Science knowledge needed for nursing practice: A cross-sectional survey of Australian Registered Nurses

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ABSTRACT

Background: Nursing practice is underpinned by science knowledge. While the literature is consistent in identifying limitations in teaching science content to nurses, there is a lack of consensus regarding what should be taught and to what level of detail. No studies to date have systematically surveyed registered nurses (RNs) for their perspectives about the science knowledge that should underpin nursing practice.
Aim: To establish the relative importance RNs place on science content taught to nurses.
Method: Practicing RNs across Australia were invited to participate in a cross-sectional survey administered online. The survey asked participants to prioritize 179 science topics according to the relative importance of each item to nursing practice.
Findings: A total of 1583 RNs completed the survey. Participants indicated strong support for the inclusion of foundational science knowledge in undergraduate pre-registration nursing programs. The majority of topics (88%) were rated as a 'high priority' (a rating of 4 or 5), particularly anatomy, physiology and pathophysiology. No topic received a rating of less than 3 (of a possible 5).
Discussion: RNs expressed different views about the prioritization of science content areas for nursing practice compared with the views of academics who teach science to nursing students. Identification of the science content areas that RNs regard as high priority for nursing practice can be used to guide improvements in nursing curriculum development.
Conclusion: The results of this study demonstrate that practising RNs place high value on various science topics and the teaching of biological sciences generally. This study suggests the need for greater inclusion of key stakeholders, including practicing RNs, when integrating bioscience within nursing curricula.

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1. Introduction

Nursing is a profession that requires a diverse skill set that is applicable in a vast range of practice environments. Ensuring adequate preparation for the registered nurse (RN) role requires a solid foundation of theoretical knowledge and an understanding of how this knowledge is applied in practice. Providers of undergraduate nursing education must prepare graduates for the unique diversity of the role of the RN and the dynamic nature of the health care environments in which they will function. The biological sciences (or biosciences) represent a significant proportion of nursing curricula internationally. Uncertainty regarding what is and is not

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Summary of relevance

Problem or issue

Although science is important in nursing education, no clear evidence identifies what topics should be taught in undergraduate nursing programs.

What is already known

Despite its importance in facilitating RNs to recognise and respond to signs of clinical deterioration, nurses lack confidence in applying science knowledge to practice

What this paper adds

This paper describes the findings of a nationwide survey of 1583 Australian RNs who prioritises science topics most relevant to safe nursing practice. The relevance of these findings and implications for education providers and the broader profession are discussed.

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critical content in undergraduate nursing programs creates pressure for educators to ensure graduates are ready for practice. This paper describes the findings of a nationwide survey of Australian RNs to identify what priority they believed should be given to science topics in undergraduate nursing programs. The relevance of these findings and implications for education providers and the broader profession are discussed.

2. Background

Biosciences, including anatomy, physiology, pathophysiology, microbiology, chemistry and physics (physical sciences) are typically taught within nursing education programs (Logan & Angel, 2011). Clinically relevant knowledge of the biosciences is essential for RNs to recognise and respond to signs of clinical deterioration (Evans et al., 2013; Jones, Mitchell, Hillman, & Story, 2013; Kelly, Forber, Conlon, Roche, & Stasa, 2014; McVicar, Andrew, & Kemble, 2013).

Studies over the past decade have suggested that many nurses are not confident in applying their bioscience knowledge or discussing bioscience related issues with patients or other health professionals (Friedel & Treagust, 2005; McVicar et al., 2013). McVicar, Clancy, and Mayes, (2010) for example, found that while surgical nurses generally recognised the significance of key signs and symptoms in the clinical environment, they had difficulties explaining physiological changes and their potential impact on patient outcomes. There is broad concern within the literature that the design and delivery of bioscience content in nursing curricula is not optimally targeted towards preparing new graduates for registered nursing practice (Davis, 2010; Friedel & Treagust, 2005). As a result, newly qualified nurses perceived a shortfall in their bioscience knowledge when commencing in the professional role, a situation that was perpetuated by the lack of opportunity to address the deficit with experience (Davis, 2010).

Although there is agreement within the literature that bioscience is a vital component of preparatory nursing programs, there is no consensus on what content should be taught and in what level of detail (Davis, 2010; Logan, Dunphy, McClean, & Ireland, 2013). This situation is also reflective of the broader higher education contexts globally, as no studies outside of nursing were found within the literature that systematically identified what science topics should be taught in health professional degree programs.

The study reported in this paper was part of a larger two-phase project that had the overall aim of identifying the existence and extent of the theory-practice gap in relation to science in nursing. In the first phase of the project, academics who taught science in undergraduate nursing programs in Australian universities were asked to identify the priority that was given to various science topics in those programs (Birks et al., 2015Birks, Ralph, Cant, Hillman & Chun Tie, 2015). This paper reports on the second phase, a national survey of RNs in practice that aimed to establish the relative importance they place on science content taught to nurses.

3. Methods

3.1. Design

The study employed a survey design using a questionnaire developed by Logan (2008) which was adapted for this study. Although the original survey was developed for use in the Australian context, minor modifications were made to formatting and terminology to enhance clarity. Face validity of the survey items was originally established during development of the academic survey in Phase 1. This process involved a review of the survey items by a panel of academics from the authors' institution and other univer-

sities from across the country. Slight modifications were made to some items, particularly the demographic questions, to ensure they were appropriate for the RN cohort. The survey was deemed to be valid for this second phase following additional testing by four final year nursing students. The questionnaire was delivered via a subscription survey website (SurveyMonkey.com). Ten demographic questions collected data including age and residential postcode. The main body of the questionnaire comprised 179 items clustered into six categories:

- Normal anatomy of body systems (11 items);
- Basic concepts (6 items);
- Normal cellular histology (10 items);
- Physiology and pathophysiology of body systems (86 items);
- Microbiology (22 items);
- Chemistry (20 items) and;
- Physics (24 items).

Participants were asked to rate each item on a 5-point Likert scale on priority from 1 (lowest priority) to 5 (highest priority). Participants were also given the opportunity to provide additional comments. Reflective of the broad content and consistent with the terminology of the original questionnaire, the term 'science' was retained in preference to 'bioscience'. This terminology was retained throughout data collection and in reporting of the results.

3.2. Data collection and analysis

Approval to conduct the study was obtained from the principal investigator's university Human Research Ethics Committee. A link to the survey was distributed via the various Chapters of the Australian Nursing and Midwifery Federation. Respondents' anonymity was assured in the information sheet attached to the survey and submission implied consent. The survey was open for completion from April to August 2014 to provide adequate time for RNs across various states and territories to participate.

Demographic data and responses to scale item date were analysed via descriptive and inferential statistics using IBM- SPSS Version 22 (IBM Corp., Armonk, New York, 2011). The association between participants' demographic characteristics and their total ratings score on priority in teaching (i) Basic Science concepts; (ii) Other Science Topics were tested. The ratings from each participant were summed into a total score to be examined. One-way ANOVA or t-test was used (as appropriate) to test for differences in the two dependent variables by age (decade), years of experience in nursing (quartiles <2 yrs; 3–5; 6–10; >10), whether a postgraduate qualification (certificate/diploma/degree) was held, and whether work setting was acute care. A p value <0.05 was regarded as significant throughout. The results of these analyses are presented in the following sections of this paper.

4. Findings

Of the 1865 returned surveys, 1583 were found to be complete with ratings of science topics and were thus included in the analysis. Participants resided in one of eight Australian states or territories, with the majority living in NSW (62.6%); Victoria (13.1%); Tasmania (9.4%); and Queensland (6.6%). Two-thirds of participants were aged over 40 years and the median age range was 40–49 years. Most (74%) had ≥5 years of nursing experience and the median duration of practice was 16 years with an average 11 years of experience in their current specialty. Half the RNs (51%) held a postgraduate qualification: a degree; a diploma; or a certificate. The demographic characteristics of the sample broadly concur with national work-