Safe Medication Administration

Madhu Sharma

Abstract

This study was conducted to develop and evaluate effective guidelines on safe medication administration in terms of knowledge and practices of nursing personnel working in paediatric care unit of a selected government hospital of Delhi. The study also explored its acceptability and utility by nursing personnel. Based on Stufflebeams Model, an evaluative experimental research approach was utilised for the study with pre-test post-test control group design. The sample consisted of 60 nursing personnel, 30 each in the experimental group (from medical ward) and control group (from surgical ward) of paediatric care unit. A structured knowledge questionnaire, an observation checklist and structured opinionnaire were utilised for data collection. The content validity of the tools and the guidelines was established by 13 experts. The study revealed that knowledge deficit existed among the nursing personnel regarding safe medication administration. The knowledge score of nursing personnel obtained after administration of guidelines was higher. There was also a higher practice score of nursing personnel after administration of guidelines.

A hospital may be soundly organised, beautifully situated and well equipped, but if the nursing care is not of high quality, the hospital will fall in its responsibilities, said Jean Barret.

Medication administration is often referred to as the "sharp edge" in the medication-use process because errors introduced at the prescribing, dispensing, or transcribing step, if not intercepted, will result in the patient receiving the medication in error. Safe administration of medications is one of the greatest responsibilities of a nurse. To prevent medications errors, the nurses should know the safe medication practices which should be followed during the work place.

"Medicines administration is not solely a mechanistic task to be performed in strict compliance with the written prescription... it requires thought and... professional judgment" (Nursing and Midwifery Council's Standards for Medicine Management).

Literature Review

Raja (2009) found that the most common steps omitted by the nurses were: having a witness during drug administration (94.7%); labelling of medication (88.3%); checking prescription charts against patient's identification immediately before medication administration (84.6%); and visually inspecting patient's identification tag (70.7%). Schmitz (2009) showed that only morphine (95%), heroin (71%) and codeine (75%) were correctly identified as narcotics by many of study participants. Imipramine (34%), diazepam (20%), and phenobarbitone (39%) were wrongly classified as narcotics by many of the nurses. Only 14 percent knew that that the frequency of psychological dependence due to use of morphine for cancer pain was less than 1 percent. Pape et al (2005) using Rapid Cycle Testing provided evidence that protocol checklists improved focus and standardised practice and visible signage also reduced nurses' distraction. Fields & Peterman (2005) concluded that a computerised intravenous medication safety system averts high-risk medication errors and provides actionable data. Paul (2010) stated that poor numeracy skills must be tackled to cut medication errors. Scott J et al (2010) highlighted the effectiveness of drug round tabards (embroidered front and back with "Drug round in progress, please do not disturb") in reducing incidence of medication errors in his study.

Dickinson et al (2010) in a descriptive quantitative study demonstrated that independent double checking (IDC) should be accepted and promoted as one of the best practice in paediatrics. Elganzouri et al (2009) concluded that system challenges faced by nurses during the medication administration process lead to threats to patient safety, work-flow inefficiencies and distractions when focus is most needed to prevent error. Lundergren & Wahren (1999) in a study on 36 nurses concluded that education in evidence-based

H.No. A-361, Gopal Nagar, Najafgarh, New Delhi.

care and handling gives nurses the opportunity to improve their ability to use theoretical knowledge in clinical problems. Nelson NC et al (2005) showed that the targeted educational intervention and monitored feedback yielded measurable improvements in the effective use of the computerised medication charting system and must be an ongoing process. Schneider PJ et al (2006) found that an interactive CD-ROM enabled nurses to apply the information learned to identify errors in medication administration and improved adherence to safe medication administration practices.

Ruth et al (2000) stated that "a fundamental rule for safe drug administration is to never administer an unfamiliar medication". The authors reported that paediatric patients are exposed up to three times the rate of potentially dangerous medication errors as adults. According to Cohen (2000), most common causes of medication errors related to nurses include: lack of knowledge of drug, lack of information about the patient, memory lapses, faulty identity checking, faulty dose checking, inadequate monitoring, etc. Nancy (2001) stated that administration of medications is one of the greatest responsibilities of the nurse. Royal College of Pediatrics and Child Health (2002) stated that the vastus lateralis is the site of choice for children under the age of two, followed by the deltoid site for children two years old and above. According to Nursing and Midwifery Council (2004), administration of medication requires nurses to understand the prescription and to have knowledge of common indications, dosages and side-effects of the medications. Mrayyan et al (2007) concluded that top causes of administration errors by nurses were: confusion by the types and functions of infusion devices. Bevi (2009) emphasised that administration of medication to children requires utmost care from the part of paediatric nurses. Physiological parameters like immature organ system, increased concentration of body water, rapid metabolism of drugs etc. affect drug activity in children.

Reddy et al (2009) conducted a retrospective case study on 500 in-patient records, at a multi-specialty hospital in Gujarat. Percentage of various types of drug events reported were – omission (2.80%), wrong time (1.40%), wrong dose (1.0%), wrong drug (1.0%), unordered drug (0.8%), wrong route (0.2%) and wrong patient (0%). Figure 1 represents a number of adverse medication events found out during the study.

Objectives

The objectives of the study were to: (i) develop guidelines on "safe medication administration" for nursing personnel; (ii) assess and compare the knowledge of nursing personnel and the practices of nursing personnel before and after application of guidelines on safe medication administration; (iii) determine the relationship between knowledge and practices of nursing personnel regarding safe medication administration, after administration of guidelines; (iv) seek association between pre-test knowledge and post-test practice scores and selected factors in terms of: age, sex, professional qualification, total professional experience, professional experience in paediatric care unit, in-service education; and (v) determine the acceptability and utility of guidelines on safe medication administration in opinion of nursing personnel.

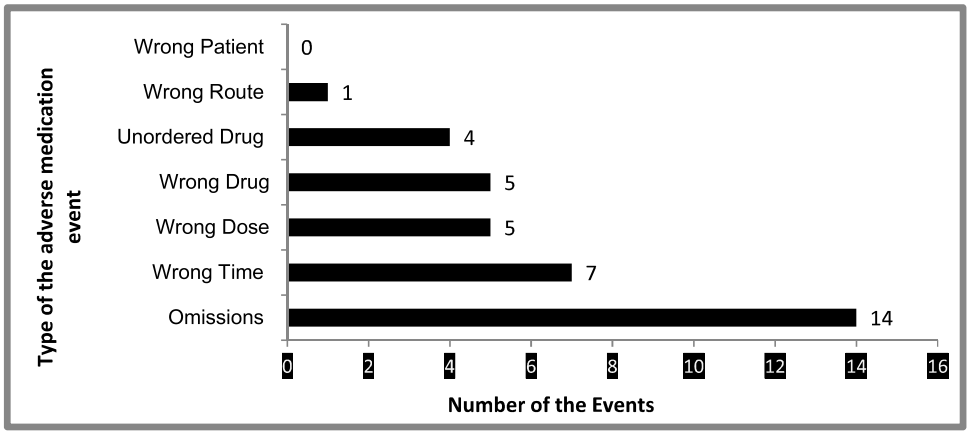
Methodology

An evaluative experimental research approach was adopted for the study with pre-test, post-test control group design. The independent variable of the study was guidelines on, "safe medication administration" and the dependent variables were knowledge and practice scores of the nursing personnel on safe medication administration working in paediatric care unit and acceptability and utility scores of the guidelines on safe medication administration.

The study with pre-test and post-test control group design was conducted in the paediatric care unit of Kalawati Saran Children Hospital, New Delhi from 11 December to 2 January 2012. Nursing personnel working in Medical and Surgical wards of paediatric units. 30 each from experimental and control group were included.

Tools used: Structured questionnaire was used to find out the sample characteristics and knowledge of the nursing

Figure 1: Types of adverse medication events



personnel regarding "safe medication administration". The reliability co-efficient was calculated by KR-20 formula. The value of 'r' was 0.90. Structured observation checklist helped to assess the practice of nursing personnel of paediatric care unit. Inter-rater reliability was computed using rank order correlation, the percentage of agreement was found out to be 100 percent. Reliability was established by Cronbach Alpha formula and the value of 'r' found was 0.89. Guidelines on use of "safe medication administration" were developed based on the criteria checklist. Content validity was established by giving the guidelines to same 13 experts from the field of paediatric. There was 100 percent agreement on the content of the guidelines except a few modifications. The content validity of data collection tools was established by 13 experts from the field of paediatric nursing and was found to be valid.

Analysis and interpretation: Frequency and percentage were computed to describe the sample characteristics. Mean, median and standard deviation (SD) of knowledge and practices scores were computed for testing acceptability and utility of the guidelines. 't' value was employed to find out the significance of difference between mean pre-test and post-test knowledge scores and practice scores. Karl Pearson Coefficient of Correlation used to find out relation between post-test knowledge and post-test practice scores of nursing personnel. Frequency and percentage of responses of nursing personnel were also computed. Chi-square value was computed to find out the association between post-test knowledge, post-test practice scores and selected factors

Results and Discussion

Age group: Majority (43.3%) were between 36-40 years (both in experimental and control group). Majority (95%) were females (96.6% in experimental group and 93.3% in the control group). Majority (71.67%) were senior secondary (66.67% in experimental group and 76.67% in the control group). In experimental group 66.67 percent were General Nurse and Midwife, and only 53.33 percent were GNM. Majority (51.67%) had experience of more than 16 years (56.67% in experimental group and 46.67% in the control group). Majority (63.33%) were having more than 10 years experience in paediatric care units (experimental group - 66.67%, control group - 60%). Medical ward (50%) comprised the experimental group and surgical ward (50%) comprised the control group. Majority (56.66% in experimental group and 73.33% in control group) had not attended any in-service education on "safe medication administration".

Changes in knowledge scores of nursing personnel

Knowledge deficit existed among nursing personnel in all areas of "safe medication administration" as evident from statistically significant 't' value of 12.25 for df (29) at 0.05 level of significance.

Experimental group became homogenous i.e. higher knowledge score after administration of guidelines (experimental group pre-test SD-2.66, post-test SD-1.66; control group pre-test SD-2.76, post-test SD-2.66). Mean difference (6.43), between post-test knowledge scores of experimental group (26.97) and control group (20.53) was found to be statistically significant, as evident from 't' value of 11.41 for df (58) at 0.05 level of significance.

Changes in practice scores of nursing personnel

Lack of practices existed among all areas of "safe medication administration" as evident from statistically significant 't' value of 16.68 for df (29) at 0.05 level of significance. Experimental group become more homogenous (higher practice score) after the administration of guidelines (along with demonstration) in terms of practices related to "safe medication administration" (experimental group pre-test SD 2.65, post-test SD 1.47; control group pre-test SD 2.48, Post-test SD 2.40).

Obtained mean difference (8), between the post-test practice scores of experimental and control group was found to be statistically significant, as evident from the 't' value of 18.31 df (58) at 0.05 level of significance.

Correlation between knowledge and practice scores

Positive significant correlation was found between knowledge and practice of nursing personnel after administration of guidelines (co-efficient of correlation r=0.566), which suggested that increase in knowledge also enhanced the practice of nursing personnel working in paediatric care unit.

Association between gain in knowledge scores

Gain in knowledge score was associated with professional qualification (x^2 = 16.81) and in-service education on "safe medication administration", including demonstration (x^2=3.96) but gain in knowledge score was independent of their age, sex, total professional experience, professional experience in paediatric care unit.

Association between gain in post-test practice scores

Gain in practice scores was associated with in-service education (x^2=3.96) on "safe medication administration", but gain in practice score was independent of their age, sex, professional qualification, total professional experience and professional experience in paediatric care unit.

Acceptability and utility of guidelines on "safe medication administration"

The mean score (28), indicates high level of acceptability and utility of guidelines among nursing personnel. The standard deviation 1.36 shows that there was not much variation in the opinion of nursing personnel. Majority (85.67%) of nursing personnel found guidelines as good source of gaining and brushing up their knowledge and acknowledged the efforts of researcher in preparing it.

Conclusion

The guidelines developed by the researcher were effective in enhancing the knowledge and practices of nursing personnel regarding "safe medication administration", held high acceptability and utility among nursing personnel and can be used for larger population in a variety of settings.

Our findings are consistent with those of (i) Lundergren & Wahren (1999) in that an educational programme helped to improve the patient care activities of experimental group including more carefully performed care and handling and better documentation, whereas nurses in the control group followed current routines; (ii) Nelson NC et al (2005), who in a study on detection and prevention of medication errors using real-time bedside nurse found that the educational intervention yielded measurable improvements in the effective use of the computerised medication charting system and must be an ongoing process; (iii) Raja et al (2009) who found that non-compliance with the standard practice of medication administration by nurses can be improved by continuing re-education and monitoring, plus the implementation of a standard operating procedure; (iv) Schneider et al (2006), who concluded that an interactive CD-ROM enabled nurses to apply the information learned to identify errors in medication administration and improved adherence to safe medication administration practices; and (v) Kumari (2009) who evaluated the effectiveness of information booklet on legal responsibilities in terms of knowledge and practice of nursing personnel.

Limitations

The study did not include the nursing personnel working in paediatric care unit apart from medical surgical units.

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