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Nurses' identification and reporting of medication errors

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NURSES' IDENTIFICATION AND REPORTING OF MEDICATION ERRORS

Aims and objectives: The purpose of the study was to investigate hospital nurses' involvement in the identification and reporting of medication errors in Turkey.

Background: Medication safety is an international priority, and medication error identification and reporting are essential for patient safety.

Design:A descriptive survey design consistent with the STROBE guidelines was used.

Methods: The participants were 135 nurses employed in a university hospital in Turkey. The survey instrument included 18 sample cases and respondents identified whether errors had been made and how they should be reported. Descriptive statistics were analyzed using the chi-square and Fisher's exact tests.

Results: The sample case of **"**Patient given 10 mg morphine sulphate instead of 1.0 mg of morphine sulphate" was defined as a medication error by 97% of respondents, whereas the sample case of "Omitting oral/IV antibiotics because of the need to take the patient out for x-rays for three hours" was defined as a medication error by only 32.1%. It was found that eight sample cases (omitting antibiotics, diluting norodol drops with saline, giving aspirin pre-prandially, injecting clexane before colonoscopy, giving an analgesic at the nurse's discretion, dispensing undiluted morphine, preparing dobutamine instead of dopamine, administering enteral nutrition intravenously) were assessed as errors and reported, although there were significant statistical differences between the identification and reporting of these errors.

Conclusion: Nurses are able to identify medication errors, but are reluctant to report them. Fear of the consequences was the main reason given for not reporting medication errors. When errors are reported, it is likely to be to physicians.

Relevance to clinical practice: The development of a common agreed definition of a medication error, along with clear and robust reporting mechanisms, would be a positive step towards increasing patient safety. Staff reporting medication errors should be supported, not punished, and the information provided used to improve the system.

Key Words: error identification, medication error, nursing, reporting.

INTRODUCTION AND BACKGROUND

Unsafe medication practices and medication errors are a leading cause of injury and avoidable harm in health care systems across the world. The estimated global cost of medication errors is $42 billion annually (WHO, 2017). For example medication errors result in harm for at least 1.5 million people every year in the United States (Aspden, Wolcott, Bootman, & Cronenwett, 2007). They have also been identified as a problem in Turkey (Güneş, Gürlek, & Sönmez, 2014). Recommendations to prevent medication error include better collaboration between patients and health professionals, wider use of information technology, and ensuring that all employees take an active part in developing and improving policies and procedures (Aspden et al., 2007). In this context, surveying the opinions and reporting behaviour of nurses with respect to medication errors is necessary to learn more about why and how such errors occur. This in turn may provide important insights that can inform the development of guidelines and procedures for preventing medication errors.

The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) defines medication error as any preventable event that may cause or lead to inappropriate use of medication or patient harm while the medication is in the control of the health care professional, patient, or consumer (NCCMERP, 2016). The Institute of Medicine (IOM) has also developed a universal definition of medication error. While the NCCMERP definition focusses on the severity of errors of *commission* and their effects, the IOM widened the scope of the definition to include *omission* (IOM 2001; NCCMERP, 2016). Furthermore, Human Error theory identifies the sources of errors as arising from a combination of latent conditions and active failures (Reason, 2004). When the pre-conditions for unsafe acts, lack of supervision and organizational deficits align, errors occur (Reason, 2000). In the present study, elements of all of these definitions have been taken into consideration to encompass the variety of the factors associated with medication errors.

Related Literature

Medication errors occur in each phase/stage of the medication process (Lisby, Nielsen, Brock, & Mainz, 2010; WHO, 2017), and slips, lapses and knowledge-based mistakes are common forms of medication error (Keers, Williams, Cooke, & Ashcroft, 2013). They happen when error-producing circumstances are present such as poor communication, heavy workloads, interruptions/distractions and lack of knowledge about medications (Brady, Malone, & Fleming, 2009; Keers et al., 2013). Nurses have responsibility for interacting with patients and health care professionals to deliver and coordinate care and so play a crucial role in both making and preventing medication errors. To maintain patient safety adequate knowledge is required to assess the risks inherent in the medication process (Smeulers, Onderwater, Zwieten, & Vermeulen, 2014), and effective reporting systems are essential (Brady et al., 2009). The analysis of reported medication errors helps identify the causes of errors and how they may be prevented (WHO, 2014). However, it has been found that employees are reluctant to report errors because they fear punitive management action in response, fear being blamed, excluded and labelled by colleagues for the error, and are concerned reporting an error may jeopardize their continued employment (Vrbnjak, Denieffe, O'Gorman, & Pajnkihar, 2016). Concerns about being regarded as incompetent by peers, not recognizing an incident to be an error, and lack of time are other issues that prevent error reporting (Vrbnjak et al., 2016). In order to provide patients with safe healthcare services, a working environment where the reporting system encourages staff to report medication errors without any fear or hesitation and is not punitive is required (Kim, Kwon, Kim, & Cho, 2011). However, evidence concerning nurses' experiences and perspectives regarding medication error practices is limited and further work is needed to examine this important area of practice (Smeulers et al., 2014), particularly in Turkey.

The Turkish context

In Turkey, the Ministry of Health serves as the quality inspectorate for the university hospitals. In 2011 it issued a *Performance and Quality of Health* directive and medication errors are now included in the list of quality breaches to be reported to the ministry (Turkish Ministry of Health, 2011). This requires the active participation of health care staff and an organizational culture that supports the development of knowledge and attitudes that will enable staff to agree clear definitions of errors and increase adherence to reporting processes (Brady et al., 2009; Lisby et al., 2010). Accurate identification and reporting of medication errors by nurses is essential if risks to patient safety are to be reduced (Brasaite, Kaunonen, & Suominen, 2015). In view of this, a study to investigate how nurses working in a Turkish University hospital understand, identify, and report errors was designed. The aim was to explore nurses' perceptions of which cases they identify as errors and the likelihood of their reporting them.

METHODS

Design

An exploratory cross-sectional survey, consistent with the STROBE (von Elm et al., 2007) guidelines for observational studies, was conducted to:

(1) Examine nurses' judgment of a series of 'hypothetical' cases of medication error

(2) Identify the factors that prevent nurses from reporting medication errors.

Setting and Participants

The university hospital where the study was conducted has a 1000 beds, 20 wards, and several other clinical units. Seven hundred and forty-eight nurses work at the hospital and at the time of the study 200 were on holiday or sick leave. The aim of the study was to investigate the perceptions and experiences of ward-based nurses and so a number of specialist services were excluded. These included: Emergency room (34 nurses), operating room (51 nurses), intensive care units (166) and polyclinics (43 nurses). Following these exclusions, using

purposive sampling (Polit & Beck, 2010), 254 nurses were invited to participate in the study. The minimum required sample size was calculated as 135 using the G-Power 3.0.10 program (Institut fűr Experimentelle Psychologie, Heinrich Heine Universität, Dűsseldorf, Germany), with an effect size of 0.35, 0.90 power (1-ß), at the confidence level 95% (α) (Faul, Erdfelder, Lang, & Buchner, 2007).

Instruments

The study instrument is comprised of three parts: the first includes items concerning nurses' socio-demographic and job characteristics (age, gender, level of education, ward type, duration of clinical experience and weekly working hours). The second section includes 18 sample cases of a range of errors (wrong dose, food-drug interaction, similarity of drug names for example – see Table 2). These cases were developed by the researchers to reflect 'typical' medication errors based on a review the literature (Bohomol, Ramos, & D'Innocenzo, 2009; Brady et al., 2009; Dilles, Elseviers, Van Rompaey, Van Bortel, & Stichele, 2011; Hsaio et al., 2010; Joolaee, Hajibabaee, Peyrovi, Haghani, & Bahrani, 2011). Participants were asked to make a judgment on these 'hypothetical' cases and assess whether an error had been made (error identification: "error" or "not an error") and if so, what action should follow ("no reporting", "reporting to the physician", "reporting via hospital incident reporting system"). The third part includes items requiring responses, which indicate nurses' reasons for not reporting errors.

Validity and Reliability

Content validity (Polit & Beck, 2006; 2010) was evaluated by ten experts including experienced nurses, head nurses and nurse academicians. They reviewed the study instrument in terms of its content, comprehensibility and grammar, and recommended minor modifications (shortening the cases, wording changes for example). The revised instrument was reassessed by the panel for comprehensibility, clarity and practicability and found to be appropriate for use. A content validity index (CVI) score was also calculated. First, nursing

experts rated each item for relevance using a four-point scale: 1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant. Second, a CVI score was computed for every item known as I-CVI (the number of experts ratings of 3 or 4 was divided by the number of experts), and finally a CVI was calculated as 0.90 (which is acceptable) as an average of all items (Polit, Beck, & Owen, 2007). To test for face validity, ten nurses completed the questionnaire and confirmed its comprehensibility, clarity, practicability and appropriateness. Reliability was assessed using the split half method. The Spearman-Brown coefficient (Schmidt & Brown, 2014) was calculated as 0.72 when 18 case items were divided into two groups each including nine items, and as 0.83 when the 18 case items were divided as odd items and even items. Reliability coefficients of 0.70 and above are regarded as acceptable for instruments (Griffin-Sobel, 2003). This demonstrates the instrument was 'fit for purpose'.

Data Collection

Data collection took place between April-July 2014. The details of the study were included at the top of the first page of the study instrument and informed the nurses about the nature and scope of the study. Additionally, researchers provided further explanation in person. The researchers visited the wards and distributed the questionnaires by hand in sealed envelopes. The researchers later collected the completed forms, returned in sealed envelopes, in person. In some cases, this was immediately after the initial visit, in others they were collected at various points over five consecutive days following the first visit. The opportunity was taken to remind staff about the survey during daily visits to the wards.

Ethical Considerations

The study was approved by the Non-Invasive Clinical Investigations Evaluation Commission and by the employing institution of three of the authors (Approval Date: 17.04.2014, Approval No: 2014/17-12).

Data Analysis

Statistical analyses were performed using the SPSS Statistics for Windows, version 15.0 (SPSS Inc., Chicago, Ill., USA). The comparisons between the identification of medication errors and the likelihood of error reporting were tested. Descriptive statistics were produced and the chi-square test and Fisher's exact test were used for analysis. The level of significance was set at $p < 0.05$ (Polit & Beck, 2010).

RESULTS

Insert Table 1 about here.

One hundred and thirty-five nurses returned useable questionnaires, a response rate of 53%. The mean age of the nurses was 33.31 years (*SD* = 6.67); the mean duration of their clinical experience was 9.47 years (*SD* = 6.83) and their reported average weekly working time was 44.62 hours (*SD* = 5.33). Almost all of the participants were female (97.8%) and the majority held bachelor degrees (85.9%). Fifty-seven per cent of the respondents worked on the medical wards (Table 1).

Insert Table 2 about here.

The incident that was most frequently identified as an error was the administration of an incorrect dose of medication (Incident 1, 97%). Other incidents that were commonly identified as errors were: administration of medication via the incorrect route (Incident 2, 96.3%), administration of medication that should not have been given to the patient (Incident 3, 96.3% and Incident 4, 94%), and incorrect administration of medication with a similar name to the one prescribed (Incidents 5 and 6, 92.6%). The average percentage of error identification when all cases are included was 81.8% (Table 2).

The incident most of the respondents said they would report to a physician was administering medication that should have been delayed (Incident 12, 68.9%), whereas the incident most respondents stated would involve them using the incident reporting system was administration of medication by the incorrect route (Incident 2, 68.1%). Most of the nurses

did not think it was necessary to report lack of monitoring the patient while taking his/her medication as an error (Incident 14, 87.3%). The average reporting percentages accounted for 46.7% for no-reporting, 49.4% for reporting to the physician, and 29% using the incident reporting system (Table 2).

Insert Table 3 about here.

Chi-square analysis showed statistically significant differences between the identification and reporting of eight sample cases as errors as shown in Table 3 ($p < 0.05$).

Insert Table 4 about here.

The most commonly given reason for not reporting medication errors was "afraid/hesitant to be seen as incompetent by peers" at 71.9%, followed by "afraid/hesitant of being punished by managers" at 66.7% and "unaware a mistake has been made" at 66% (Table 4).

DISCUSSION

Reporting Rates

In response to the cases, approximately half of the nurses stated they would not report errors, despite the average error identification rate being 81.8% (Table 2). This finding confirms earlier work in which it was found that the mean reporting was 1.3, whereas the average of medication errors recalled by the nurses was 19.5 per nurse (Joolaee et al., 2011). In other studies, reporting rates were also low, with only 19% of medication errors reported via the reporting system (Yung, Yu, Chu, Hou, & Tang, 2016) in one, and 28.3% in another (Kim et al., 2011).

The rate of reporting to a physician was higher than the rate of reporting using the incident reporting system in almost all cases (Table 2). The reason nurses preferred reporting errors to the physician might be a desire to resolve problems locally, and as quickly as possible to prevent any harm to the patient, so they try to resolve the incident at the team level to avoid escalation and involvement of senior staff. Reluctance on the part of nurses to make

independent decisions and act autonomously may also be a partial explanation of this approach.

The rate of identification and reporting of errors that could result in death or injury was higher (Incidences 2, 6, 9, 12), whereas the rate of identification and reporting of errors that nurses believed to be system based and/or would cause no serious harm to the patient was lower (Incidences 11, 15, 16, 18) (Table 3). This has also been found in earlier work (see Espin, Griffiths, Wilson, & Lingard, 2010; Kreckler, Catchpole, McCulloch, & Handa, 2009; Okuyama, Sasaki, & Kanda, 2010 for example).

This is an issue of concern because if errors are not reported, patient safety is compromised. Setting this work in the context of recent developments in patient safety research (Braithwaite, Wears, & Hollnagel, 2016), this discrepancy can be interpreted as a conflict between "work as imagined" and "work as done" (Deutsch, 2017). Health care, organisations are replete with policies, protocols and systems which Braithwaite et al. (2016) term "work as imagined", which refers to the policy, targets, and compliance regarding standards of service. Whilst this has been successful in some areas, despite extensive efforts by many committed and well-intentioned policy-makers, managers, clinicians, researchers and patient groups, improvements in safety have been confined to a few celebrated examples (Mannion & Braithwaite, 2017). In view of this, it has been recommended that greater attention to "work as done" is needed if the underlying reasons for unsafe care are to be understood and addressed. In this way, effort can be directed to reducing the gap between work as imagined and work as done and thus improve safety. This involves demonstrating how good care is delivered in challenging/harsh/difficult/varying conditions/circumstances rather than focusing on things going wrong, the basis for most improvement initiative (Braithwaite, Wears, & Hollnagel, 2015; 2016). However, with regard to nursing, if this is to be achieved in respect of medication errors the barriers to reporting and the negative consequences of reporting must first be understood.

Reasons for not reporting errors

In the present study, the most common reasons given for not reporting medication errors were "afraid/hesitant to be seen as incompetent by peers," "afraid/hesitant of being punished by managers," and "unaware a mistake has been made" (Table 4). Fear, being chastised, being regarded as incompetent by peers, and beliefs that the error is not significant enough to report, have been found to be barriers to reporting errors (Vrbnjak et al., 2016). Although there is a reporting mechanism in the hospital where the study was conducted, nurses were reluctant to report errors for the reasons noted earlier. This suggests a strategy is needed to develop a more 'user-friendly' system, which supports rather than penalizes staff. Further training is also required to enable staff to recognize errors and be reassured that error reports will be welcomed and supported, not punished.

The finding that some incidents were not identified as errors by the respondents (Table 2) is perhaps an outcome of the absence of an agreed or standardized definition of medication error in the hospital or among the nursing staff. This suggests that the nurses are not adequately informed about reporting systems, the incidents to be reported are not clear to them; the reporting system is not conducive to ease of reporting and so reporting remains inadequate. Ineffective use of the reporting systems prevents learning from previous errors and may have a negative impact on the learning culture.

Limitations

A response rate of 53% was achieved which was sufficient for statistical analysis, however there were some limitations of the study. It was conducted in one hospital, and involved only nurses. However, this was because the key role of nurses in medications management was a central focus of the study. The investigation of nurses' judgment on 'hypothetical' cases and not on real practice should also be taken into consideration when interpreting the findings.

CONCLUSION

Nurses' fear of the consequences of reporting a medication error may compromise patient safety. However, despite this nurses reported that they would identify and report serious medication errors. It was most likely that such reports would be made to physicians. The incident that most of the nurses felt did not need to be reported was the failure to monitor the patient while taking he/she was taking his/her medication.

RELEVANCE TO CLINICAL PRACTICE

A common agreed definition of what constitutes a medication error should be developed in Turkish hospitals and training provided for nurses to enable them to recognize and report errors accurately. This will help ensure prevention of harm and improvements in patient safety. In order to eliminate the barriers to error reporting, team members and managers should avoid a punitive response, and a no-blame voluntary user-friendly reporting system should be established, and strategies formulated to increase the rate of reporting errors that are currently under-reported. Nurse managers can take a leading role in introducing the necessary changes. Identification and reporting of errors by staff will contribute to the development of a safe working environment and a patient safety culture (Vincent & Amalberti, 2016).

This study demonstrates the need for healthcare managers to appreciate the complex nature of the health care systems and be aware of Reason's model to analyze and understand the factors associated with medication errors. Use of Braithwaite et al.'s (2017) work on complexity theory would also be beneficial in building understanding of the challenges of increasing patient safety in hospitals and highlight the potential of learning from experience of when things go well, not only when there are system failures.

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Impact Statement/Summary Box

What does this paper contribute to the wider global clinical community?

- This study demonstrates the need for nurses to appreciate the complex nature of the health care systems and understand the nature and causes of medication errors.
- The clinical envrionment needs to be made more receptive to nurses reporting medication errors.
- Nurses should be encouraged and supported to report medication errors.
- If patient safety is to be maintained it is important to learn from experience when things go well, as well as when there are system failures.