How should science be taught to nurses? Preferences of registered nurses and science teaching academics

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ABSTRACT

Aims and objectives: To identify how science should be taught to nursing students, and by whom.
Background: An understanding of foundational science and its role in supporting safe and effective nursing practice is an important part of student learning. The well documented challenges in teaching this content are compounded by a lack of evidence regarding educational strategies that lead to improved educational outcomes.
Design: The study employed a cross-sectional design using online surveys.
Methods: Two surveys were conducted in Australia involving (i) academics who teach science in undergraduate nursing programs and (ii) registered nurses (RNs). Participants were asked to respond to a range of questions around how science should be taught to nurses. There were n = 30 and n = 1808 respondents respectively.
Results: Findings indicated a need to better integrate science content throughout nursing curricula. Participants were supportive of a discrete science subject in the foundation year and the integration of science content throughout the remainder of the curriculum. Participants across both surveys were ambivalent about whether the depth of science teaching was adequate for nursing practice. Most nurse academics and RNs thought that nurses should teach science, while non-nursing science teachers were less certain.
Conclusions: Existing consensus clearly values the delivery of science content as an initial and ongoing priority of learning throughout the undergraduate nursing program.
Relevance to practice: Improving the ways in which students learn sciences will impact on nursing practice, with the potential to improve patient care.

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1. Introduction

A strong grounding in the biological sciences (biosciences) is essential for safe and effective nursing practice. Such knowledge is critical for developing the clinical proficiency of students in undergraduate nursing programs. Successfully establishing a solid science foundation is vital for promoting a strong nexus between theory and practice. Ensuring that the right depth and breadth of science content is taught to nursing students, as well as integrating it throughout nursing curricula using educationally effective

strategies is a complex process. Through the surveying of two populations: (1) science-teaching academics and (2) registered nurses (RNs), data were collected and analysed. Their responses centred on how science content should be taught in undergraduate nursing programs. The findings presented in this paper relate specifically to perceptions of the nature of science content in nursing curricula, who should teach it, how it should be taught and whether or not it is adequate for practice.

2. Background

The pressured nature of designing responsive, relevant curricula in the context of undergraduate nursing programs is well established (Ralph, Birks, Cross, & Chapman, 2015). Similarly, the rising acuity of patients in hospitals, diversity of national health priorities, and growing technologically-orientated clinical environment

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requires a breadth and depth of knowledge from RNs who work in these contexts (Friedel & Treagust, 2005; McVicar, Andrew, & Kemble, 2014; Nairn, 2014; Ralph, Birks, Chapman, & Francis, 2014).

The nature of advancements in the clinical environment have escalated calls for RNs to be taught an adequate depth and breadth of bioscience knowledge as part of their educational preparation; thus ensuring that they are proficient in the contexts in which they practice (Evans, Berry, & Mate, 2013; Friedel & Treagust, 2005; Gresty & Cotton, 2003; Jones, Mitchell, Hillman, & Story, 2013; Jordan, 1994; Kelly, Forber, Conlon, Roche, & Stasa, 2014; McVicar et al., 2014; Torrance & Jordan, 1995; Wong & Wong, 1999). However, teaching this content in nursing is traditionally a troublesome prospect in respect of *how* it should be taught and *who* is best placed to teach it. The challenges students face in learning bioscience have been the source of strong ongoing debate (Gordon & Hughes, 2013; Gresty & Cotton, 2003; Larcombe & Dick, 2003; Logan & Angel, 2011; McVicar, Clancy, & Mayes, 2010; Smales, 2010; Thalluri, 2007). A persistent lack of strategies for learning and teaching this content in nursing hinders educational development in this important area.

Nursing academics are challenged to deliver an adequate depth of bioscience content that is sufficient to underpin an immense variety of clinical contexts (Craft, Hudson, Plenderleith, Wirihana, & Gordon, 2013; Evans et al., 2013; McVicar et al., 2014). Compounding this issue is the ongoing trepidation with which students learn in these subjects as they are perceived as a difficult area of study within nursing programs (Gresty & Cotton, 2003). This situation is further complicated by a lack of confidence among RNs around bioscience knowledge and its application to practice (Clancy, McVicar, & Bird, 2000; Friedel & Treagust, 2005; McVicar et al., 2014). While some studies have offered strategies to overcome these difficulties (Gordon & Hughes, 2013; Gresty & Cotton, 2003) the limited availability of evidence has foiled efforts to establish evidence-based attempts at enhancing strategies to improve learning and teaching. This study aimed to explore *how* science should be taught to prepare graduates for practice by seeking the perspectives of Australian academics teaching science in undergraduate nursing programs as well as practising RNs.

3. Methods

3.1. Design

The study used a quasi-experimental design comprising of an online survey distributed to science-teaching academics (Group 1) and RNs (Group 2). Each survey was contextualised for the two participant groups. The targeted populations were science-teaching academics in the 36 Australian schools of nursing and registered nurses in Australia who numbered 259,494 in 2015 (NMBA, 2015).

The survey instruments used in the study were adapted from a questionnaire developed by Logan (2008). Although designed for the Australian context, minor changes were undertaken to enhance formatting, terminology, and clarity. The face validity of the survey instruments were tested with academics during initial development and further tested with final year nursing students. The questionnaire was delivered via a subscription survey website (SurveyMonkey). The bulk of the surveys consisted of 179 items relating specifically to science topics. This data is reported elsewhere (Author- Blinded for Review). Demographic data were collected, along with responses to the questions asking both groups about how to teach science in nursing programs and who should teach it (Box 1). Respondents were asked to select 'yes', 'no' or 'unsure' to the questions posed and were also given the option of providing free text comments to support their responses.

3.2. Data collection and analysis

Subsequent to securing approval from James Cook University's Human Research Ethics Committee (Approval: H5515), an email with the survey link was sent via the Council of Deans of Nursing and Midwifery (Australia and New Zealand) to Heads of Australian Schools for dissemination to the academic cohort. Each institution varies in respect of the number

of academics who teach science content to nurses, and whether this role is undertaken by nursing or science faculty. The total target population is therefore in flux, however, the research team determined that at least two persons who meet the inclusion criteria would be employed at each institution.

RNs were recruited via an email sent to state-based chapters of the Australian Nursing and Midwifery Federation, with a total membership exceeding 249,000, for distribution to their members (ANMF, 2014). Surveys were open for completion from April to August 2014 to provide adequate time for respondents across various States and Territories to participate. Data were analysed using IBM-SPSS Statistics for Windows Version 22 (IBM Corp., Armonk, New York, 2013) and descriptive and inferential statistics. Chisquare tests of independence were used to compare categorical data (age group, level of qualification, length of practice range) with response data. $P < 0.05$ was regarded as significant. The results of these analyses are presented in the following sections.

4. Results

4.1. Demographical data

Thirty academics who resided in seven States/Territories of Australia responded to the survey. Given the relatively small number of academics who teach science to nursing students in undergraduate nursing programs nationally, this sample was considered reflective of the target population. Around half (16/30; 53%) were nurse academics and the remainder were science-qualified academics who were not nurses. Most held a postgraduate degree. The majority (n = 25) were aged over 40 years, with an average science teaching experience of 8.4 years (range: 1–25).

A total of 1808 RNs (Group 2) completed the question set reported on in this paper. RN participants resided in one of eight Australian states or territories. Most were mature aged; few (18%, n = 323) were aged less than 30 years, 40% (n = 707) were aged 30–49, and 43% (n = 771) were aged over 50 years. The median duration of their nursing practice was 15 years (range 0–50 years), although almost one-third reported less experience. One-quarter (24%; n = 426) were qualified with a nursing diploma/certificate or hospital education and another 161 held both this qualification and a nursing degree; in all, 59% (n = 1073) held a bachelor degree and almost half of all RNs (48%; n = 866) held a postgraduate qualification: degree, diploma or certificate.

5. Survey questions

Is nursing an applied science?

When asked whether nursing was an applied science, all except one science-teaching academic agreed. The majority of RNs when asked the same question, agreed that nursing is an applied science (81%; n = 1454) although 10% (n = 195) were unsure.

Do you think science in undergraduate nursing courses should be taught by nurse academics?

When academics were asked whether undergraduate nursing students should be taught science by nurse academics, most nurse academics agreed with this suggestion (11/15; 73%). Non-nurse