Nurse Education Today 34 (2014) 225–232

Contents lists available at ScienceDirect

Nurse Education Today

journal homepage: www.elsevier.com/nedt

Identification of prescribing errors by pre-registration student nurses: A cross-sectional observational study utilising a prescription medication quiz ☆

Leeann Whitehair *, Steve Provost [1], John Hurley [2]

School of Health and Human Sciences, Southern Cross University, Australia

ARTICLE INFO

Keywords:
Patient safety
Prescriptions
Medication errors
Students
Cross-sectional study
Observation methods

SUMMARY

Background: Nurses are central to the aim of ensuring medication safety, through being predominantly responsible for the administration of medications to patients in acute care settings. Correct identification of prescribing errors by nurses helps to ensure that errors are detected early in the process of administering medications to patients. The limited available research however, suggests that both qualified and student nurses have difficulty in identifying prescribing errors with high accuracy.
Objective: To collect baseline data on pre-registration student nurses' ability to identify prescribing errors.
Design: A cross-sectional observational design utilising a prescription medication quiz was employed. The quiz contained six prescriptions that simulated a national inpatient medication chart, and included common types of prescribing errors, as identified in the literature.
Settings: One Australian university.
Participants: Third year pre-registration student nurses enrolled in a clinical nursing course in a Bachelor of Nursing programme.
Methods: Statistical analysis of the data was performed using descriptive statistics, Pearson's product-moment correlation coefficient (Pearson's *r*) 2-tailed test, and independent sample *t*-tests.
Results: Results from the 192 participants suggested that student nurses had difficulties in identifying the prescribing errors built into the prescription medication quiz. Of the five prescriptions containing an error, 7.3% of students identified all 5 errors, 13% identified 4, 21.9% identified 3, 26.6% identified 2, and 20.3% identified only one error.
Conclusions: It is vital for patient safety that student nurses have greater awareness of, and ability to, correctly identify prescribing errors. The ability of individual students to correctly identify all five errors in this study was poor. These results support the need for educators to consider alternative approaches to educating students about medication safety. Recommendations with the potential to address this gap in education through the use of simulation are proposed.

Introduction

Patient safety focuses on reducing the risks associated with the delivery of health care to an acceptable minimum (World Health Organisation (WHO), 2011). Increasingly, patient safety is being recognised as a global health priority (WHO, 2012), and a key issue for health care organisations and education facilities (Mansour, 2012). In Australia, recognition of the importance of patient safety in the delivery of care by health care professionals is reflected in both national and state level policies (Australian Commission on Quality and Safety in Health Care (ACQSHC), 2012; New South Wales (NSW) Department of Health, 2012), and within standards indicating the quality of care that must be delivered across all health care environments (ACQSHC, 2011a), in order that patients be protected from harm.

Literature

Despite receiving considerable attention from both policy makers and individual health organizations medication errors continue to occur (Roughead and Semple, 2008). Medication errors may occur at any point in the process of medication administration including: prescribing, dispensing and administering a medication (Australian Council for Safety and Quality in Health Care, 2002). Prescribing errors are a regular occurrence for patients situated within hospitals (Dean et al., 2002; Lewis et al., 2009; Roughead and Semple, 2008). Estimates of the incidence of prescribing errors in Australian hospitals

☆ Conflict of interest: none.

* Corresponding author at: Southern Cross University, Hogbin Drive, Coffs Harbour NSW 2450, Australia. Tel.: +61 2 6659 3919; fax: +61 2 6659 3051.
E-mail addresses: leeann.whitehair@scu.edu.au (L. Whitehair), steve.provost@scu.edu.au (S. Provost), john.hurley@scu.edu.au (J. Hurley).
[1] Southern Cross University, Hogbin Drive, Coffs Harbour NSW 2450, Australia. Tel.: +61 2 6659 3304; fax: +61 2 6659 3051.
[2] Southern Cross University, Hogbin Drive, Coffs Harbour NSW 2450, Australia. Tel.: +61 2 6659 3688; fax: +61 2 6659 3051.

0260-6917/$ – see front matter © 2014 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.nedt.2012.12.010

ranged from 2.4% to as high as 24.5% for medication charts assessed in the paediatric department (Roughead and Semple, 2008). Lewis et al. (2009) found that of the 33 studies that reported errors, the median error rate (interquartile range) was 7% (range 2–14%) of medication orders, and the reported rate of errors per admission (19 studies) was 52 (range 8–227) errors per 100 admissions. Dean et al. (2002) reported that out of approximately 36,200 medication orders written during the four week study period a total of 538 prescribing errors were identified, equating to 1.5% (95% confidence interval (CI): 1.4 to 1.6). Dosing errors were found to be the more common type of prescribing error (Dean et al., 2002; Roughead and Semple, 2008; Lewis et al., 2009). The medications most commonly involved were antimicrobials and medications acting on the cardiovascular system (Lewis et al., 2009), paracetamol, morphine, diamorphine, metoclopramide and beclamethosone (Dean et al., 2002).

Variations in defining a prescribing error may give rise to difficulties when reporting rates of prescribing errors (Lewis et al., 2009). The definition adopted here is that a clinically meaningful prescribing error is considered to have occurred for patients situated in hospital settings when, "as a result of a prescribing decision or prescription writing process, there is an unintentional significant (1) reduction in the probability of treatment being timely and effective or (2) increase in the risk of harm when compared with generally accepted practice" (Dean et al., 2000, p. 235). Situations in which an error in decision making should be considered include the prescription being inappropriate for the patient, or pharmaceutical issues for example, when the medication to be infused is prescribed in a concentration greater than that recommended for peripheral intravenous administration (Dean et al., 2000). The definition supported broad consensus within a group of United Kingdom health care professionals as to events that should be included or excluded, is suitable for both research and clinical governance initiatives (Dean et al., 2000), has been utilised in a number of studies since its formation (Lewis et al., 2009), thus providing a basis for comparison. Medication errors detected prior to reaching the patient, and harm averted, may be described as a "close call" (Australian Council for Safety and Quality in Health Care, 2002, p. 82), or "near miss" (WHO, 2011, p. 81; Clinical Excellence Commission and NSW DOH, 2011, p. 28). Medication errors may be a result of the person failing to carry out a planned action, or when they apply an incorrect plan (WHO, 2011), but it is important to note that they are considered to be preventable events (Brady et al., 2009; Dean Franklin et al., 2005).

Currently in Australia, nurses, other than nurse practitioners and midwife practitioners, are not legally permitted to prescribe medications (Elliott and Liu, 2010), although alternate models of non-medical prescribing are under consideration (National Health Workforce Planning and Research Collaboration, 2010). Prescribers, medical officers for example, have a responsibility to minimise prescribing errors (Coombes et al., 2008), and pharmacists are well placed to detect prescribing errors (Coombes et al., 2005; Lewis et al., 2009). However, nurses are central to the aim of ensuring medication safety, through being predominantly responsible for the administration of medications to patients in acute care settings (Brady et al., 2009). Nurses can query a prescription order with the prescriber (Elliott and Liu, 2010), and have an important role to play in identifying prescribing errors (Dean et al., 2002; Guy et al., 2003). For example, Guy et al. (2003) investigated the number of times a prescription was queried with a prescriber by pharmacists and nurses, and found that nurses queried almost 50% out of a total of 363 interventions during the two week study period. Correct identification of prescribing errors by nurses helps to ensure that errors are detected early in the process of administering medications to patients, and may provide a critical defense aimed at minimising harm (Coombes et al., 2008).

According to Reason (2000), human error can be viewed from a person approach or system approach. In a person approach, the focus is on naming, blaming and shaming the individual. From a system approach, factors contributing to errors are viewed in relation to not only the person, but also to the whole team, and the workplace contexts in which they undertake their work. A pivotal feature of the system approach is the concept of defenses. Reason's current model of accident causation shows causes of the errors represented as holes in layers of a Swiss cheese (Reason et al., 2006). Within Reason's (2004) model the layers of the cheese represent controls, defenses and, barriers as well as safeguards within a system whose function is to protect potential victims from local hazards. However, weaknesses in the defense system (holes) may open up the possibility of the defenses being penetrated by the trajectory of an accident resulting in harm to a victim. The holes in the defenses are considered to occur by either active failures and/or latent conditions. Active failures are perpetrated by individuals who are in direct contact with a patient or system, and referred to as unsafe acts. The unsafe acts can be categorised as errors or violations, with errors referred to as slips, lapses, fumbles or mistakes (Reason, 2000). Latent conditions are referred to as "the inevitable "resident pathogens" within the system" that may result in error producing conditions in the workplace and/or result in long lasting weaknesses (holes) in the system's defenses (Reason, 2000, p. 769). Prescribing errors may be conceptualised as active failures in that the unsafe act is at the hands of individuals who are in direct contact with the patient.

Improving undergraduate students' ability to correctly identify prescribing errors is consistent with the concept of strengthening defenses (Reason, 2000), and implementing solutions to prevent harm (Milligan, 2007). Raising awareness of errors, and preserving patient safety by timely human adjustments, is a vital adjunct to a focus on individual performance characteristics alone (Reason, 2000). Organisational safeguards may never be fully effective in preventing harm, but safeguards can be augmented by improving mental skills of the health professionals delivering direct care (Reason, 2004). However, the mental skills necessary to increase the likelihood of detecting errors need to be practiced, but the early training of healthcare professionals in this area of expertise is not a common occurrence (Reason, 2004).

A limited number of studies have been focused on the ability of qualified nurses or pre-registration health care students to identify prescribing errors (Coombes et al., 2005; Warholak et al., 2011a). In one Australian hospital, Coombes et al. (2005) found that more qualified nurses than graduate nurses correctly identified and acted on prescribing errors for four out of six simulated scenarios. No difference was found though between experienced and graduate nurses' ability to identify the prescribing errors when a patient was ordered a drug to which they had experienced a severe adverse drug reaction, and when the patient was incorrectly prescribed a standard release format of an antihypertensive, instead of the patient's previously prescribed sustained release format. Warholak et al. (2011a) investigated pre-registration third year pharmacy ($n = 81$), 2nd year medical ($n = 70$), and 4th year nursing students' ($n = 50$) ability to identify prescribing errors within three fictional prescriptions. The authors reported that more pharmacy students correctly identified prescribing errors, when compared to nursing and medical students. The number of prescribing errors in this study was limited to two types of errors, and the number of student nurses participating was relatively small, thus studies using larger samples, and more types of errors are warranted to validate these findings. Further, students were not permitted access to prescribing resources, a common practice utilised in Australian acute care hospital settings, which possibly may have improved error identification rates.

Considering the importance of this issue to patient safety, as well as the limited amount of evidence indicating the ability of pre-registration student nurses to identify prescribing errors, further studies are warranted. The objective of this study was to investigate pre-registration student nurses' ability to correctly identify prescribing errors, and accuracy in determining types of errors, as one part of a quasi-experimental interrupted time series pilot research.