses within the Bachelor of Nursing. Furthermore, the lack of any relationship between satisfaction and pass rates across the program is evidence that students are not simply equating success with satisfaction.

Although pass rates for RU nursing bioscience courses (72 – 84%) are higher than the 55 – 65% reported at other tertiary institutions (Durai et al 2012) and 63% (Whyte et al 2011) it does not appear to be because courses at the former are relatively easy or lacking in content. First, the bioscience courses are part of an accredited program which requires their content and depth to be regularly reviewed by staff in Science and Nursing, as well as by an external accreditation panel. Second, it is notable that both nursing and allied health students from other Australian universities often take these bioscience courses by cross-institutional enrolment, which requires prior approval by the student's principal institution.

The finding that students are highly satisfied with bioscience courses at RU are inconsistent with previous studies at other Australian institutions (Craft et al 2013; Birks et al 2011) and further research is needed to identify why. There are at least three possible reasons. First, one important contributor to student satisfaction is the commitment and capability of teaching staff, including their command of the subject, clarity of presentation, interaction with students, organisation and preparation, ability to motivate students and their presentation skills (Kane et al 2004; Hativa et al 2001; Elton 1998; Feldman 1997; Horan 1991; Sherman et al. 1987; Hildebrand 1973). All three bioscience coordinators have undergraduate qualifications in general science (which included physiology, but none are medically trained) and, for two, their doctoral and current research is in animal ecology. Wharrad et al (1994) also found that 72% of bioscience teachers in nursing programs in the United Kingdom held a PhD in science and only 15% had a nursing qualification, but concluded that while being taught by a subject specialist was advantageous, the lack of a nursing background meant that the material was rarely presented in a way that was related to nursing practice. It is possible the RU instructors' initial *lack* of detailed anatomical, physiological, pathophysiological and nursing knowledge made it necessary for them to first teach themselves and then put the material into a nursing context, thereby seeing things from the point of view of a starting student and thus developing a conceptual, rather than a highly-detailed, factual treatment of the material. Their sound knowledge of general science also made it possible to develop explanations and course materials that could be understood by students with little or no prior knowledge of basic science (which is often the case for nursing students (McKee 2002)). Thus the instructors embedded strategies and used innovative delivery methods that minimised anxiety and targeted the learners' needs (Gordon et al 2012), as well as using assessment strategies that fostered originality and encouraged students to question (McKillup and McKillup 2007). Starting from an assumed zero background basic concepts are introduced, expanded upon and then gradually fleshed out until the students, sometimes to their surprise, find themselves with sufficient understanding to apply their knowledge in the workplace: *"I felt really nervous, but I remembered the diagram about acidosis in your lecture and told the intern he was wrong and the doctor said: That girl is right!"* (student reporting on a hospital placement in 2000).

Second, all three of the bioscience coordinators have received awards for teaching excellence; two have qualifications in education. They frequently consult with each other and the nursing faculty to ensure the bioscience courses are well integrated and relevant to the program. Students have acknowledged the quality of curriculum design and delivery: *"I have learned so much this term, you would not believe it! (I don't believe it myself). I am sure in part, it is because of the numerous and varied resources you have made available. But MAINLY, it is because of your clear understandable delivery of the material"* (student forum post 2012). It is also possible that the necessity to teach students by distance has resulted in better teaching to both internal and distance students. Both distance and on campus education now rely largely upon web-based learning platforms such as Moodle. Distance delivery requires a higher level of communication skills, a sound grasp of information technology, and empathy and respect for students of disparate backgrounds. Class websites are easy to navigate, meet a variety of learning styles, and are relatively simple in layout and format. Communication and engagement are enhanced by email, discussion boards and blogs. It is notable that students who have transferred to RU from other institutions (or are taking courses cross-institutionally) have reported their previous bioscience courses consisted of a loosely organised set of topics, with little continuity or overall integration, and did not relate well to their nursing program. *"Just a note to say thanks for the best course I've ever done. I'm soooo glad I decided to take this subject at RU after I failed at [another university]. You make it all so clear and interesting as well"* (student email 2012).

Finally, the bioscience courses have been the major part of the workload and therefore the primary responsibility of each coordinator for the past five years. Unfortunately, some science staff have said that teaching to non-science rather than science majors is 'second rate' and, therefore, an unpleasant and unrewarding chore. The authors do not share these attitudes. Instead, they have recognised a unique opportunity to create enthusiasm for science and an understanding of the scientific method in a large group of 'naive' students. Nursing students, with their variety of backgrounds, abilities and interests are rewarding to teach, yet teaching outside of the 'area of interest' was one of the five most common 'dislikes' of lecturers (Brown and Atkins 1997). More research into the attitudes of academic staff is warranted to identify if this is a sector-wide phenomenon that may contribute to the dissatisfaction with bioscience courses reported elsewhere among nursing students.

CONCLUSION

It is possible to deliver bioscience courses that are appreciated by students, even though they deal with relatively complex concepts and are often content heavy. The methods described in this paper can be summarised by four principles: sound content knowledge and a conceptual delivery approach; a student-centred attitude and perspective; quality materials; and excellent communication. First, the teacher has to have sufficient knowledge, commitment and confidence to develop and offer clear and conceptual explanations instead of excessive and often irrelevant detail. Second, they need to be able to see things from the student's perspective and, therefore, start at an appropriate level; take advantage of prior student knowledge and experiences; and put concepts into the context of the health professional. Third, they need to provide well organised, quality materials that cater for a range of learning styles. Finally, to achieve this they also need to communicate clear expectations, give detailed and prompt feedback, respect the diversity within their classes and encourage interactions with students.

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Y doesn't Gen Y 👍Like 2 w8?

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KEY WORDS

Nurse Practitioner, Treatment Stream, Generation Y, waiting times, expectations, satisfaction.

ABSTRACT

Objective

The aim of this small scaled research project was to identify any generational differences in expectations and satisfaction in waiting times, amongst Minor Injury patients with an ATS (Australian Triage score) four and five and how, or indeed if these relate to overall satisfaction of the Emergency Department (ED) Fast track or Treatment Stream (TS) Service. The question for this research was: In what ways do generational groups perceive waiting times for the service provided by an Emergency Department Fast track or Treatment Stream Service and with what implications for future services?

Design

A descriptive survey design where patients entering the TS area of the ED were given a validated patient satisfaction questionnaire to complete during their stay, in order to quantify their expectations of the waiting times and their level of satisfaction. Data was descriptively analysed and discussed within the conceptual framework of generational descriptions.

Setting

Emergency Department, within an independent Emergency Nurse Practitioner (ENP) led TS service.

Subjects

Convenience sample, limited to a maximum of every third adult patient attending the Armadale ED TS area, was offered the opportunity to participate in the study.

Main outcome measures

Expectations of waiting times and levels of satisfaction across generational groups.

Results

There was no difference between the expectations of Gen Y and other generational groups (Pr Chi 0.135), however Gen Y were still significantly less satisfied with the service than the other generational groups (P=0.018).

Conclusion

More research is required to address the expectations and satisfaction in waiting times and health services offered to different generational groups. This study offers beginning insights.

INTRODUCTION

Fast track or TS is an initiative implemented in EDs internationally to address increasing presentation numbers and associated increased waiting times in the ED for patients with minor illness and injury, without negatively impacting on the higher acuity patients (Dinh et al 2012; Abbott 2010; Kwa and Blake 2008; Jarvis 2007; Mills and McSweeney 2005; Megahy and Lloyd 2004; Cooper et al 2002).

TREATMENT STREAMING AT ARMADALE HEALTH SERVICE

From 2010 to Jan 2013, Armadale Hospital had a TS area staffed with ENP's. The ENP led service was set up to provide efficient and effective management of patients with triage categories four and five and assist with meeting the government National Emergency Admission Targets (NEAT), for triage categories four and five. The ENP in the TS area at Armadale functioned as the sole practitioner in the area, however there was always access to senior medical support in the main ED if required. The designated TS area had four assessment/treatment beds and an eight seated waiting/treatment area inside the department.

From 2006-2012, ED presentations to Armadale Hospital doubled from 30,000 to just over 61,000 patients per year. Approximately 25-30% of ED presentations (20,000 patients) were minor injuries and were allocated to the TS. The hours of operation for TS were between 0800hrs and 2200hrs daily (Kwa and Blake 2008) and medical staff attended to patients in the area, in the absence of an ENP.

Different generations have unique needs and concerns. However, Generation Y represent the future of health care in terms of large demographic numbers. Vast numbers of Gen Y patients access their health care needs via ED because their psychological profile links them to a drop in service that they can access quickly (Deloitte 2010), however Gen Y are generally less satisfied with service provision due to higher expectations (Thiedke 2007, Urden 2002). Market research into Generational analysis can help an organisation to develop insight in order to "consider the differences in world view and attitude between various generations…and use the information and business strategies to identify trends, changes and customer or client demands" (www.business.qld.gov.au, Washburn 2000).

BACKGROUND: LITERATURE REVIEW

Many studies have demonstrated that waiting times (Soremekun et al 2011) and expectations (Lateef 2011; Toma et al 2009) have an impact on the patients' satisfaction levels, however those who looked at age, did so in conjunction with other demographic characteristics such as gender, ethnicity, education and income, rather than exploring age in isolation (Taylor and Benger 2004, Urden 2002; Knudtson 2000).

Studies by Thiedke (2007) and Young et al (2000) found that individuals aged ≥ 70 years were more likely to be satisfied with the health system than individuals 18–29 years of age ($P < 0.001$). These authors both theorised that the lower satisfaction scores of younger patients might reflect on their inexperience (and possibly unrealistic expectations) with health care organisations. Some patients expect to be met at the door by a doctor immediately on arrival in ED (Roper 2010).

Satisfaction is both a cognitive evaluation and an emotional reaction to components of care delivery and service. When looking at patient satisfaction it appears what is measured is a combination of the patients expectation before the visit, the experience at the visit and the extent to which the patient felt their symptoms were resolved (Thiedke 2007). It is a subjective perception and is closely tied to individual's expectations (Urden 2002). It was therefore postulated that different generational groups had different expectations, which influenced their level of satisfaction. Expectations fall into two categories (Cooke et al 2006): consumer expectations of what is likely to occur or consumer expectations of what 'should' happen.

CONCEPTUAL FRAMEWORK: GENERATIONAL DESCRIPTIONS

A generation is a peer group, which is defined by both key life events and its demographics. Strauss and Howe (1991) named five generations, however these do not have exact boundaries and different authors will list differing birth years. There are generalisations about generational attitudes and outlook and there will be exceptions, however certain overall trends and outlooks, e.g. shared values and behaviours will appear, due to similar influences and experiences (Borges et al 2006; www.valueoptions.com).

The Silent Generation (born between 1926 – 1945). The prevailing value of this generation is adherence to proper principles such as law and order, patriotism and faith. They save and pay for what they get (Washburn 2000). They like to be involved in their care plans (Gauthier et al 2012).

Baby boomers (born between 1945-1964) are focused on self-discovery based on humanistic, altruistic, and narcissistic assumptions. They are a demographically powerful and important group, due to sheer numbers. They like instant gratification and can be very moralistic, but would prefer to work out morals and ethics themselves, rather than accept authority or institutional principles (Washburn 2000).

Generation X (Gen X - born between 1965-1981) is wedged between the Baby boomers and Generation Y and thus feel demographically overlooked and insecure. This was the first generation to develop ease with technology. They like hard facts; expertly delivered and value variety and speed (Borges et al 2006).

Although Generation Y (Gen Y - born between 1982-2003) is not as big as the Baby boomers they will have as large an impact on business and infrastructure as the boomers did. Even though this generation is only recently starting to graduate from high school they are already changing the face of advertising and marketing. They have grown up with computers, email and instant communication and information. The internet and television are the Gen Y medium of choice (Washburn 2000) when seeking information (Chaczko 2008; Weiler 2004).

It is well acknowledged that Gen Y have ‘a sense of entitlement’ (Garrett 2013), see themselves as of the utmost importance and highest worth (Goessi 2013) and that they want everything for themselves (Jaswal 2013), wanting it now and expecting ‘excellent customer service’ (Waldron 2013). They therefore cannot comprehend a health care system that does not give them the highest priority (Garrett 2013; Goessi 2013; Jaswal 2013).

Gen Y are known to have below average visits to the GP (1.5 per year). A survey of health care consumers by Deloitte (2010) showed that 39.1% of Gen Y did not have a GP. Deloitte (2010) also demonstrated that Gen Y’s visits to the ED are higher than any other generation, both due to sporting accidents and the fact that they access ED for routine medical problems, which they perceive as more convenient. Deloitte (2010) identified many factors for this higher presentation to ED, suggesting this generation are also more likely to wait until a health issue becomes severe, rather than accessing primary care when symptoms first appear. Gen Y dislike making appointments, preferring instead to attend ED, expecting to be seen quickly and also have not developed a relationship with a GP. However this may also be due to the fact young people do not perceive they need a GP. It is not known if this is a Gen Y phenomenon, or simply a result of their young age.

An understanding of generational differences underpinning the value sets of different generations in inextricably linked to how care can be prioritised in relation to community expectations (Chaczko 2008). This research attempts to identify the expectations of generational groups in terms of waiting times; with a focus on the patient expectations of what is likely to occur (Cooke et al 2006), by asking patients direct questions about their expectations (Boxer and Boxer 2009).

PURPOSE OF THE RESEARCH

Gen Y form 30-40% of the total patient numbers attending ED's (Thiedke 2007). Based on generational descriptions, the possibility exists that 'Gen Y doesn't like to Wait'. This understanding focusses attention on whether their levels of satisfaction correlate with Gen Y's higher expectations, as theorised by Thiedke (2007) and Urden (2002). What this may mean for clinical environments and future service delivery (Washburn 2000) is important to explore.

The aim of this small scaled research project was to identify any generational differences in expectations and satisfaction in waiting times, amongst Minor Injury patients with an ATS (Australian Triage score) four and five and how, or indeed if these relate to overall satisfaction of the Emergency Department (ED) Fast track or Treatment Stream (TS) Service. The question for this research was: In what ways do generational groups perceive waiting times for the service provided by an Emergency Department Fast track or Treatment Stream Service and with what implications for future services?

STUDY DESIGN

A descriptive survey design was employed.

POPULATION SAMPLED

A convenience sample comprising of potentially every third adult patient attending the Armadale ED TS area, was offered the opportunity to participate in the study. Armadale ED saw 61,000 patients in the previous year. Approximately one third of these (20,000) were TS patients. An uptake of 25% uptake was anticipated on a potential recruitment total of 50 patients per day. The maximum number of patients likely to be recruited on a daily basis was therefore approximately 12. In order to achieve a confidence level of 95% with a 5% sample error, it was calculated that a minimum sample population of 377 patients would be required to be recruited.

Patients entering the TS area of the ED were given a validated patient satisfaction questionnaire by the ENP or Medical Officer (MO), to complete during their stay, together with a verbal explanation of the study. The questionnaire was validated during a study by Sun et al (2001) in order to quantify their impression of the waiting times and their level of satisfaction and had a Cronbachs alpha score of 0.88 (Dihn et al 2012). Patient satisfaction was measured as an overall care score which gave a rating from 1 (poor) to 5 (excellent) and gave a combined score. There were five elements of care considered: 'courtesy and politeness, explanation and advice, waiting times and understanding of discharge instructions' (Dinh et al 2012).

Data was gathered by the nursing staff, ENPs and emergency medical officers and was collected over a three month period from September to December 2013. The Research was approved by the South Metropolitan Health Service Ethics Committee. Consent was implied by completion of the questionnaire. The questionnaire response identified patients by their Emergency Department Information System (EDIS) day number only. Patients were asked to complete the questionnaire during their visit to the ED TS area, rather than returning it by post, in order to improve the response rate. Patients were asked to identify their generational cohort on the demographic details. They were also asked to outline their expected and perceived waiting times on Likert scales from 0-30 mins to 4 hours: these included wait to be seen, wait for their investigations and their total wait in the department. They were then asked to identify their levels of satisfaction with the service and staff on Likert scales with ratings of 0 (poor) to 5 (excellent). The responses were analysed to see if there were any differences in the waiting times, expectations of waiting times and patient satisfaction between the different generational cohorts attending the TS area of the ED. In addition, overall numbers of patients from different generations attending the TS area of the ED were also analysed. The actual total perceived waiting times for individual patients were then cross-correlated with the actual time of admission and actual discharge time on EDIS.

EDIS data was used to corroborate patients' impression of waiting times.

INCLUSIONS

All patients entering the TS area of the Emergency department, between the ages of 18 and 65.

EXCLUSIONS

Patients under 18 years of age over 65 years of age; patients who did not comprehend English, including patients requiring an interpreter; patients with decreased physical or mental capacity to complete or comprehend the survey and patients with other comorbidities leading to increased length of stay and/or admission.

LIMITATIONS

It was also likely that the vast majority of patients sampled will have been seen by an ENP. This is because it is the ENP team driving this piece of research and also because it was not common (during the day) for a medical officer to be assigned to the streaming area. Medical officers therefore pick up the occasional patient during the day if the patient numbers attending the streaming area at any one time are too large for the ENP to cope with alone.

The ability to recruit patients closely correlated with the influx of patients into the department. The busier the department, the less likely it was to have time to recruit patients. This likely reflects the decreased ability to attend to the research and get patients to fill in questionnaires during the afternoon shift, when it tends to get very busy. This would have skewed the results, if the impetus of the questionnaire was solely on patient satisfaction, as it is well documented that patient satisfaction decreases with increased waiting times (Parker and Marco 2014). However, as this study focuses on the differences in patient expectations and was investigating the correlation between expectations and satisfaction, it was felt that the information was still worth analysing. The longer the study went on, the numbers of patients recruited reduced and then the study was halted early, due to the discontinuation of the TS area.

Due to a change in focus of departmental service initiatives, the TS was discontinued in December 2013 and the ENPs now see minor injury patients within the main department. Unfortunately, this research had to cease before the proposed number of patients had been recruited, however the preliminary data from this research was collated and analysed in the hope that it might provide some valuable insight into any generational differences in patient expectations and satisfaction, so that this information might be utilised in ongoing strategic planning for this cohort of patients, attending the Emergency department.

FINDINGS

Results were descriptively analysed using Stat data and statistical analysis software and discussed within the conceptual framework of generational descriptions.

Quantitative data was analysed using Pearsons Chi and Fischers. Significant variables identified were that there may be variations between the perception of waiting times by the patient and the data input on EDIS. This may be inaccurate with regard to discharge times, due to the fact that this information is not always recorded as the patient leaves the department.

- 86.75% of the patients questioned were seen by an ENP and 6 % were by an ED Medical officer (MO). 4.6% were seen by both an NP and an MO.

- 72% of patients questioned were seen between 0800 and 1400 hours, with 23% between 1400 and 2200.
- Only 7% of the patients questioned fell into the silent generation category. 40% were Gen Y with 26% gen X and 25.5% baby boomers. These figures are in keeping with the literature which identifies a 40% ED attendance for Gen Y (Deloitte 2010).
- 60% of attendees were male and 38% female. Four did not state their gender.

Table 1: Perceived wait times to be seen in percentages of total patients

Wait Times	30mins	<1hour	2-3 hours	>4hours
%	52	32.5	12	4

- 80% of patients said they 'expected' to be seen within three hours, with 40% of those expecting a wait of <1hour. In fact, patients perceived that 84.5% waited less than an hour and 96.5% total waited less than three hours.
- 43% of respondents experienced a wait of less than 30mins for 'test results' with a further 26% waiting under 1 hour. 77% total, waiting under three hours for test results.
- 98.6% of patients felt that the staff member attending them was courteous and polite, with the other 1.3% in the 'average' category.
- 97% felt that the advice they were given was either 'good' (15%), or 'excellent' (82%).
- 92% left the ED feeling that they understood the discharge instructions, with 6% declaring that their discharge instructions were poor and 1.3% said they were average.

Reasons for attending ED were varied: 1.3% was unstated; 47% stated it was an emergency; 20% were unable to get an appointment at their GP; 1.3% said the GP was too expensive (there are two large bulkbilling clinics nearby); 9% thought ED provided a better service and 21% had other reasons for attending but did not state what these were.

Overall satisfaction was good or excellent in 95% of respondents. However only 62% of the Gen Y group rated their satisfaction as excellent compared to 90% of respondents who were not Gen Y ($p<0.001$) P=0.018 (see tables 2 and 3a/b).

Table 2: Does satisfaction with ED visit vary with aged group?

KEY SATISFACTION: 0=missing 1=Poor; 2=Average;3=Good;4=Excellent

Satisfaction	**0**	**1**	**2**	**3**	**4**	**TOTAL**
Year Born Pre 1925	0	0	0	0	2	2
1925-1945	0	0	0	1	9	10
1946-1964	0	0	0	1	37	38
1965-1980	0	0	2	5	33	40
1980-1995	0	2	5	16	37	60
TOTAL	0	2	7	23	118	150

Pearson chi2(12) = 21.0448 Pr = 0.050

Fisher's exact = 0.018

Table 3a: Does level of satisfaction vary between Gen Y and all other aged groups?

	Gen Y	Other generations	TOTAL
SATISFACTION	0	1	
0	0	2	2
2	2	5	7
3	7	16	23
4	81	37	118
Total	90	60	150

Pearson chi2(3) = 17.9315 Pr = 0.000

Fisher's exact = 0.000

Table 3b

```
    Over    Proportion        Std. Err.  [95% Conf.Interval]

_prop_1
    0                 (no observations)
    1  .0333333  .0233696    -0128454     .079512

_prop_2
    0  .0222222  .015625     - 0086529    .0530973
    1  .0833333  .0359823    . 0122318    .1544349

_prop_3
    0  .0777778  .028389      .0216807    .1338749
    1  .2666667  .0575717     .1529042    .3804291

_prop_4
    0  .9        0317999    . 8371629     .9628371
    1  .6166667  .0632976    .4915897     .7417436
```

INTERPRETATION

62% (95% CI 49-74%) of generation Y rated their satisfaction as excellent compared to 90% (84-96%) of those who were not Gen Y (p<0.001).

Expectations of Waiting Times:
comparison of generational groups revealed no difference between expectations of waiting times and perceived waiting times for any generation. Pr Chi 0.135. Therefore Generation Ys expectations were surprisingly the same as everyone else's. Data was examined to identify whether or not the waiting times were longer for Gen Y, to find out if this was why they were less satisfied. The wait times were not statistically significant between groups; however Gen Ys perception of their waiting time was wrong in a significant number of cases. Whilst as expected, a proportion of these thought they had waited longer than they actually had, an equal number thought they had waited a shorter time than they actually had.

DISCUSSION

Understanding generational differences can ensure the health services are delivered in a way to match expectations and increase level of satisfaction.

In this study, 150 patients were recruited over the study's time period providing results that add valuable insights and are worthy of discussion.

High numbers of patients seen by ENPs were due to ENP's primarily staffing the TS area and ENPs driving this research and encouraging their patients to complete the questionnaires. As the covering MOs changed daily, it also proved difficult to inform all of them about the research.

The correlation between patient expectations and satisfaction that had been postulated in the literature (Thiedke 2007; Urden 2002) was not supported by our findings. Whilst the results were very interesting, it is difficult to propose changes to the service when there is no perceived need, due to the fact that the expectations of the Gen Y'ers were the same as the other generations. A demonstrated difference in expectations could have supported further research to ascertain why and subsequently support proposed changes to the current system in order to meet those expectations.

This study found that Gen Y's appear to have a decreased awareness of time (longer and shorter) when compared to the other generations. However these results are in direct contrast with a study by Parker and Marco (2014), which did not identify any correlation between accuracy of time estimates and age. The authors postulate this may be due to the fact many of them are engrossed in social media whilst they are waiting and lose track of the time completely.

CONCLUSION

Gen Ys expectations with regard to waiting times were the same as the other groups, but Gen Ys are still less satisfied than the other generational groups. The reasons for this are unclear however this research demonstrated that Gen Ys dissatisfaction was not correlated with their expectations of the service. Further research is required in this field with a larger cohort of patients in order to ensure an improved confidence interval and increased rigor.

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A nurses' guide to the hierarchy of research designs and evidence

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KEY WORDS

Evidence based practice (EBP). Case reports, Cross-Sectional Studies, Cohort Studies, Random Control Trials, Systematic Reviews, Meta-analysis

ABSTRACT

Objective

This article provides a breakdown of the components of the hierarchy, or pyramid, of research designs. Its intention is to simplify the components of the hierarchy to enable novice readers of research to better understand the differing approaches and levels of evidence.

Primary Argument

Evidence-based Practice (EBP) is the integration of the best research evidence with clinical expertise and the patient's unique circumstances. This includes respect of patient values, and their needs, whilst delivering high-quality, cost effective health care. Understanding the differing levels of evidence, and their reliability, is paramount to making correct and appropriate health care decisions. Nurses are required to use evidence-based practice as they are responsible for a significant amount of judgments and decisions every day, and therefore, they must use research literature as part of their clinical decision-making.

Conclusion

The content, or levels of evidence, of the hierarchy will be discussed in a systematic, logical order from the base to the apex of the pyramid. A comparative grid at the end may lead the nurse to better understand the differing components of the seven levels of evidence or, depending on the source, eight.

INTRODUCTION

The nursing research pyramid, or nursing research hierarchy of evidence, provides a visual and systematic depiction of forms of research from the least reliable (base) to the most reliable (apex). The pyramid includes both qualitative and quantitative paradigms. Pyramids vary slightly from source to source which can be confusing. To further add to the varying hierarchies "there is currently no universally agreed upon hierarchy of evidence for study types that seek to answer questions about patient's experiences and concerns (Del Mar et al 2013 p.29). Figures 1 and 2 are discussed in the main part of this article.

At the Base of the Pyramid (Level 7): Ideas, Opinions, Anecdotes and Editorials

The least reliable evidence comes from ideas, opinions, anecdotes and editorials. Our knowledge comes from varying places and our practices can be from tradition and custom, with many practices ritualistic. We can accept those practices with little questioning (Usher and Fitzgerald 2008 p.7). Whilst personal ideas, opinions and experience can be useful, they may not be transferrable or easily explained. They are akin to anecdotal evidence which is based on, or consists of, reports or observations of usually unscientific observers (Merriam Webster Dictionary 2015).

Editorials are usually in the form of a newspaper or magazine article that give the opinion of the editor or publisher (Merriam Webster Dictionary 2015). They are printed and available for public view and scrutiny but cannot be used as scientific evidence.

Another form of evidence not mentioned in the pyramid is instinct which is a 'hunch' or 'gut feeling' which is closely tied to personal experience (Usher and Fitzgerald 2008 p.10). Benner (1984) believes this is often deep knowledge derived from many hours, even years, of observation and experience, and acknowledges its importance, but it remains under-researched (Usher and Fitzgerald 2008 p.10) and cannot be quantified. It is, however, an important tool in nursing practice and part of nurses' synergistic response to patients and events (Center for Spirituality & Healing and Charlson Meadows 2015).

Case Controlled Studies, Case series and Case Reports (Level 6)

A case controlled study, or a case report, can be defined as an in-depth research study of an individual unit which may include, for example, one person, one family, a group or other social unit (Burns and Grove, 2009; Jackson and Borbasi 2008 p.154). A case study generally combines both qualitative and quantitative data (Jackson and Borbasi, 2008). This is further described by Wilczynski and McKibbon (2013 p.43) as an original study but specifically one study only. Jirowong and Pepper (2013 p.156) suggest that case controlled studies have subjects with a disease or condition (cases) or don't (controls). Information is obtained about their previous exposure/non-exposure to the intervention or factor under study (NHMRC (National Health and Medical Research Council) 2009). Comparisons can then be made by the researchers. There is a potential for bias in recalling information and the quality may be affected if the information is collected retrospectively (Jirojwong and Pepper 2013).

A case series is defined as a report on a series of patients, or cases, who have an outcome of interest or may have received some intervention (Del Mar et al 2013) whereas the NHMRC (2009) state it is a single group of people exposed to a intervention (factor under study). Whilst pre and post tests are recorded, there is no control group (Del Mar et al 2013 p.28). Due to the individual nature of these studies, with limited ability to extrapolate to a wider audience, they remain at the lower part of the pyramid.

Cohort Studies (Level 5)

Cohort Studies are defined by Jirawong and Pepper (2013 p.156) as a study which categorises participants according to the level of exposure to risk factors who are then followed over a period of time to observe the possible occurrence of a disease. This is further clarified by Del Mar et al (2013 p.25) as a longitudinal, observational study where differences in outcome are observed and related to the initial differences. The NHMRC (2009 p.9) state that those under study are then compared to a group not exposed to the risk factor.

Cohort studies can be prospective or retrospective. The NHMRC (2009 p.9) explain that prospective cohorts are observed at a point in time to be exposed or not exposed to an intervention whereas retrospective studies are usually done from medical records.

Observational studies are good at answering questions about prognosis, diagnosis, frequency and aetiology but not questions regarding the effect of an intervention (Del Mar et al 2013 p.24). Random Controlled Trials are able to quantify the effects of intervention hence they are higher up the pyramid than Cohort studies.

Random Control Trials (Level 4)

Random Control Trials, or RCT's, are the gold standard but Meta-analyses (discussed below) combine many RCT's. RCT's are considered to provide the best evidence (Koch et al 2008 p.233). This is an experimental form of research where participants are randomised (randomly allocated) in to two, or more, different groups with each group receiving a different intervention. At the end of the trial the effects of the different interventions are then measured (Del Mar et al 2013 p.25). The results are gathered and decisions can be made once it is evident that one intervention is more effective than another.

RCT's are routinely used to test new forms of medication because the design has the three major characteristics of an experiment, namely randomisation, a control group and manipulation (Jirojwong and Pepper 2013 p.153). This style is considered very reliable because the replication of a trial is possible and the study protocols have to be well defined and clearly described (Rose 2013).

Critically-Appraised Individual Articles (Article Synopses) (Level 3)

Critical appraisal is a term used to assess the outcomes for evidence with regard to an individual research study's effectiveness (Jirojwong, Johnson and Welch 2013). Authors of critically-appraised individual articles evaluate and synopsise individual research studies (Harvey Cushing/John Hay Whitney Medical Library 2015; Walden University 2015; Glover et al 2006). A synopses is the evidence of an individual article with an expert telling you its strengths (Wilczynski and McKibbon 2013 p.43). This is less reliable than Critically Appraised Topics as there is less evidence on single articles than in a synthesis of a topic using several papers.

Critically Appraised Topics (Evidence Syntheses) (Level 2)

Several journals have sections where they highlight critically appraised papers (Wilczynski and McKibbon 2013) and tell you how strong the evidence is. Authors of critically-appraised topics evaluate and synthesise multiple research studies (Harvey Cushing/John Hay Whitney Medical Library 2015; Walden University 2015; Glover et al 2006).

These are also called Synopses of Syntheses which have structured abstracts, or brief overviews, of published systematic reviews that have been screened for methodological rigour (Wilczynski and McKibbon 2013 p.46). Synthesising research publications entails categorising a series of related studies, analysing and interpreting their findings and then summarising those findings in to unified statements. The potential lack of standardisation can undermine the validity. However, if properly conducted, it is a systematic approach that can integrate qualitative and quantitative strategies (Shi 2007).

The Apex of the Pyramid (Levels 1a/1b Figures 1 and 2): Systematic Reviews and Meta-analysis

Systematic reviews can be defined as a compilation of all scientific studies on a particular topic according to predetermined criteria (Fernandez et al 2013 p.348). More specifically, it is a method to "review existing literature on a particular question by identifying, appraising, selecting and synthesising all high quality research evidence relative to that question" (Jirojwong et al 2013 p.405). Systematic reviews differ from literature reviews in that they involve rigorous review of all the available evidence on an aspect of health care (Koch et al 2008). The quality of the research is appraised and then the evidence is ranked in terms of reliability (Koch et al 2008). Authors of a Systematic review ask a specific clinical question, perform a comprehensive literature search, eliminate the poorly done studies and attempt to make practice recommendations based on the well-done studies (Harvey Cushing/John Hay Whitney Medical Library 2015; Walden University 2015; Glover et al 2006).

Fernandez et al (2013) and the NHMRC (2009) state that Systematic reviews are recognized as the highest form of evidence as they include all available evidence with conclusions based on rigorous critical appraisal. Literature reviews, by comparison, a much simpler and are a summary of available theoretical and research literature on a selected topic (Borbasi et al 2008 p.105). This helps to place the research problem in a context of what is already known and can help support the need for the study. Systematic reviews may summarise results from qualitative, quantitative or combination studies, that is, Mixed methods research (Bennett et al 2013).

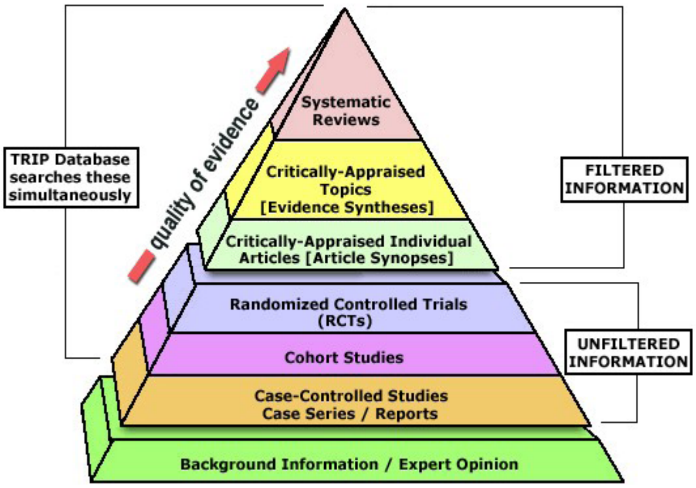
A Meta-analysis is also at the highest part of the pyramid because it is a pooled analysis of several randomised controlled trials (DelMar et al 2013 p.24). Some sources place Systematic reviews alongside Meta-analyses whereas others place Meta-analyses above Systematic reviews. The Meta-analysis differs from Systematic reviews in that the results of two or more individual quantitative studies are typically summarised using the measure of effect that allows for statistics to be compared and combined to form the Meta-analysis (Bennett et al 2013 p.284). A Meta-analysis is a systematic review that combines all the results of all the studies into a single statistical analysis of results (Harvey Cushing/John Hay Whitney Medical Library 2015; Walden University 2015; Glover et al 2006). Sometimes the results of the RCT's cannot be combined because the interventions, or outcomes, may be too diverse to combine and the results are then synthesised narratively (Bennett et al 2013 p.284). Higgins and Green (2011) support this stating if studies are clinically diverse then a meta-analysis may be meaningless, and genuine differences in effects may be obscured.

An example of a body who performs both Systematic reviews and Meta-analyses is the Cochrane Collaboration (Cochrane Community 2015). Cochrane Reviews are Systematic reviews, or Meta-analyses, of primary research into human health care and health policy. They are recognised internationally as the highest standard in evidence-based care (Cochrane Community 2015; Jirojwong and Welch 2013 p.284). Their role is to investigate effects of interventions for prevention, treatment and rehabilitation. They also assess the accuracy of a diagnostic test for a given condition in a specific patient group and setting (Cochrane Community 2015).

CONCLUSION

An understanding of the pyramid of evidence will lead the nurse to appreciate and identify which levels of research are more reliable. Nurses need to be competent in evaluating the strengths and weaknesses of research studies and the applicability of them in relation to their working environment (Jirojwong and Welch 2013 p.5; Levett-Jones 2013; Nursing and Midwifery Board of Australia 2013; Stevens 2013). Nurses have a responsibility to contribute to the development of the profession's knowledge through research.

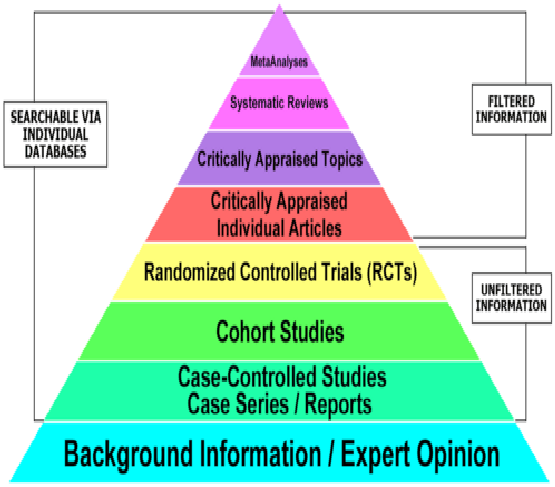
Figure 1



EBM Pyramid and EBM Page Generator, © 2006 Trustees of Dartmouth College and Yale University. All Rights Reserved. Produced by Jan Glover, David Izzo, Karen Odato and Lei Wang.

(Glover et al 2006)

Figure 2



(Bone and Spine, 2015; http://boneandspine.com/what-is-hierarchy-of-evidence/, 2015)

Comparative Grid of the Seven Levels of Evidence

Level 7 Base	Ideas, Opinions, Editorials, Anecdotes.	Least reliable. Basically anecdotal. Unscientific reports and observations (Usher and Fitzgerald 2008)
Level 6	Case Series and Case Reports	Slightly more reliable but there is a potential for bias in recalling information and the quality may be affected if the information is collected retrospectively (Jirojwong and Pepper 2013).
Level 5	Cohort Studies	Becoming more reliable. Observational studies are good at answering questions about prognosis, diagnosis, frequency and aetiology but not questions regarding the effect of an intervention (Del Mar et al 2013 p.24).
Level 4 Middle	Random Control Trials	Very Reliable/ Gold Standard. Random Controlled Trials are able to quantify the effects of intervention hence they are higher up the pyramid than Cohort studies (Koch et al 2008)
Level 3	Critically-Appraised Individual Articles (Article Synopses)	Increasing reliability of findings. A synopses is the evidence of an individual article with an expert telling you its strengths (Wilczynski and McKibbon 2013 p.43). This is less reliable than Critically Appraised Topics as there is less evidence on single articles than in a synthesis of a topic using several papers.
Level 2	Critically Appraised Topics (Evidence Syntheses)	Very high reliability. Synthesising research publications entails the categorising of a series of related studies, analysing and interpreting their findings and then summarising those findings in to unified statements. The potential lack of standardisation can undermine the validity.
Level 1a/1b Apex	Systematic Reviews and Meta-analysis	The most reliable of all. Systematic reviews, and Meta-analyses, of primary research into human health care and health policy are recognised internationally as the highest standard in evidence-based care (Cochrane Community 2015; Jirojwong and Welch 2013 p.284).

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