Article

Perceived Occurrence of Medication Administration Errors among Nursing Students at a Higher Education Institution in Western Cape, South Africa

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Abstract

The aim of the study was to determine awareness and perception of trends in the occurrence of medication administration errors (MAEs) among nursing students. A descriptive quantitative design was employed on two consecutive days and a self-administrative questionnaire was used to collect data. The validity and reliability of this instrument were tested and established by a pilot study. Responses were collected from 291 nursing students at a higher education institution (HEI) in Western Cape, South Africa. Non-probability proportional quota sampling was used and the data was analysed with IBM SPSS® software. The data was presented in graphs, percentages, means and standard deviation, while inferential statistics was applied. The findings of the study revealed that 85.2% of the respondents were aware of MAE occurrence. There was no significant difference between the respondents' awareness of MAE occurrence and their year of the study. The significant (p-value < 0.05) subscale for the causes of MAE occurrence was the physician communication subscale (p-value < 0.001). Moreover, the respondents perceived the top item to be using abbreviations instead of writing out the prescription orders completely (p-value < 0.001, mean = 4.85). The respondents disagreed that the pharmacy related subscale and its items were causes of MAE occurrence. In conclusion, the nursing students who participated in the study were aware of MAE occurrence

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during their practice time. The causes of these errors as indicated by the respondents are mentioned in the article. Therefore, the healthcare institutions as well as HEIs must focus on treating these causes in order to reduce MAE occurrence and enhance patient safety.

Keywords: medication errors; medication administration errors; nursing students

Introduction and Background

According to the World Health Organization (WHO 2011), the risk of being harmed during the rendering of healthcare is much greater than the risk of being harmed by air travel or nuclear plants, which are sources usually perceived as being considerably dangerous (Iliffe n.d.). Errors that occur during the delivering of healthcare lead to about 7 000 deaths annually in the United States (US) (WHO 2011, 243), while in the United Kingdom these errors are the main cause of 712 deaths every year and are indicated as a contributory factor in 1 700 to 22 300 deaths per year (Elliott et al. 2018, 4). The number of deaths is an average based on the incidence of medication errors (MEs) worldwide, but there are no clear statistics from the developed countries (Haw, Stubbs and Dickens 2014, 798; WHO 2011, 243). However, it is important to stress that there are differences between the developed and developing countries (Iliffe n.d.).

The medication administration process consists of five steps, namely: (1) prescribing/ordering the medication; (2) transcribing and verifying the order; (3) preparing the medication and delivering it; (4) administering the medication by the healthcare workers; and (5) monitoring and documenting the medication. Medication errors may occur at any time during one or more of these steps (Gordon 2014, 18) and MEs are classified according to prescription, transcription, dispensing, and administration errors (Radley et al. 2013, 471). An error at the administration phase is very critical because it is directly harmful to the patient and the possibility to correct it, is limited. Understanding how and why medication administration errors (MAEs) occur, represents the key to the intervention that minimises MAEs (Keers et al. 2013a, 1046).

Wakefield, Uden-Holman and Wakefield (2005, 475–489) classify the causes of MAEs into four main groups, namely, MAEs caused by factors related to pharmacies, manufacturers, physicians, and nurses. Wakefield, Uden-Holman and Wakefield (2005, 475–489) developed a questionnaire based on the four main groups to investigate nurses' perceptions regarding MAEs. This questionnaire served as a baseline for further research regarding the causes of MAEs.

Nurses are responsible for administering medications to various in- and outpatients daily. Hence, the chance of committing errors during this process is probable (Jones and Treiber 2010, 240). So, the prevention of MAEs and ensuring patient safety are

important roles of the nurse, as they are part of the medication administration process (Weant, Bailey and Baker 2014, 47).

Pryce-Miller and Emanuel (2010, 8) argue that nursing education institutions (NEIs) should create a learning environment where experienced lecturers and professional registered nurses conduct workshops for undergraduate nurses on the occurrence of MAEs. Nursing students' awareness of MAEs and patient safety is enhanced by early exposure to the complex nature of the medication administration process. This should be taught and practised in the clinical skills laboratory as continuous practice assists nurses to improve patient outcomes (Ofosu and Jarrett 2015, 12). Practical training should be fundamental for nursing students in order to facilitate a deeper understanding of MAEs and their impact on patient safety (Hammoudi, Ismaile and Yahya 2017, 1038). Although lecturers spend time and effort on teaching students the protocols for safe medication administration, students still commit MAEs (Valdez, De Guzman and Escolar-Chua 2013, 222). In the literature, registered nurses are the focus of MAEs, while nursing students' MAEs remain unreported (Valdez, De Guzman and Escolar-Chua 2013, 222). Therefore, the current study was conducted among the nursing students at an HEI in Western Cape, South Africa to determine the main factors that influence the occurrence of MAEs in order to enhance the patients' safety and supress the occurrence of these errors.

Problem Statement

Lack of the knowledge of MAEs has dire consequences for patients, nurses and healthcare institutions. It severely compromises patient safety and may lead to disability or even death. Therefore, it is imperative that nurses receive adequate training to administer medication correctly to patients.

Aim and Objectives of the Study

The aim of the study was to determine the awareness and perception of the occurrence and reporting of MAEs among nursing students at an HEI in Western Cape, South Africa.

The objectives of the study were to:

- determine the level of awareness of the occurrence and reporting of MAEs;
- determine the factors related to MAE occurrence as experienced by undergraduate nursing students at an HEI in Western Cape in the units at the healthcare facilities where undergraduate students are placed.

Research Methodology

Research Design

A descriptive quantitative design was used in the study that was conducted among the nursing students on 2 and 3 April 2017. Descriptive research is aimed at casting light on current issues or problems through a process of data collection that enables researchers to describe the situation more completely, in this case the occurrence and reporting of MAEs as perceived by nursing students at an HEI in Western Cape.

Research Setting

The study was carried out at an HEI in Western Cape, South Africa. The nursing department of the HEI has three sites where the basic undergraduate training programme is offered. The campus included in the study for data collection has the largest number of undergraduate students compared with the other two sites, which are situated in two rural communities.

Population and Sampling

The target population for the study was approximately 563 second-, third- and fourth-year undergraduate nursing students registered for the undergraduate nursing degree at an HEI in Western Cape. All the students enrolled for the study programme were approached to participate in the study.

Non-probability proportional quota sampling was used in the study. The purpose of quota sampling is to draw a sample that has the same proportions or characteristics as the whole population. With this sampling method, the researcher divided the population group into three subgroups (strata) depending on their year of study (second-, third- and fourth-year nursing students). Quota sampling with convenience technique was then used to collect the data to achieve the desired sample size.

Sample Size

The researcher used the Sample Size Calculator (2016) to calculate the sample size, a confidence level of 95%, and a confidence interval of 4. Moreover, the sample size was calculated manually. Based on that, the sample size was estimated as 291, comprising second-, third- and fourth-year undergraduate nursing students.

Data Collection

The present study used a self-administered questionnaire for the data collection. Maintaining the quota distribution, the students were invited to participate in the study, and 300 consent forms were distributed. The researcher and his supervisor met with all

the students, and the lecturer in each class introduced the researcher to the prospective respondents. The data was collected from the population over two days on 2 and 3 April 2017. On the first day, data was collected from the second-year nursing students, then on the following day, data was collected from the third- and fourth-year nursing students. Three hundred consent forms were signed and 300 questionnaires distributed to the respondents. Nine of the returned questionnaires were excluded because they were incomplete. However, the sample size was achieved.

Before data collection commenced, the purpose and aims of the study were explained to the respondents. A written information sheet was also given to all respondents and attached to the consent form. The respondents were made aware that they had the right to withdraw from the study, even after they had provided informed consent, without being victimised or with any negative consequences. The respondents were given 15 minutes (as determined by the pilot study) to complete the questionnaire after reading it and having it explained by the researcher and his supervisor. All of the respondents returned their questionnaire before the end of 15 minutes.

The questionnaires were collected after completion and coded anonymously by the researcher as second year (2.000), third year (3.000) and fourth year (4.000). After extraction of the data, the completed questionnaires were stored safely in a locked safe in the nursing department at the HEI where the researcher is a registered student.

Research Instrument

The data collection instrument in the present study consisted of a self-administered questionnaire. The questionnaire was used to determine the perceived occurrence of MAEs among the nursing students.

The questionnaire for the study was divided into three sections in alphabetical order. Parts A and B were developed by the researcher. Part C had been used in previous studies and developed by Dr Bonnie Wakefield of the Sinclair School of Nursing at the University of Missouri, US. Permission to use the questionnaire was obtained from the developer.

Part A collected the respondents' demographic characteristics (age, gender, marital status and year of study) and comprised items 1, 2, 3 and 4. Part B outlined the respondents' awareness of the occurrence and reporting of MAEs and comprised Item 5. Part C outlined the causes of MAEs and comprised 20 items on MAE-related causes with a 6-point Likert scale (1 = strongly disagree to 6 = strongly agree). This part of the questionnaire was further classified into four subscales: physician communication causes (6 items: questions 10, 11, 12, 13, 14 and 18); medication package causes (3

items: questions 7, 8 and 9); pharmacy related causes (3 items: questions 15, 16 and 17); and nurse related causes (8 items: questions 19, 20, 21, 22, 23, 24, 25 and 26).

Pilot Study

A pilot study was employed in the study and conducted at one campus of the HEI under study. The pilot study was used to test the various components of the questionnaire in terms of the validity and reliability of the instruments to the nursing students. The pre-testing questionnaire was conducted on one day during the data collection period. The respondents in the pilot study included 15 second-, third- and fourth-year nursing students who met the inclusion criteria for the study. The respondents of the pilot study were not included in the sample size of the study.

Consent forms with the information sheet about the study were distributed to the respondents prior to the questionnaire sheets. Agreement to participate in the pilot study was obtained using the consent form. The researcher explained to the respondents the purpose of the study and the contents of the informed consent. The researcher informed the respondents that they were free to participate in the study or to withdraw at any time even after completion of the consent form. A total of 15 questionnaires were distributed. All the distributed questionnaires were returned. The respondents indicated that the questionnaire was clear, easy to read and easily understood. The questionnaires took approximately 10–15 minutes to complete. The results of the pilot study indicated that no corrections or adjustments to the existing instrument were necessary. The Cronbach's alpha for the whole instrument was 0.83; 0.84 for the medication package subscale; 0.85 for the physician communication subscale; 0.89 for the pharmacy related subscale; and 0.81 for the nurse related subscale.

Data Analysis

The collected data was coded and tabulated. The Statistical Package for Social Sciences (SPSS Version 24) was used to analyse the data. Microsoft Excel was utilised for graphical presentation such as line and bar charts. The analysis was performed under the supervision of, and with consultation and support from, the statistician at the HEI where the research was done. In the study, descriptive and inferential statistics were conducted to analyse the collected data.

Ethical Considerations

Permission for the study was obtained and renewed annually from the Research Ethics Committee of the Faculty of Health and Wellness Sciences at the Cape Peninsula University of Technology (CPUT) (reference number: CPUT/HW–REC 2016/H23). An informed consent was obtained from each respondent. Anonymity and confidentiality were assured. The respondents' names were not recorded, and the data was numerically

coded. Only the researcher, his supervisor, co-supervisor, and the statistician had access to the data.

Results

Demographic Characteristics

In the current study, 290 respondents indicated their gender. Most of the respondents (81.3%, *n* = 236) were female. The majority of the respondents (97.9%, *n* = 285) responded to the age item and the mean of their ages was 23.49, with a minimum age of 19 years and a maximum age of 43 years. Most of the respondents (81.7%, *n* = 233) were 25 years or younger. The majority of the respondents (88.7%, *n* = 258) reported their status as single. The distribution of the respondents was similar over the three years of study, with 110 (37.8%) in second year, 93 (32.0%) in third year and 88 (30.2%) in fourth year.

Respondents' Awareness of MAE Occurrence across Each Year of Study

The respondents' year of study was the only demographic variable that showed a difference with the respondents' awareness of MAE occurrence. As the study related to the nursing students' awareness of MAE occurrence, the researcher checked if there was any relation between the students' awareness and their year of study.

Table 1: Respondents' awareness of MAE occurrence across each year of study

	Are you aware of any medication administration errors in the health services where you are placed?		
Year of study	**No**	**Yes**	**Total**
Second year	16 (14.7%)	93 (85.3%)	109
Third year	18 (19.4%)	75 (80.6%)	93
Fourth year	9 (10.2%)	79 (89.8%)	88
Total	**43**	**247**	**290**

As presented in Table 1, the respondents' awareness of MAE occurrence in each year of their study is highlighted. The majority (*n* = 290) responded to the question, except for one who did not answer this question.

A similar proportion of the respondents were aware of MAE occurrence during their clinical placements in the three years of study. The highest percentage of awareness of MAE occurrence among the respondents was noted among the fourth-year students (89.8%, *n* = 79).

Relationship between the Respondents' Year of Study and Their Awareness of MAE Occurrence

Table 2 shows the result of the chi-square test to determine if there was a significant difference between the respondents' year of study and their awareness of MAE occurrence during their practice time.

Table 2: Results of chi-square tests for the respondents' awareness of MAE occurrence across years of study

Chi-square tests			
	Value	**Df**	**Asymptotic significance (2–sided)**
Pearson chi-square	2.986*	2	0.225
Likelihood ratio	3.027	2	0.220
Linear-by-linear association	0.610	1	0.435
No. of valid cases	290		

Note:

*0 cells (0.0%) have an expected count less than 5. The minimum expected count is 13.05.

There was no significant difference between the respondents' year of study and their awareness of MAE occurrence as indicated by the *p*-value in Table 2. In other words, the respondents' awareness of MAE occurrence was independent of their year of study.

Causes of MAE Occurrence

Subscales of Respondents' Perceptions of the Causes of MAE Occurrence

Figure 1 shows the subscales of the respondents' perceptions of the causes of MAE occurrence.

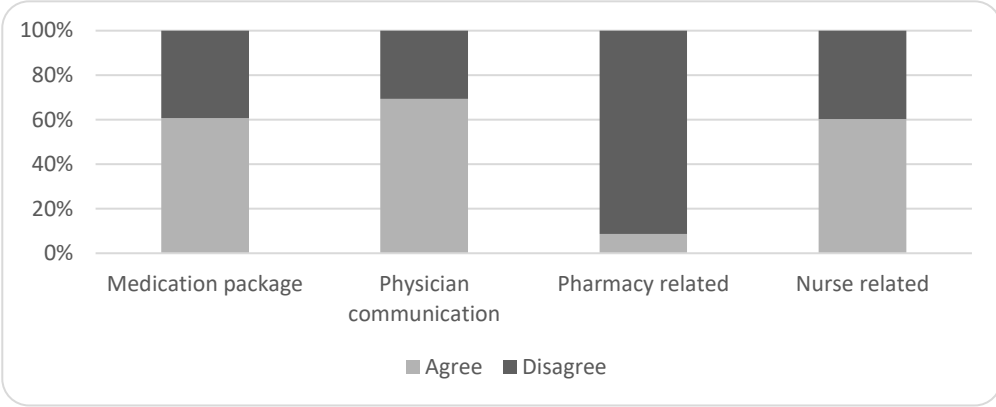

Figure 1: Subscales of the respondents' perceptions of the causes of MAE occurrence

The physician communication subscale was ranked at the top subscale and was agreed on by over two-thirds of the respondents. Moreover, the respondents indicated that the medication package and nurse related subscales were at the same level of agreement.

Significant Subscales of the Causes of MAE Occurrence

Table 3 presents the results of one sample *t*–test for the four main subscales of the causes of MAE occurrence. All the subscales were significantly different from the neutral level of the 6-point Likert scale (3.5). The observed point was the pharmacy related subscale which was significantly lower than the neutral level. This is an indication that this subscale was not a significant cause of MAE occurrence among the respondents. The other three subscales were significantly higher than the neutral level of the 6-point Likert scale and thus reflected a significant cause of MAE occurrence.

Table 3: Significant subscales of the causes of MAE occurrence

One-sample *t*-test						
	Test value = 3.5					
					95% confidence interval of the difference	
Subscale	***t***	**Df**	**Sig. (2–tailed)**	**Mean difference**	**Lower**	**Upper**

Physician communication	12.459	290	< 0.001	0.72125	0.6073	0.8352
Medication package	3.193	290	0.002	0.24914	0.0956	0.4027
Pharmacy related	–28.445	290	< 0.001	–1.73654	–1.8567	–1.6164
Nurse related	6.537	290	< 0.001	0.35880	0.2508	0.4668

Significant Difference Items of the Causes of MAE Occurrence

Table 4 presents the results of the one-sample *t*-test for the items.

Table 4: The significant causes of MAE occurrence

One-sample *t*-test						
	Test value = 3.5					
					95% confidence interval of the difference	
Item	**Mean**	**Std. deviation**	**Std. error mean**	***t***	**Df**	**Sig. (2–tailed)**
The names of many medications are similar.	3.50	1.611	0.095	–0.036	289	0.971
Different medications look alike.	3.99	1.667	0.098	4.976	290	< 0.001
The packaging of many medications is similar.	3.76	1.657	0.097	2.644	288	0.009
Physicians' medication orders are not legible.	4.65	1.650	0.097	11.819	288	< 0.001
Physicians' medication orders are not clear.	4.67	1.514	0.089	13.151	289	< 0.001
Physicians change orders frequently.	3.88	1.448	0.085	4.501	289	< 0.001
Abbreviations are used instead of writing the orders out completely.	4.85	1.554	0.091	14.840	290	< 0.001
Verbal orders are used instead of written orders.	2.97	1.733	0.102	–5.253	289	< 0.001
Pharmacy delivers incorrect doses to this unit.	1.90	1.226	0.072	–22.232	289	< 0.001
Pharmacy does not prepare the medication correctly.	1.72	1.116	0.065	–27.247	290	< 0.001
Pharmacy does not label the medication correctly.	1.68	1.112	0.065	–27.929	289	< 0.001

Poor communication between nurses and physicians or between the nursing student and the supervisor.	4.32	1.464	0.086	9.589	290	< 0.001
Many patients are on the same or similar medications.	4.51	1.446	0.085	11.936	290	< 0.001
On this unit, there is no easy way to look up information on medications.	3.40	1.758	0.103	–0.984	290	0.326
Nurses or the nursing students get pulled between teams and from other units.	3.84	1.688	0.099	3.432	288	0.001
Nurses or the nursing students do not adhere to the approved medication administration procedure.	3.07	1.686	0.099	–4.319	289	< 0.001
Nurses or the nursing students are interrupted while administering medications to perform other duties.	4.63	1.619	0.095	11.896	290	< 0.001
Unit staffing levels are inadequate.	4.24	1.600	0.094	7.929	289	< 0.001
All medications for one team of patients cannot be passed within an accepted time frame.	3.99	1.651	0.097	5.014	289	< 0.001
Nurse or the nursing student is unaware of a known allergy.	3.19	1.789	0.105	–2.999	290	0.003

The means of 12 of the 20 mentioned causes of MAE occurrence were significantly higher than the neutral mean of the 6-point Likert scale (3.5). The means of these causes ranged between 3.76 (+1.657) and 4.85 (+1.554). The top three significant causes with the highest means were the use of abbreviations (4.85±1.554), unclear physician orders (4.67±1.514), and illegible physician orders (4.65±1.619). Similar packaging of many medications ranked at the bottom of the significant causes with a mean of (3.76±1.657).

Discussion

The current study aimed to determine nursing students' awareness of MAE occurrence and what they perceived to be the causes of MAE occurrence during their practice time. The study found most of the respondents were aware of MAE occurrence during their practice. This finding has been reported worldwide. In the emergency department of the Imam Khomeini Hospital in Iran, less than half of the nurses had committed MEs

(Ehsani et al. 2013, 1). Another study conducted by Feleke, Mulatu and Yesmaw (2015) indicated that MAEs occurred in about half of administered medication among nurses in Ethiopia. According to Ojerinde and Adejumo (2014, 22), more than half of the nurses in Nigeria were involved in ME occurrence. These errors occurred because of a shortage of nurses, insufficient pharmacological information, nurses' interruption during medication administration, physician communication causes, nurse related causes, pharmacy related causes, and medication package causes (Aboshaiqah 2014, 63; Al-Youssif, Mohamed and Mohamed 2013, 61; Blignaut 2015, 162; Ehsani et al. 2013, 1; Hanna 2014, 41; Wakefield, Uden-Holman and Wakefield 2005, 484).

Four subscales for MAE occurrence were mentioned in the current study. Physician communication represented the main subscale of the causes of MAE occurrence. Moreover, the result of the one-sample *t*-test reflected the fact that this subscale was a significant cause of MAEs as perceived by the respondents. This finding is supported Aboshaiqah (2014, 63), who reported the physician communication subscale as the main cause of MAE occurrence. Moreover, the physician communication subscale was reported by other studies as the second cause (Hanna 2014, 41), or the fourth cause (Al-Youssif, Mohamed and Mohamed 2013, 61) of MAE occurrence. Furthermore, other studies noted some cases related to physician communication as a reason for MAE occurrence. Blignaut (2015, 162–182) noted communication lapses between nurses and physicians as a cause of MAE occurrence among the respondents in medical and surgical units in Gauteng, South Africa. Likewise, there are other South African studies that have noted the lack of communication between nurses and physicians as an important cause of MAE occurrence (Du Preez 2016, 87; Hill 2016, 81–92). Nurse-physician communication represented the baseline for patient safety. Hence, communication between physician and nurse is of utmost importance, as it could have detrimental effects on the patients' safety (Holmström 2017, 96; Mohmmed and El-Said Hassane El-sol 2017, 83).

The respondents indicated that the medication package subscale was the second cause of MAE occurrence. The result of the one-sample *t*-test reflected the fact that the respondents perceived that this subscale was a significant cause of MAE occurrence. This finding concurs with that of Aboshaiqah (2014, 66), who reported that nurses in Saudi Arabia agreed slightly with this subscale being a cause of MAE occurrence. However, Hanna (2014, 41) and Al-Youssif, Mohamed and Mohamed (2013, 65) reported this subscale as the main cause of MAE occurrence in their studies. It is important that all medication should be clearly designed and marked in order to distinguish between the various medication packages. Applying the barcode technique to mark all medication differently could play an important role in facilitating the selection and administration of the correct medicine (Alotaibi and Federico 2017; 1177; Blignaut 2015, 251; Keers et al. 2013b, 253). Furthermore, the nurse should take the

medication package to the patient's bedside and open it just before administering the medication (Al-Youssif, Mohamed and Mohamed 2013, 65).

The nurse related subscale was cited as the third cause of MAE occurrence. Moreover, the result of the one-sample *t*-test confirmed that this subscale was a significant cause of MAEs as perceived by the respondents. This finding is supported by Aboshaiqah (2014, 66), who indicated that nurses in Saudi Arabia agreed slightly with the nurse related subscale being a cause of MAE occurrence. Other studies reported the nurse related subscale as the fourth (Al-Youssif, Mohamed and Mohamed 2013, 61) or last (Hanna 2014, 41) cause of MAE occurrence. In South Africa, the patient-nurse ratio, work overload, inadequate staffing levels, and nurses being interrupted while administering medication were noted as contributing factors by professional nurses and medication administrators (Blignaut 2015, 162; Du Preez 2016, 46–57; Hill 2016, 71–75). These issues could be minimised by increasing staffing levels and providing a safe medication preparation area with a "No-Talk" sign (Feleke, Mulatu and Yesmaw 2015, 1; Mohmmed and El-Said Hassane El-sol 2017, 84). A continuous educational development programme should be provided for nurses to raise their awareness of the effects of interruption during medication administration on patient safety (Feil 2013, 6–8).

The respondents disagreed that the pharmacy related subscale was a cause of MAE occurrence. Furthermore, the result of the one-sample *t*-test confirmed that this subscale was not a significant cause of MAE occurrence. This finding is supported by Al-Youssif, Mohamed and Mohamed (2013, 57) and Aboshaiqah (2014, 66) who noted this subscale as the least cause of MAE occurrence. Moreover, Aboshaiqah (2014, 66) and Hanna (2014, 41) indicated that the nurses disagreed slightly with this subscale as a cause of MAE occurrence. Likewise, Hill (2016, 70) reported that 58.05% of South African nurses indicated that MAEs rarely occurred owing to incorrect dispensing of medication by the pharmacy. Regular courses for nurses, physicians and pharmacists with regard to medication management and calculation play an important role in mitigating MAE occurrence and enhancing patient safety (Du Preez 2016, 99; Feleke, Mulatu and Yesmaw 2015, 7).

The use of abbreviations was perceived as the main cause contributing to the occurrence of MAEs. This reason was cited as the first significant cause of MAE occurrence in the current study. This finding is supported by Blignaut (2015, 161), who reported that 83.2% of South Africa medication administrators mentioned this as a risk for MAE occurrence. Al-Youssif, Mohamed and Mohamed (2013, 66) noted the use of abbreviations as the second reason for MAE occurrence as indicated by nurses in Saudi Arabia. Moreover, many international studies have confirmed the use of abbreviations as an important cause of MAE occurrence (Aboshaiqah 2014, 65; Hanna 2014, 41;

Valdez, De Guzman and Escolar-Chua 2013, 222). This information is useful to healthcare institutions in avoiding the use of abbreviations and encouraging physicians to write orders clearly and legibly (Al-Youssif, Mohamed and Mohamed 2013, 66; Du Preez 2016, 98).

The result of the one-sample *t*-test showed that unclear physician orders were the second significant cause of MAE occurrence. Similarly, Hanna (2014, 41) mentioned unclear physician orders as the second cause of MAE occurrence as indicated by nurses in the US. However, according to Abaoshaiqah (2014, 65), only 25% of nurses in Saudi Arabia mentioned it as a cause of MAE occurrence. When an order is not clear, it could lead to misinterpretation which could compromise patient safety. This information could facilitate the development of new techniques, such as electronic orders and the use of barcodes for prescribing orders, to avoid or mitigate the occurrence of MAEs (Alotaibi and Federico 2017, 1177; Blignaut 2015, 251).

Recommendations

Based on the findings, it is recommended that interpersonal skills and communication among nurses and physicians be enhanced in order to discuss the causes of MAE occurrence openly; that interruption during medication administration should be eliminated with a no-distraction area and use no-talk signs to alert others during the medication administration time; that the staff level should be increased and the nurse educator/supervisor should be available to nursing students during their practice time, so they will not depend on the nurses; and that students should be exposed to more simulation practice in this regard in the onsite clinical laboratories at NEIs under the supervision of well-trained clinical mentors/supervisors.

Limitations of the Study

The HEI where the study took place is one of three HEIs that offer undergraduate nursing training in Western Cape, with four campuses. Since the study was only conducted on one of its campuses, the results are not generalisable. Also, a self-reporting method was used in the study that might introduce some bias. However, the research was conducted at the largest campus with the most students enrolled at that institution. Furthermore, the HEI has a large number of students similar to its counterparts. Moreover, the target sample for the study was achieved. Furthermore, both the researcher and his supervisor were available during questionnaire distribution to clarify any questions from the respondents.

Conclusion

In conclusion, the study findings revealed that most of the respondents were aware of MAE occurrence during their practice time. There was no significant difference between the respondents' awareness of MAE occurrence and their year of study. Four main subscales for the causes of MAE occurrence were mentioned in the study; however, the respondents agreed with the medication package, physician communication and nurse related subscales as causes of MAE occurrence, while they disagreed with the pharmacy related subscale as a cause of MAE occurrence. The top items for MAE occurrence as perceived by the respondents in the current study were using abbreviations instead of writing out the prescription orders completely and unclear physician orders. The respondents perceived incorrect medication preparation by the pharmacy to be the most disagreed item as a cause of MAE occurrence.

MAEs are a problem worldwide and it are a threat to the patients' lives. Therefore, the causes of these errors must be discovered and treated among the nursing students, as well as the graduated nurses, to reduce the occurrence of these errors. This requires cooperation between the education institutions, healthcare institutions, and the healthcare workers along with a commitment to keep the patients safe.

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