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Original Article

# Knowledge and Perception on Medication Administration Error and Its Reporting among Nurses Working in a Children Hospital

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## Abstract

**Introduction:** Medication administration error (MAE) is a global concern related to patient safety and the problem of under reporting further increases the risk of morbidity and mortality. This study aimed to identify the knowledge and perception on medication administration error and its reporting among nurses working in Children's Hospital.

**Methods:** A cross sectional design with simple random sampling technique was used to select 121 nurses. Self-administered semi-structured questionnaire was used to collect the data on knowledge and perception towards MAEs reporting. Chi-square test and Pearson's correlation was used for analysis.

**Results:** Majority (75.2%) had good knowledge on MAE and most (91.7%) had positive perception regarding MAE reporting. The most common perceived causes of MAE were overload of work due to inadequate staffing, lack of training and in-service education and poor communication. Majority (62.8%) have seen or heard about MAEs during their clinical experience. Fear from consequences, disciplinary action and negative image by patient party were the common reason for non-reporting of MAEs.

**Conclusions:** The study concluded that majority of nurses had a good knowledge and positive perception on MAEs and its reporting with major perceived causes as work overload, inadequate staffing and communication problem. Fear of consequences were identified as main barrier for MAE reporting.

## Introduction

Medication Administration Error (MAE) is described as any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer.[1] The annual cost of drug errors is estimated to be $42 billion USD worldwide. Around 1.2 out of every 1000 inpatients die as a result of MAEs yearly in United States.[2] Nurses have the professional obligation to identify and report MAE either as a contributor or an observer, because they are member of the healthcare team.[3] The most frequent types of MAEs are giving medications to the wrong patient, giving them at the wrong time, and failing to test for allergies.[2,4,5] MAE occur among all patient, however, compared to the adult population, there is a higher risk of injury in children.[6] The common causes of MAE in paediatric population are individualized dosing, calculation error and lack of appropriate formulations, unfamiliarity with paediatric population and communication challenges.[7]

The majority of research on drug errors has so far been done on adults. However, children may have potential of these errors of up to three times more frequently

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than adults.[6,8] By enhancing nurses' calculating and administration skills, their knowledge of indications, actions, and contraindications, MAE can be avoided.[9] For the purpose of developing successful strategies for mistake reduction, it is critical to comprehend the risk factors and root causes of MAE.[7] MAE offers the chance to communicate and share knowledge held in an incident reporting system in order to identify and fix errors that endanger patient safety.

The present study has been concpetualised to find out the knowledge and perception on MAE and its reporting among nurses working in a Children's Hospital.

## Methods

This is a descriptive cross-sectional study conducted in different wards of Kanti Children's Hospital, Maharajgunj, Kathmandu, Nepal during the duration of 2023 Dec 24 to 2024 Jan 19. Nurses working in the hospital wards were included in the study. Nurses with less than six months total working experience and working in OT and OPD were excluded. Probability simple random sampling technique was used. The total name list of all nurses was noted and lottery method without replacement was carried out to take 121 samples. The sample was calculated using Slovin's formula. A self-administered semi-structured questionnaire was used to collect the data regarding socio-demographic information, work place related factors, knowledge and perception on reporting of MAEs. The questionnaire was taken from Wakefield's Medication Administration Error Reporting Survey 2005, which is a valid tool.[20] Written permissions was obtained from Ms. Bonnie. J. Wakefield through email to use her tool and modify it as per need and the context of our country. Data was entered into the computer using a statistical software package for analysis (SPSS version 20). Descriptive statistics, Chi-square tests, Fisher's exact test and Pearson's correlation test were used to analyse the results. Ethical approval was taken from Institutional Review Board (IRB) of National Academy of Medical Sciences with Ref. no. 587/080 and Institutional Research Committee (IRC) of Kanti Children's Hospital with Ref. no. 474. The data were collected after having written consent from the selected respondents.

## Results

Table 1 illustrates the demographic features and work related data of the study population. Tables 2, 3 and 4 show the nurses response in regards to causes, reporting and knowledge of MAE. Table 5 shows the level of perception on MAE Reporting. Table 6 represents the level of perception on MAE reporting with socio-demographic variables. Table 7 illustrate the correlation of knowledge on MAE and perception on MAE Reporting.

**Table 1:** Socio-demographic characteristics of respondents (N = 121)

| Characteristics of Nurses | Number | Percent |
|---|---|---|
| **Age (Years)** | | |
| Upto 30 | 72 | 59.5 |
| 31 - 40 | 36 | 29.8 |
| 41 - 50 | 10 | 8.3 |
| Above 50 | 3 | 2.4 |
| Median (Q1, Q3): 28 (25, 34) | | |
| **Educational qualification level** | | |
| PCL nursing | 39 | 32.2 |
| Bachelors nursing | 75 | 62.0 |
| Masters in nursing and above | 7 | 5.8 |
| **Total working experience (Years)** | | |
| 1 - 5 | 58 | 47.9 |
| 6 - 10 | 27 | 22.3 |
| 11 -15 | 18 | 14.9 |
| Above 15 | 18 | 14.9 |
| Median (Q1, Q3): 6 (3,14) | | |
| **Category of ward / unit** | | |
| Critical | 88 | 72.7 |
| General | 33 | 27.3 |
| **Experience in current workplace (Years)** | | |
| Upto 1 | 44 | 36.4 |
| 2 - 5 | 46 | 38.0 |
| 6 -10 | 22 | 18.2 |
| 11 and above | 9 | 7.4 |
| **Median (Q1, Q3): 3 (1,6)** | | |
| **Trainings / classes related to MAEs reporting** | | |
| Yes | 55 | 45.5 |
| No | 66 | 54.5 |
| **Nurse patient ratio** | | |
| Not as per standard | 121 | 100.0 |
| **Availability of guidelines and protocols for medication administration** | | |
| Yes | 35 | 28.9 |
| No | 86 | 71.1 |

**Table 2:** Respondents' perception regarding causes of MAEs (N = 121)

| Statement | Response | | | | Mean ± SD |
|---|---|---|---|---|---|
| | SA No. (%) | A No. (%) | D No. (%) | SD No. (%) | |
| Nurses related causes | | | | | 2.66 ± 0.46 |
| Nurses are overloaded with works due to inadequate staffs. | 85 (70.2) | 31 (25.6) | 2 (1.7) | 3 (2.5) | 3.64 ± 0.64 |
| Poor communication with physician and colleagues. | 28 (23.1) | 67 (55.4) | 18 (14.9) | 8 (6.6) | 2.95 ± 0.80 |
| Nurses are distracted by other patients, coworkers, or events on the unit. | 32 (26.4) | 50 (41.3) | 33 (27.3) | 6 (5.0) | 2.89 ± 0.85 |
| Administration of drugs prepared and labelled by others. | 30 (24.8) | 54 (44.6) | 23 (19.0) | 14 (11.6) | 2.82 ± 0.93 |
| Lack of proper documentation. | 23 (19.0) | 63 (52.1) | 23 (19.0) | 12 (9.9) | 2.80 ± 0.86 |
| Nurses are unaware regarding the allergy history of patient. | 12 (9.9) | 67 (55.4) | 36 (29.8) | 6 (5.0) | 2.70 ± 0.71 |
| Miscalculation of dose of medicines. | 16 (13.2) | 51 (42.1) | 36 (29.8) | 18 (14.9) | 2.54 ± 0.90 |
| Nurses are confused by the different types and functions of infusion devices. | 5 (4.1) | 60 (49.6) | 41 (33.9) | 15 (12.4) | 2.45 ± 0.76 |
| Nurses have insufficient knowledge regarding medicines. | 7 (5.8) | 47 (38.8) | 46 (38.0) | 21 (17.4) | 2.33 ± 0.83 |
| Nurse fails to check the "6Rs" (five rights: right patient, right drug, right route, right time, right dose and right documentation) | 12 (9.9) | 33 (27.3) | 40 (33.1) | 36 (29.8) | 2.17 ± 0.97 |
| Nurses do not recognize an error occurred. | 5 (4.1) | 26 (21.5) | 60 (49.6) | 30 (24.8) | 2.05 ± 0.79 |
| Drugs related causes | | | | | 2.73 ± 0.55 |
| There is confusion between 2 drugs with similar names. | 16 (13.2) | 68 (56.2) | 32 (26.4) | 5 (4.1) | 2.78 ± 0.72 |
| Medication labels/packaging are of poor quality or damaged. | 19(15.7) | 63 (52.1) | 24 (19.8) | 15 (12.4) | 2.71 ± 0.88 |
| Lack of availability of drug formulations for pediatric patients. | 15 (12.4) | 66 (54.5) | 30 (24.8) | 10 (8.3) | 2.71 ± 0.79 |
| Physician related causes | | | | | 2.92 ± 0.65 |
| Physician's writing on the doctor's order form is difficult to read. | 31 (25.6) | 67 (55.4) | 12 (9.9) | 11 (9.1) | 2.97 ± 0.85 |
| Use of abbreviations instead of writing the orders out completely. | 24 (19.8) | 71 (58.7) | 18 (14.9) | 8 (6.6) | 2.92 ± 0.78 |
| Use of verbal orders instead of written orders. | 34 (28.1) | 58 (47.9) | 11 (9.1) | 13 (14.9) | 2.89 ± 0.98 |
| System related | | | | | 3.26 ± 0.74 |
| Lack of in-service education and training related to medication administration errors. | 49 (40.5) | 59 (48.8) | 9 (7.4) | 4 (3.3) | 3.26 ± 0.74 |

(SA = strongly agree, A = agree, D = disagree, SD = strongly disagree)

**Table 3:** Respondents' perception on medication administration errors reporting

| Statement on MAE reporting | Response | | | | Mean ± SD |
|---|---|---|---|---|---|
| | SA No. (%) | A No. (%) | D No. (%) | SD No. (%) | |
| I am aware about when a medication error should be reported. | 39 (32.2) | 74 (61.2) | 6 (5.0) | 2 (1.7) | 3.23 ± 0.62 |
| Some medication errors are not reported because nurses are afraid of the reaction they will receive from the Nurse Manager. | 12 (9.9) | 64 (52.9) | 35 (28.9) | 10 (8.3) | 2.64 ± 0.77 |
| Some medication errors are not reported because nurses are afraid of the reaction they will receive from their peers. | 9 (7.4) | 60 (49.6) | 38 (31.4) | 14 (11.6) | 2.52 ± 0.79 |
| It is ok to not report the medication administration error if it does not cause any serious outcome.* | 9 (7.4) | 13 (10.7) | 56 (46.3) | 43 (35.5) | 3.09 ± 0.86 |
| Fear of disciplinary action or even losing one's job is a barrier to reporting of error. | 16 (13.2) | 60 (49.6) | 27 (22.3) | 18 (14.9) | 2.61 ± 0.81 |
| It is not my responsibility to report the error caused by someone else.* | 7 (5.8) | 16 (13.2) | 57 (47.1) | 41 (33.9) | 3.09 ± 0.83 |
| I do not hesitate before I decide to report a medication error. | 23 (19.0) | 72 (59.5) | 18 (14.9) | 8 (6.6) | 2.91 ± 0.77 |
| The expectation that medications be given exactly as ordered is unrealistic.* | 13 (10.7) | 29 (24.0) | 61 (50.4) | 18 (14.9) | 2.69 ± 0.85 |
| The response by nursing administration does not match the severity of the error. | 6 (5.0) | 44 (36.4) | 59 (48.8) | 12 (9.9) | 2.36 ± 0.73 |
| Nurses could be blamed if something happens to the patient as a result of the medication error. | 18 (14.9) | 59 (48.8) | 31 (25.6) | 13 (10.7) | 2.67 ± 0.85 |
| No positive feedback is given for passing medications correctly. | 25 (20.7) | 56 (46.3) | 33 (27.3) | 7 (5.8) | 2.82 ± 0.82 |
| I believe reporting medication errors makes patients or their families develop negative attitudes toward my profession.* | 19 (15.7) | 53 (43.8) | 35 (28.9) | 14 (11.6) | 2.36 ± 0.88 |
| I believe it is important to report medication errors even whether or not harm to the patient may occur. | 39 (35.2) | 67 (55.4) | 9 (7.4) | 6 (5.0) | 3.14 ± 0.76 |
| I believe that patients and families have a right to be told about medication errors and whether or not harm to the patient may occur. | 21 (17.4) | 79 (65.3) | 18 (14.9) | 3 (2.5) | 2.97 ± 0.65 |
| I fear media exposure in public. | 19 (15.7) | 64 (52.9) | 25 (20.7) | 13 (10.7) | 2.73 ± 0.85 |
| It is important to establish "no blame culture" to promote medication error reporting. | 42 (34.7) | 62 (51.2) | 13 (10.7) | 4 (3.3) | 3.17 ± 0.74 |
| The individual nurse responsible for error should be punished rather than the team .* | 10 (8.3) | 61 (50.4) | 34 (28.1) | 16 (13.2) | 2.46 ± 0.83 |

(SA= strongly agree, A= agree, D= disagree, SD= strongly disagree) *negative statement, reversely scored

**Table 4:** Respondents' level of knowledge on MAE (N = 121)

| | Number | Percent |
|---|---|---|
| Level of knowledge | | |
| Good (> 50%) | 91 | 75.2 |
| Poor (≤ 50%) | 30 | 24.8 |
| Median (Q1, Q3): 9 (6.5,11) | | |

**Table 5:** Respondents' level of perception on MAE reporting (N = 121)

| | Number | Percent |
|---|---|---|
| Level of perception | | |
| Positive | 111 | 91.7 |
| Negative | 10 | 8.3 |
| Median (Q1, Q3): 58.33 (54.16, 64.18) | | |

**Table 6:** Association of level of perception on MAE reporting with socio-demographic variables (N = 121)

| Characteristics | Level of perception | | P-value |
|---|---|---|---|
| | Positive No. (%) | Negative No. (%) | |
| Age (Years) | | | |
| Upto 30 | 64 (88.9) | 8 (11.1) | 0.199* |
| Above 30 | 47 (95.9) | 2 (4.1) | |
| Educational Qualification level | | | |
| PCL nursing | 35 (89.7) | 4 (10.3) | 0.725* |
| Bachelors nursing and above | 76 (92.7) | 6 (7.3) | |
| Total working experience | | | |
| Upto 10 | 75 (88.2) | 10 (11.8) | 0.032* |
| Above 10 | 36 (100.0) | | |
| Current area of practice | | | |
| Critical | 80 (90.9) | 8 (9.1) | 0.726* |
| General | 31 (93.9) | 2 (6.1) | |
| Experience in current workplace (Years) | | | |
| Upto 5 | 80 (88.9) | 10 (11.1) | 0.063* |
| Above 5 | 31 (100.0) | | |
| Trainings / classes related to MAEs reporting | | | |
| Yes | 51 (92.7) | 4 (7.3) | 0.754* |
| No | 60 (90.9) | 6 (9.1) | |
| Availability of guidelines and protocols for medication administration | | | |
| Yes | 32 (91.4) | 3 (8.6) | > 0.99* |
| No | 79 (91.9) | 7 (8.1) | |
| Have seen or heard of MAE | | | |
| Yes | 72 (94.7) | 4 (5.3) | 0.171* |
| No | 39 (86.7) | 6 (13.3) | |

*Fisher's exact test, P-value statistically significant at < 0.05

**Table 7:** Correlation between knowledge on MAE and perception on MAE reporting (N = 121)

| Variables | Correlation coefficient (r) | P-value |
|---|---|---|
| Knowledge / Perception | 0.297 | 0.001 |
| Significant using the Pearson's correlation test at ** P < 0.01 (two-tailed) | | |

## Discussion

Majority (75.2%) of respondents in the present study had good knowledge regarding MAE which was consistent with the findings of an Italian study where larger (85%) number of respondents had adequate knowledge on the MAEs.[10] In both the studies, majority of respondent's educational qualification was bachelors level which might have contributed in resemblance of findings. Comparatively, lower number of nurses had good knowledge on MAE according to the study conducted in Saudi Arabia.[11] The possible explanation for this variation might be due to the difference in the nursing curriculum, training opportunities and availability of protocols and guidelines.

The most common perceived causes of MAEs in this study were work overload due to inadequate staffs strongly agreed by majority (70.2%) of respondents. Studies conducted in different nations namely South Korea, Jordan and Iran support this finding.[2,12,13] Similarly, other studies conducted in Turkey and Iraq manifested common finding where majority of nurses perceived lack of adequate staffing as the major cause of MAE occurrences.[14,15] Another more common perceived nurse related causes of MAEs was poor communication with physician and colleagues agreed by which is comparable with the finding of the study done in Saudi Arabia.[4] A study conducted in Turkey showed that common physician related causes of MAE were physicians' illegible and unclear medication orders and the use of verbal orders instead of written order which supported the finding of current study.[14]

The most common perceived drug related cause was confusion between two drugs with similar names was concordant to the results of study conducted in South Korea.[12] Majority (66%) of respondents in this study agreed on lack of availability of drugs in paediatric dosage form and lack of proper documentation as causes of MAEs. This was supported by findings of Iranian study where 77.4% said drug calculation problem was one of the main causes for MAEs.[13] Medication dosing in paediatric patients considers body weight, which needs dosage calculation and hence can result in miscalculation.

Regarding system related perceived cause, this study depicted that about half (48.8%) of respondents agreed and 40.5%

strongly agreed on lack of in-service education and training related to medication administration errors as cause of MAEs. This is consistent to the study conducted in Jordan which revealed similar finding.[2]

This study revealed that medication errors are not reported because nurses are afraid of the reactions from their Nurse Manager (52.9%) and their peers (49.6%). This was in line to the result of study conducted in Sudanese hospital where key reasons for failure in reporting MAEs were similar to this study. However, comparatively a higher number of respondents in current study agreed on fearing a disciplinary action as a barrier to reporting of error.[16] The possible justification might be due to the difference in educational qualification of respondents, employment opportunities, error reporting and mitigation process. When fear dominates the perspective of staff, the likelihood is that the reporting of medication errors will decrease.

There was significant association found between working experience and perception on MAE reporting (P = 0.032). This finding was supported by study in Iraq where association was seen between the overall years of experience and frequency of MAE (P = 0.009). Nurses with more working experience reported more MAEs.[15] A study conducted in Ethiopia inferred that nurses who had work experience of less than or equal to 10 years were two times [AOR = 1.7, 95 % CI (1.33, 4.99)] more likely to make an error when compared to those who had experience greater than 10 years.[17] This might be due to the increase in experience to MAEs and reporting and higher exposures to different kinds of drugs which results in less chance of drug related errors.

This study showed an association between nurses' perception about MAEs reporting and department.[16] This might be due to the variation in sample composition, type of wards where the sample respondents are working and the prevalence of errors in the particular department. A South Korean study showed consistent results where no association was found between knowledge of nurses regarding MAE and educational degree, years of work experience, hospital type, or electronic incident reporting system.[18]

Though there was no statistical significance seen, higher number of respondents who had bachelors and above qualification had good knowledge on MAE in comparison to PCL nursing and had positive perception on MAE reporting. A divergent finding was revealed in a study conducted in Bangladesh showed presence of significant relationships between nurses' knowledge on MAE with age, service experience and level of education.[19] Likewise, study conducted in Saudi Arabia showed significant association between the prevalence of medication error with age groups, history of attending a MER training course, poor knowledge and negative attitude.[11]

This self-report may be different from the real nurse to patient medication administration observation and so, is possible for an individual to deliberately conceal her true nature when responding to a self-report measure. The study is carried out in only single children hospital selected purposively at a particular period of time and also the number of participants in this study can inhibit the generalizability of the findings.

## Conclusions

The study concluded that majority of nurses had a good knowledge and positive perception on MAEs and its reporting. Work overload due to inadequate staffing was a main perceived cause of MAEs whereas fear from consequences, disciplinary action and negative image by patient party were identified as major barriers for MAE reporting. Significant association was seen between working experience and perception on MAE reporting. A positive correlation was seen between knowledge on MAEs and perception towards reporting. Regular training and in-service education programs on MAE prevention and promotion of error reporting should be conducted for nurses. The policy makers should emphasize maintaining nurse-patient ratio as per the standards and promote a no blame culture in the workplace. Policies for implementation of patient safety action plan should be formulated by the Government to prevent error and promote reporting.

**Conflict of Interest:** None

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