

Knowledge and practices of nurses in emergency care management of toxicology cases

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Abstract

Toxicology cases are one of the most common reasons for emergency room consultations and hospitalization. It deals with exposure to poisons, chemicals or substances that could have harmful effects on the human body, environment, and even animals. The study aimed to assess the knowledge and practices of nurses in emergency care management of toxicology cases. Specifically, this study determined the demographic profile of the nurses in terms of age, sex, educational attainment, length of service and previous attendance of trainings or seminars regarding toxicology; assessed the knowledge and practices of nurses in emergency care management of toxicology cases; tested the significant relationship between the demographic profile of the nurses and their knowledge and practices in emergency care management of toxicology cases, and finally; based on the results of the study, drew implications for the development of emergency nursing care guidelines for toxicology cases. A descriptive design of methodology was used in this study to examine nurses' knowledge and practices in the emergency care management of toxicology cases. The methods that were utilized to collect the data and determine nurses' knowledge and practices for the emergency care management of toxicology cases were shown using an Input-Process-Output model. An adapted research questionnaire, approved by the original author, was administered through an online platform to obtain quantitative data. The three-part questionnaire included the demographic profile of the respondents, the knowledge of nurses in emergency care management of toxicology cases, and the practices of nurses in emergency care management of toxicology cases. This study involved 150 nurses who were recruited using the snowball sampling method. These nurses are currently employed in various government hospitals' emergency room during the data collection phase. The statistical tool used to analyze the data were frequency and percentage distributions, weighted means, and ranking. Furthermore, all data were processed using Predictive Analytics Software version 26 statistical software to better understand the study's findings and relationship using alpha levels of 0.05 and 0.01. Based on the results, out of 150 respondents, 86 (57.3 %) were females and 123 (82.0 %) were between the ages of 30 and 39. The majority (84.7%) of the nurses had bachelor's

degree, and 106 (70.7%) of them had worked for more than five years. In addition, majority (52.7%) of emergency room nurses attended toxicology-related trainings or seminars. The study revealed that nurses' knowledge regarding emergency care management of toxicology cases was unsatisfactory, obtaining an average of less than 75% of the total scores. On the other hand, nurses' level of practice in emergency care management of toxicology cases was satisfactory using the scoring system employed to analyze the collected data for this study. The study also revealed that previous participation in toxicology-related activities such as seminars, trainings or workshops has significant relationship to the knowledge and practices of emergency room nurses in the provision of emergency care management to different toxicology cases. However, it was identified that there is no significant relationship that can support the idea that higher or satisfactory levels of knowledge could lead to better or satisfactory practice.

Keywords: toxicology, poisoning, poison, knowledge, practice, emergency care management

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1. Introduction

Toxicology cases are one of the most common emergency conditions brought to an emergency room for consultation and hospitalization. Like trauma cases and infectious diseases, toxicology cases are also time-sensitive emergencies which need the services from trained health care professionals for proper diagnosis and treatment. According to the World Health Organization (2021), 106, 683 people died because of non-intentional or accidental poisoning in 2016 and from 2019 to 2020, there was an increase in cases of poisoning. In response to this global problem, health care professionals were encouraged to strengthen their involvement in any toxicology related management and activity augmentation. In addition, any event of suspected or identified poisoning or toxicology related incident may call for prompt attention and management in the emergency unit. Life-saving measures and immediate managements are priorities that are directed towards removing the poison and addressing the problems of airway, breathing, circulation and any other unfavorable clinical manifestations through supportive management. Despite the efforts of the government and other private organizations, providing emergency care to any toxicology patients in any region of the country remains a challenge. Access to information systems, protocols, processes, and various competency development training related to toxicology for health care professionals are limited. Currently, there are few trained professionals in this field who are also holding other functions in different clinical areas and institution committees. These put additional challenge particularly for institutions lacking in-house or nearby poison centers that provide direct assistance to treatment on any toxicology related incidents. There were few published and conducted research studies examining this area of interest, which supports the necessity for raising awareness of the toxicology field and the poisoning aspect. Moreover, researchers are not aware of local studies that assessed the nurses' knowledge and practices on managing toxicology cases and even conducted for the nursing profession.

Fortunately, the Philippines' Department of Health has thirteen (13) designated hospitals throughout the country with a poison center that continuously spearhead the provision of suitable management to acutely and chronically poisoned patients and facilitate health promotion and prevention toxicology related activities. However, despite the department orders released to support these institutions, there is still inadequacy on manpower, supplies, and equipment dedicated for toxicology. During an arrival of toxicology case with an unknown cause or highly toxic substance at the emergency room, nurses and physicians on duty will only depend on trained professionals' advice and wait for their responses prior to intervening with the case. As mentioned in the studies of El-Ata et al. (2021), poisons may immediately affect a patient's condition, and any delays in the provision of essential emergency medical treatment endanger the patient's life. Moreover, hospitals lack established written protocols or standards such as nursing care checklist, manuals or work instructions designed to guide medical professionals rendering specialized toxicology case management. The researcher, from a nursing perspective, conducted this study to contribute to Toxicology Nursing by determining the knowledge and practices of nurses assigned to emergency rooms catering various cases of toxicology. This study also identified elements that have an impact on nurses' performance during delivery of nursing care management of toxicology or poisoning cases during emergencies.

Evidence-based recommendations for emergency nursing care of toxicology cases were developed and recommended to improve the quality of nursing care and provide better treatment to patients. These will empower the emergency room nurses to appropriately provide independent nursing actions without heavily depending on the trained professionals such as nurses, physicians, or other health care professionals to take the lead in the management of the toxicology case. Most importantly, the patients who will receive the emergency care would benefit most from this study since findings could help in the enhancement of the management provided in the emergency room.

Objectives of the Study - The study aimed to assess the knowledge and practices of nurses in emergency care management of toxicology cases. Specifically, this study determined the demographic profile of the nurses in terms of age, sex, educational attainment, length of service and previous attendance of trainings/ seminars regarding toxicology; assessed the knowledge and practices of nurses in emergency care management of toxicology cases; tested the significant relationship between the demographic profile of the nurses and their knowledge and practices in emergency care management of toxicology cases, and finally; based on the results of the study, drew implications for the development of emergency nursing care guidelines for toxicology cases.

Theoretical Framework - The application of a theory or theories in a study that provides a perspective on how the study will be processed and provide answers to research questions is referred to as using a theoretical framework. It also allows researchers to “find their own voices, as well as the intellectual resources to develop theories that strive to emancipate, rather than dominate.” Simply said, this will serve as guide for the research study. Based on the statement above, Patricia Benner’s “From Novice to Expert theory” is proven to be useful in providing a good framework or structure for the conducted study. It identifies five levels of nursing experience which are novice, advance beginner, competent, proficient, and expert. These stages demonstrate shifts in awareness and interaction with the situation, as well as a move from relying on principles and previous experiences. According to this theory, the novice nurse focuses more on detailed tasks, much like a “to do list,” and is then promoted to the next level of competency after a period of learning and experience until they reach the expert level, wherein nurses now focus on the big picture even while accomplishing other job. These degrees of competence assist nurses in supporting one another by knowing and valuing knowledge gained through proper education and experience over time.

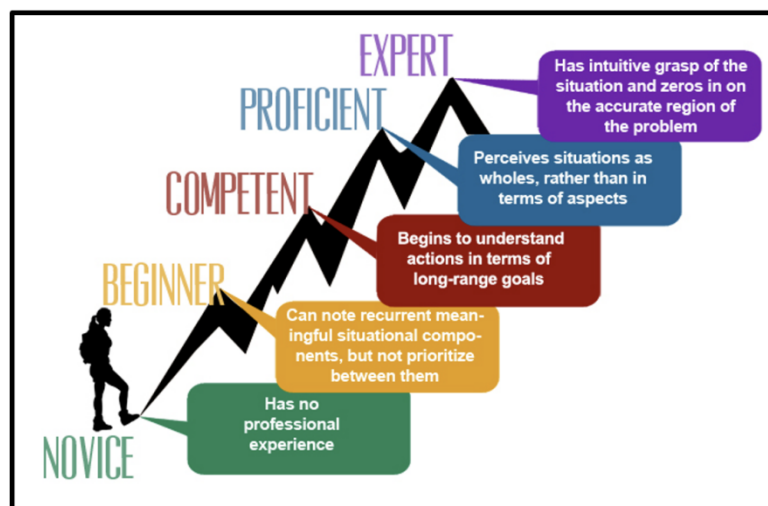


Figure 1
Patricia Benner’s “From Novice to Expert Theory”

The theory of Benner (1982), showed the difference between the experienced nurse and the novice in terms of level of knowledge and practices when they perform a certain task. With the theory, the study showed the relationship between the knowledge and practices of emergency room nurses handling various toxicology cases. The demographic profile of the respondent- nurses, in terms of their age, sex, level of education, length of service, and participation to training relevant to the study’s interest, was shown as well, to see whether it would have an impact on their knowledge and practices. As an outcome, it served as a guide for the development and recommendation of evidence-based recommendations for appropriately managing toxicology cases.

Conceptual Framework - A conceptual framework illustrates the variable’s anticipated relationship. It identifies the important objectives for the research process and points out how they interact to produce meaningful results (Swaen, et. al.,2022). In this study, the researcher developed an Input-Process-Output (IPO) model to more effectively depict the methods used to gather data from respondents to establish their knowledge

and practices regarding emergency care management of toxicology cases.

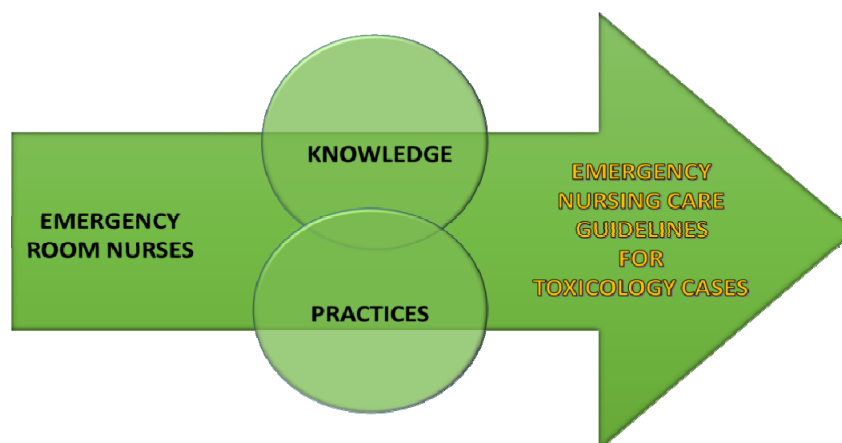


Figure 2. Emergency Nursing Care Guidelines for Toxicology Cases

Figure 2 represents the researcher's study pathway. This study aimed to develop and recommend emergency nursing care guidelines for the management of toxicology cases for emergency room nurses. This was formulated based on the results of the study. The researcher initially gathered information of the demographic profile of emergency room nurses in terms of age, sex, educational attainment, length of service and previous attendance to trainings/ seminars regarding toxicology. Second and third, the researcher separately determined the knowledge and practices of emergency room nurses in managing toxicology related emergencies, respectively. The researcher also determined whether there are any significant relationships between the respondents' demographic profile, knowledge, and practices regarding the subject matter. Finally, based on the findings of this study, evidence-based emergency nursing guidelines were developed and recommended to enhance the management followed for toxicology cases in emergency nursing care.

2. Methods

Research Design - The study utilized a descriptive design that assessed and evaluated the knowledge and practices of nurses in emergency care management of toxicology cases. It is used to define a population's characteristics and gather information that will be used to address a variety of variables such as what, when and how inquiries except why questions on a certain population or group (McCombes, 2022). It also comprises of surveys and other types of fact-finding investigations that explain the situation as it now exists (Mishra, et. al.,2017). The design of the study is quantitative where data were gathered and analyzed quantitatively. It makes predictions, verifies causal linkages, and generalizes results to larger groups through discovery of patterns and averages.

Setting and Participants - The participants of the study were nurses working in the emergency department of different government hospitals, which directly caters to different toxicology cases. Nurses who functioned as supervisors and were assigned to other clinical areas were excluded in this study. A snowball sampling approach was used to identify participants. This kind of non-probability sampling was employed by choosing new participants who are recruited by current respondents to establish the study's sample (Nikolopoulou, 2022). It helped the researcher to conduct studies on individuals with particular characteristics who would be hard to find. The study's sample size of 150 emergency room nurses from different government hospitals was taken and adopted from a previous study conducted by Tassew et al. (2022), which included 149 participants, and which was statistically used to draw conclusions and provide recommendations.

On the other hand, the pilot study phase of the study was conducted initially after the determination of the sample size and school's approval of the submitted research paper. The researcher used the same sampling technique to collect the data needed to process the reliability of the tool to be used. The participants who participated during the pilot study were also excluded from the final data analysis. Luckily, a total number of 150

emergency room nurses participated and surveyed online. Emergency room nurses were selected to be participants of the study because they were the ones initially and frequently experienced managing various toxicology cases during an acute phase of exposure. As mentioned in the review of literature, toxicology cases were brought to emergency units due to life-threatening toxicologic conditions caused by chemicals and substances absorbed through different means. The data that were collected from the participants contributed to clarify and support the research questions and objectives.

Instrument of the Study - The researcher adapted the research instrument from the previous study of Abebe et al. (2019) that also studied the knowledge and practices of Dessie Referral Hospital nurses on provision of initial management of poisoning cases. The author's permission to use the instrument was formally obtained prior to the conduct of the study. It was followed by the development of a three-part data collection questionnaire comprising the variables to be assessed. The first part of the research instrument gathered the participant's demographic information. It identified their age, sex, educational attainment, length of service and previous attendance to trainings or seminars related to toxicology.

The second part of the research instrument assessed the nurses' knowledge about emergency management of different toxicology cases that was evaluated using a true-false type of questions. Abebe et al. (2019) and Tassew et al.'s (2022) scoring system for this part was employed. All correct responses to this part of questionnaire received one point, while all incorrect responses received zero point. The percentage of the total score was used to determine the participant's level of knowledge. Total scores greater than 75% indicate satisfactory or good level of knowledge on the management of toxicology cases in emergency care setting. However, nurses are deemed to have an unsatisfactory or poor level of knowledge if the total score is less than 75%. In the third part of the research instrument, the nurses' practices in providing emergency care management to toxicology was gauged on a four-point Likert scale. All data collected for this part was interpreted using a scoring system based on the means of nurses' total responses for all statements. Satisfactory level of practice was gained by nurses when the composite mean is accepted as "Most of the time" and "Always" with mean scores of 2.50-3.49 and 3.50-4.00, respectively. However, composite mean scores were interpreted as unsatisfactory level of practice if it falls between "Rarely" (1.50-2.49) and "Never" (1.00-1.49).

The modified research instrument was evaluated by panels from academe, research, and toxicology prior to data collection. It was to determine the validity of the tool used for the study. Upon evaluation and approval, the research instrument underwent pilot testing through an online platform to emergency room nurses from a government hospital which also caters toxicology cases. The snowball sampling method was used in the selection of the participants for the pilot testing. The collected data from the pilot testing phase were used to assess the reliability of the instrument. All gathered data underwent statistical analysis using the PASW version 26 statistical software. The reliability test results revealed 0.853 for the knowledge assessment part and 0.802 for the practice assessment part of the instrument. Both reliability results were interpreted as "Good" for internal consistency.

Data Gathering Procedures - Study approval from Lyceum of the Philippines University-Batangas College of Nursing and Ethics Review Board was obtained for the conduct of study. A pilot testing was facilitated to emergency room nurses from a government hospital for the instrument's validity and reliability tests. After this phase of the study, actual data collection was undertaken electronically, and participants were obtained using a snowball sampling method. Informed consent was introduced and collected prior to data collection. It contains the brief background and purpose of the study. It explained that participation is completely optional, and participants are free to cancel at any time without being charged. Researcher's contact information was also provided in case of any concerns regarding the study or the data collection. The collection was facilitated and completed by the first week of April 2023. Afterwards, responses gathered were processed for data analysis within the same month using statistical measures used by statisticians.

Data Analysis - The researcher employed a descriptive data analysis to evaluate the quantitative data of the

study. This analysis aided in accurately organizing or summarizing the gathered data (Bhandari, 2023). It was helpful in creating tabulated mean, median, percentages and range of the variables of the study. The following statistical tools were used to analyze the data. Frequency and percentage distributions were utilized to determine the nurses' profile in terms of age, gender, educational attainment, length of service, previous participation to any toxicology related activities. The nurses' practices were determined using weighted means and ranking. The result of Shapiro-Wilk Test revealed that p-values of the main variable were less than 0.05 which means that the data set is not normally distributed. Therefore, Mann Whitney U test for two groups and Kruskal Wallis for three groups were used as part of the non-parametric tests to determine the significant differences. A post-hoc test was also carried out. Furthermore, all data were processed using PASW version 26 statistical software, formerly SPSS, to better understand the study's findings using alpha levels of 0.05 and 0.01.

Ethical Consideration - Ethical issues were emphasized and prioritized to guarantee that the study is conducted ethically. Before the study was conducted, Ethics Review Board of Lyceum of the Philippines University-Batangas approval was facilitated and obtained. This study followed the methodology established by the university. Proper selection of participants and introduction of the study to participants were observed. Informed consent of all participants was explained and acquired prior to participation, highlighting the study's objectives as well as their anonymity and confidentiality. It also includes a description of their important role in executing the study. Their right to withdraw from the study at any time was emphasized and their participation was entirely voluntary.

3. Results and discussion

Age. Table 1 shows that the majority of the nurses have an age of 30 to 39 years old with a frequency of 123 (82.0%). It is followed by respondents with the age that ranges from 20 to 29 years old with a frequency of 16 (10.7%). However, there's still 10 (6.7%) out of 150 respondents have an age which is within the bracket of 40 to 49 years old and 1 of the total respondents has an age of more than 50 years old. Based on the findings, majority of the emergency room nurses that researcher surveyed are within middle aged adulthood or part of millennial generation which was like the study's findings of Rutto et al. (2012) where same age bracket represented their major respondents. On the other hand, respondents in the studies conducted by Abebe et al. (2019) and El-Ata et al. (2021) were primarily from those between the ages of 20 and 29.

Sex. Majority of the emergency room nurses participated are females (57.3%), which outnumbered male emergency room nurses (42.7%). Based on the findings, majority of the respondents who took part in this study are females, which was consistent with the findings revealed in the studies of Rutto et al. (2012) and El-Ata et al. (2021), who found that females represented the majority of the survey's respondents. However, the studies conducted by Abebe et al. (2019) and Tassew et al. (2022) revealed that men represented the majority of the study's respondents.

Educational Attainment. As seen from Table 1, most of the respondents have a bachelor's degree with the frequency of 127 (84.7%) of the 150 respondents. It is followed by respondents with master's degree with frequency of 20 (13.3%). However, 3 (2%) of 150 respondents have a doctorate degree. Based on the findings, majority of the respondents possessed bachelor's degrees which differs with El-Ata et al. (2021) but similarly appeared in the study by Rutto et al. (2012), Abebe et al. (2019) and Tassew et al. (2022).

Length of Service. Out of 150 emergency room nurses participated in this study, 106 (70.7%) of the nurses were in the service for more than 5 years and followed by respondents with working experience of 3 to 5 years. However, there are still 11 (7.3%) and 10 (6.7%) of the nurses, respectively, with service lengths of less than a year and 1 to 3 years. According to the results, it showed that majority of the respondents have been managing and serving a variety of patients for a long period of time similar to findings from studies conducted by El-Ata et al. (2021) and Tassew et al. (2022). The findings of Rutto et al. (2012) and Abebe et al. (2019), on the other hand, showed that most respondents had less than 5 years in service.

Table 1***Frequency Distribution of the Respondents Profile***

	Frequency (f) n = 150	Percentage (%)
Age		
20 to 29 years old	16	10.7
30 to 39 years old	123	82.0
40 to 49 years old	10	6.7
more than 50 years old	1	0.7
Sex		
Male	64	42.7
Female	86	57.3
Educational Attainment		
Bachelor's Degree	127	84.7
Master's Degree	20	13.3
Doctorate Degree	3	2.0
Length of Service		
less than 1 year	11	7.3
1 year to 3 years	10	6.7
3 years to 5 years	23	15.3
More than 5 years	106	70.7
Previous attendance to trainings/ seminars regarding toxicology		
Yes	71	47.3
No	79	53.7

Previous attendance at trainings / seminars regarding toxicology. It shows that 79 (52.7%) of emergency room nurses did not attend any toxicology related activities, whereas 71 (47.3%) had. According to the findings, which were consistent with those of Rutto et al. (2012) and El-Ata et al. (2021), the respondents predominantly had not attended seminars and trainings related to toxicology. Unlike Abebe et al. (2019) who reported that 56.9% of the respondents had attended toxicology related trainings and seminars. However, the difference in frequency among nurses who had previous attendance to toxicology seminars and trainings in this study is not as remarkable to other studies mentioned.

Table 2 shows the distribution of the nurses' responses to the 15 True or False question items for the knowledge part of the instrument. The questions focused on the different general principles of managing toxicology related cases as mentioned in literature review. Based on the table, 150 (100%) of the nurses surveyed online correctly answered statements 1 and 13, which cover the definition of a poison and dealing with a poisoning incident, respectively. Some questions such as the definition of decontamination and accidental poisoning, as well as the assessment of the nervous system, were almost totally correct, with more than 90% of respondents answered correctly. Statements 3, 9, and 10 concerning basis of antidote administration, toxicology case observation, and external decontamination materials were answered correctly by more than 80% (<90%) of respondents. Using the scoring system of Abebe et al. (2019) and Tassew et al. (2022) to determine the respondents' knowledge, nurses had a satisfactory level for the statements previously mentioned, with more than 75% total score.

However, 7 of the remaining statements (statements 2, 5, 6, 7, 8, 14 and 15) received a total score of less than 75% of the respondents' correct answers, placing these statements within the unsatisfactory level of knowledge. These statements concerned the antidote for iron poisoning, use of activated charcoal, efficacy of gastric lavage, importance of patient treatment over the poison, administration of antidotes in poisoning cases, administration of atropine during organophosphate poisoning, and recommended hours for performing gastric lavage. These findings suggested that these areas need further interventions to enhance their understanding of these concepts. It can be activities focusing on enhancing nursing knowledge on antidote administration, and elimination of the poison of the general principles of managing poisoning or toxicology cases.

Table 2

Knowledge in Emergency Care Management of Toxicology Cases

Statement	True		False	
	F N	%	F N	%
Poison is any substance that has the potential to harm or disrupt bodily functions as a result of its chemical action. (True)	150	100.0	0	0
Iron poisoning is best treated with N-Acetylcysteine as an antidote. (False)	50	33.3	100	66.7
Antidote administration will depend on the patient's clinical condition or laboratory test findings. (True)	123	82.0	27	18.0
Decontamination is the procedure of eliminating or neutralizing any poisons that have accumulated on individuals and equipment. (True)	144	96.0	6	4.0
Use of activated charcoal is recommended for ingestion of corrosive substances such as sodium hypochlorite and hydrochloric acid. (False)	83	55.3	67	44.7
The efficacy of gastric lavage would rise as the period between ingestion and treatment increased. (False)	113	75.3	37	24.7
It is very important to treat the poison rather than the patient. (False)	47	31.3	103	68.7
Administration of an antidote is always necessary and advised in all poisoning cases. (False)	62	41.3	88	58.7
Poisoning cases may need observation in the emergency room for at least 24 hours. (True)	124	82.7	26	17.3
Any type of soap can be used to properly externally decontaminate the patient who has been poisoned. (False)	25	16.7	125	83.3
It's essential to assess and take account of the nervous system's functions throughout admission. (True)	149	99.3	1	0.7
Accidental poisoning involves non-intentional intake, overdose, and exposure to medicines, medicaments, or poisonous substances. (True)	142	94.7	8	5.3
When addressing poisoning cases in the ED, the dose and timing of ingestion must be taken into account. (True)	150	100.0	0	0
In the event of organophosphate poisoning, atropine should not always be given. (True)	75	50.0	75	50.0
It is recommended to do gastric lavage 4 hours after ingesting a poisonous dose that might be fatal. (False)	60	40.0	90	60.0

Table 3 displays the distribution of overall knowledge scores in emergency care management of toxicology cases for each respondent. A total of 59 (39.33%) of the 150 emergency room nurses obtained more than 75% of the total scores from the 15 True or False question items. However, 91 (60.67%) emergency room nurses scored less than 75% of the total scores. According to these data, the majority of the nurses participated have unsatisfactory knowledge regarding the emergency care management of toxicology cases. A large portion of respondents had an inadequate understanding of the study's subject. Furthermore, the study showed that scores ranged from 7 to 15, with a mean score of 74% for all emergency room nurses evaluated for knowledge on management of toxicology cases. In conclusion, the mean score for nurses' knowledge is less than 75%, which is an unsatisfactory level based on the scoring system used in this study. Similarly, to other studies, nurses had overall mean scores of less than 75% which denotes unsatisfactory level of knowledge regarding toxicology cases or poisoning incidents (El Sayed et al.,2015; Abebe et al., 2019; El-Ate et al., 2021). In contrast, Tassew et al. (2022) showed that nurses had a satisfactory or good level of understanding on the initial management of acute poisoning cases.

Table 3

Frequency Distribution of the Respondents' Total Score of Knowledge in Emergency Care Management of Toxicology Cases

Score	Frequency	Percentage (%)	Verbal Interpretation
>75 %	59	39.33	Satisfactory
<75 %	91	60.67	Unsatisfactory
Total	150	100	

Legend: >75% = Satisfactory; <75% = Unsatisfactory

Table 4***Practices in Emergency Care Management of Toxicology Cases***

Indicators	WM	VI	Rank
In severe acute poisoning, I maintain adequate airway, respiration, and circulation as a priority.	3.86	Always	2
I administer atropine in case of suspected organophosphate poisoning.	2.73	Most of the time	15
I provide gastrointestinal decontamination based on the specific poison(s) taken, the time between ingestion and presentation, and the estimated severity of the toxic substance.	3.31	Most of the time	12
I assess and record the patient's vital signs (blood pressure, respiratory rate and rhythm, pulse rate and other pertinent findings).	3.87	Always	1
I perform gastric lavage to individuals who have taken possibly lethal doses of poison within an hour of their arrival as necessary.	3.09	Most of the time	14
I compute the toxic dose of the chemical agent if formulation is available.	3.25	Most of the time	13
I do frequent re-evaluation of the status of the toxicology patient during antidotal therapy.	3.65	Always	6
During the history-taking, I gather and document information on the patient's present health status as well as the toxic dose of the substance.	3.77	Always	3
Before administering the ordered antidote, I verify and calculate the desired dose again.	3.71	Always	4
When caring for a toxicology patient, I do a thorough physical examination.	3.70	Always	5
I closely monitor the patient's intake and output during treatment.	3.63	Always	7
I facilitate patient's referral to other necessary medical services such as psychiatry, family medicine, adolescent medicine, child protection unit, and so on.	3.47	Most of the time	10
I wear proper PPE when dealing with toxicology patients.	3.33	Most of the time	11
When a new toxicology patient arrives, I identify the agent involved, estimate the severity, and anticipate the toxicity.	3.61	Always	8
I perform dermal decontamination to toxicology patients by removing any contaminated clothing and washing any exposed skin thoroughly with water that is at room temperature.	3.51	Always	9
Composite Mean	3.50	Always	

Legend: 3.50 - 4.00 = Always; 2.50 - 3.49 = Most of the time; 1.50 - 2.49 = Rarely; 1.00 - 1.49 = Never

Table 4 represents the assessment of the nurses' practices in emergency care management of toxicology cases. Their responses to the 15 statements on practices of nurses were obtained on a four-point Likert Scale. Based on the drawn responses, the composite mean for all statements is 3.50 which indicates that the respondents always practiced in general. Among the items cited, they always assess and record the patient's vital signs (blood pressure, respiratory rate and rhythm, pulse rate and other pertinent findings (3.87), in severe acute poisoning, they maintain adequate airway, respiration, and circulation as a priority (3.86) and during the history-taking, they gather and document information on the patient's present health status as well as the toxic dose of the substance (3.77) topped on the list. These results suggested that emergency room nurses always practice and regularly perform these skills when dealing with toxicology or poisoning cases in their institutions. However, items such as facilitating patient's referral to other necessary medical services such as psychiatry, family medicine, adolescent medicine, child protection unit, and so on, wearing proper PPE when dealing with toxicology patients, providing gastrointestinal decontamination based on the specific poison(s) taken, the time between ingestion and presentation, and the estimated severity of the toxic substances, performing gastric lavage to individuals who have taken possibly lethal doses of poison within an hour of their arrival as necessary and administering atropine in case of suspected organophosphate poisoning got the lowest mean values of 3.47, 3.33, 3.31, 3.09 and 2.73 respectively. Based on the respondent's individual ratings of their practices to different interventions provided by emergency room nurses when handling different toxicology cases, there are areas of practice that received the lowest score of 1, indicating that nurses never and rarely do this frequently when caring for a toxicology patient. As stated on the studies of Abebe et al. (2019) and Tassew et al. (2022), majority of nurse who participated in their studies agreed on the importance of having standard guidelines or protocols in practice to support their actions.

Based on the overall responses to this part of the instrument and having the composite mean of 3.50 which

was interpreted as “Always”, emergency room nurses’ practice on the management of toxicology cases was accepted as satisfactory level using the scoring system employed for this study. This revealed that nurses had good practice on the subject being assessed. Tassew et al. (2022) showed similar findings, suggesting that nurses are good in providing nursing care in a variety of toxicology cases when managed at emergency units.

Table 5

Difference of Responses on the Knowledge in Emergency Care Management of Toxicology Cases When Grouped According to Profile

Demographic Profile	p-value	Interpretation
Age	0.839	Not Significant
Sex	0.070	Not Significant
Educational Attainment	0.343	Not Significant
Length of Service	0.289	Not Significant
Previous attendance to trainings/seminars regarding Toxicology	0.000	Significant

Legend: Significant at p-value <0.05

The majority of the findings above indicated that there was no statistically significant relationship between the nurses’ demographic profile and knowledge. As seen on the table, age, sex, educational attainment, and length of service cannot be used to evaluate a nurse’s understanding of toxicology and other related occurrences. This also implies that anyone of any age, sex, educational attainment, or length of service can be equally knowledgeable about toxicology. However, this study revealed that previous attendance to toxicology related trainings/seminars had a significant relationship with the levels of knowledge of the respondents, with a p-value less than the level of significance of 0.05. It implies that involvement in various toxicology related activities may have an impact on nurse’s knowledge and may define someone’s understanding of toxicology or poisoning.

Table 6 shows the comparison of responses on the practices of nurses in emergency care management of Toxicology cases when grouped according to respondent’s profile. It was observed that there was significant difference when grouped according to educational attainment (p-value = 0.007) and previously attended Toxicology related trainings and seminars (p-value = 0.024). This was noticed since the obtained p-values were less than the alpha level. This means that nurses’ responses differ significantly based on the post hoc test conducted. However, as indicated from the results, there is no significant difference with the practices of emergency room nurses when grouped according to age, sex, and length of service since the computed p-value is greater than 0.05 level of significance.

Table 6

Difference of Responses on the Practices in Emergency Care Management of Toxicology Cases When Grouped According to Profile

Demographic Profile	p-value	Interpretation
Age	0.966	Not Significant
Sex	0.775	Not Significant
Educational Attainment	0.007	Significant
Length of Service	0.114	Not Significant
Previous attendance to trainings/ seminar regarding Toxicology	0.024	Significant

Legend: Significant at p-value <0.05

This showed that those nurses who obtained a higher degree and attended Toxicology related trainings and seminars have greater assessment on the practices on the emergency management of toxicology cases. This also implies that age, sex, and length of service do not determine nurses’ level of practice and should not be used as a basis for appraisal. Based on these findings, it indicates a need for nurses to increase participation and involvement in various toxicology related activities for improvement of their knowledge and practices regarding the care of toxicology related cases. More so, the findings of El Sayed et al. (2015) supported and found similarities with current results of the study. Their study also revealed that there were no statistically significant

differences in practice when grouped to nurses' age, gender, marital status, years of experience, or nursing position. With a p-value of 0.004, which is less than the 0.05 level of significance, practice was also known to have a significant difference in relation to educational attainment in their study.

Table 7***Difference on the Knowledge and Practices in Emergency Care Management of Toxicology Cases***

	p-value	Interpretation
Knowledge and Practices of Nurses in Emergency Care Management of Toxicology Cases	0.507	Not Significant

Legend: Significant at p-value < 0.05

The table 7 displays the differences in emergency room nurses' responses about knowledge and practices in the emergency care management of toxicology cases. The relationship between the variables is not statistically significant with a p-value of 0.507 since it showed p-value result of more than the significance level of 0.05. This finding was also supported by El Sayed et al. (2015) study, which found no relationships between the two variables. It signifies that anyone with satisfactory or unsatisfactory level of knowledge could have an acceptable level of practice on provision of emergency management to different toxicology cases. On the other hand, El-Ata et al. (2021) showed a significant relationship between nurses' knowledge and practices in addressing various toxicology incidents. The findings of this study suggested development of measures to enhance both nurses' knowledge and practices.

During the data collection phase of the study, some issues involving the management of toxicology cases were additionally identified and brought up by respondents themselves. It focused more on the challenges or difficulties they had when addressing various toxicology cases, which may have contributed to the study's findings about the nurses' knowledge and practices. These challenges tested their knowledge, practices, and critical thinking abilities to give prompt treatment and avoid complications. Additionally, they also suggested measures to enhance nurses' knowledge and practices in managing different toxicology cases, which were also seen and supported by the study's findings and were also included in the next chapter. Similar to treating other emergency cases in the emergency room, nurses also deal with a variety of challenges or difficulties when managing cases of acutely poisoned patients or toxicology cases. Based on their additional responses, many of them face challenges because of many contributing factors. Uncooperative or untrustworthy patients and relatives or other witnesses of poisoning incident, insufficiency of data obtained due to unrecalled amount of poison consumed or absence of witnesses, and dealing with toxicology patient who had psychiatric problems are identified as challenges during initial encounter and assessment of toxicology patients. Comprehensive management to toxicology cases was not appropriately facilitated and patient's concerns were not addressed immediately due to shortage of manpower in the emergency room especially nursing staffs. Even on-duty physicians, nurses, and other health care professionals lack training in providing specific toxicologic management. It was also mentioned that lack or absence of protocols and standard guidelines in the area makes provision of specialized care more challenging.

Most nurses surveyed said it was more difficult to manage toxicology cases since there were not enough or possibly unavailable resources such as antidotes, toxicologic laboratory and diagnostic examinations within their institutions such as serum paracetamol, serum iron, drug test screening / confirmatory, endoscopy and flexible laryngoscopy. As for them, it will be crucial to treat these situations quickly and effectively if these resources are readily available. However, even though resources are available in the emergency room, nurses still lack knowledge and practice in the preparation, calculation, and administration of antidotes, as well as performing treatments such as gastric lavage with activated charcoal. Furthermore, nurses surveyed also verbalized challenges on dealing with ethical issues and considerations, particularly when managing cases where patient intentionally commit poisoning or an act of suicide. These additional responses obtained from the study's respondents were also consistent with previous studies' findings conducted by other groups of researchers. As stated in the studies of Rutto et al. (2012), El- Sayed et al. (2015), Abebe et al. (2019), El-Ata et al. (2021), Tassew et al. (2022), unsatisfactory level of knowledge and practice of nurses in the provision of management of

toxicology cases may be associated to absence or lack of attendance to educational programs on Toxicology, continues supervision from specialist, unavailability or limited management resources and shortage of manpower. This part of the study encompasses even respondents' suggestions for the present situation of nurses. Most respondents suggested provision of continuing professional education, coaching, and mentoring of trained staff, availability of resources (antidotes, supportive medicines, laboratory, and diagnostic examinations), readily available toxicology references or guidelines, and additional trained professionals in the area or institution. These suggestions were mentioned to further enhance nurses' knowledge and practices in emergency care management of different toxicology cases.

4. Conclusion and recommendations

The following findings were drawn from the gathered data: Out of 150 emergency room nurses participated in the study, 86 (57.3%) were females and 123 (82.0%) were between the ages of 30 and 39. The majority (84.7%) of them had bachelor's degree, and 106 (70.7%) had worked for more than five years. Furthermore, 52.7% of the nurses attended toxicology related training and seminars. Based on the scoring system of the study, the emergency room nurses' level of knowledge on eight (8) statements was accepted as satisfactory for emergency care management of toxicology cases. These statements included definition of poison (100%), dealing with a poisoning incident (100%), neurological assessment (99.3%), description of decontamination (96.0%), accidental poisoning (94.7%), external decontamination (83.3%), observation of toxicology cases (82.7%), and basis for antidote administration (82.0%). However, the nurses' understanding of the remaining seven (7) statements falls to an unsatisfactory level. These statements were importance of patient treatment over the poison (68.7%), iron poisoning antidote (66.7%), recommended hours for gastric lavage (60.0%), prevalence of antidote administration (58.7%), administration of atropine during organophosphate poisoning (50.0%), use of activated charcoal (44.7%), and efficacy of gastric lavage (24.7%). In summary, the study revealed that nurses' knowledge regarding emergency care management of toxicology cases is unsatisfactory, obtaining an average of less than 75% of the total scores. The composite mean for all the statements that emergency room nurses responded to, is 3.50 indicating that the respondents generally always practice the different nursing actions stated in the practice assessment part of the questionnaire.

The following statements received an interpretation of always: assess and record the patient's vital signs (3.87); maintain adequate airway, respiration, and circulation as a priority (3.86); gather and document information on the patient's present health status as well as the toxic dose of the substance (3.77); calculation of desired antidote dose before administration (3.71); doing a thorough physical examination (3.70); frequent re-evaluation of the toxicology patient during antidotal therapy (3.65); monitoring the patient's intake and output (3.63); identification of involved agent (3.61); and proper dermal decontamination (3.51). However, six (6) of the 15 items' weighted mean lie between 2.50 and 3.49, indicating that emergency room nurses often do the task as follows: facilitate patient's referral to other necessary medical services (3.47); wearing proper personal protective equipment (PPE) (3.33); performing gastrointestinal decontamination (3.31); computation of the toxic dose of the agent (3.25); performing gastric lavage (3.09); and administration of atropine in case of suspected organophosphate poisoning (2.73). With the p-values of 0.839, 0.070, 0.343, and 0.289, respectively, age, sex, educational attainment, and length of service have no significant relationship on nurses' knowledge of the emergency care management of toxicology cases.

The nurses' level of knowledge regarding the subject of the study was shown to be significantly associated with previous participation in any toxicology related activities as supported by p-value of less than 0.05 level of significance (0.000). The findings show that previous participation in toxicology related training and seminars (p-value = 0.024) and education background (p-value = 0.007) have significant effects on nurses' practice. On the other hand, as the stated p-value is more than 0.05 level of significance, the study revealed that there are no significant differences in the respondents' practices when categorized according to age, sex, and length of service. Between nurses' knowledge and practice on emergency care management of toxicology cases, 0.507 p-value result indicates no significant relationship or difference between the variables and is not significant at 0.05 level

of significance. It suggests that nurses, regardless of knowledge level, may provide emergency management to various toxicology cases with a degree of practice that is acceptable.

Based on the findings derived, the following conclusions were drawn: Majority of the emergency room nurses in this study are female, between 30 to 39 years old, have bachelor's degree, have been working for more than 5 years, and have no theoretical or practical sessions related to toxicology. Based on the scoring system used in this study, most of the respondents had a satisfactory level of knowledge on emergency care management of toxicology cases in terms of definition of poison, accidental poisoning, and decontamination, dealing with a poisoning incident, neurologic assessment during poisoning, basis of antidote administration, toxicology case observation, and materials needed for external decontamination. However, majority of the nurses surveyed presented unsatisfactory level of knowledge on iron poisoning antidote, use of activated charcoal, efficacy of gastric lavage, importance of treating patient over the poison, prevalence of antidote administration, administration of atropine during organophosphate poisoning, and the recommended hours for performing gastric lavage. Finally, with an overall mean score of less than 75%, emergency room nurses have unsatisfactory level of knowledge on emergency care management of toxicology cases. Based on the weighted mean of each statement for assessment of the practices of emergency room nurses in emergency management of toxicology cases, majority were interpreted as "always" followed by "most of the time". These findings showed that emergency room nurses primarily had mostly good practices on the several general concepts performed during the provision of emergency nursing care to toxicology cases.

As a result, it revealed that emergency room nurses' level of practice is satisfactory. Nurses' knowledge of emergency management of toxicology cases has a statistically significant relationship with participation in various toxicology related activities such as seminars, trainings, or workshops. Nurses who participated in toxicology activities demonstrated a satisfactory level of knowledge, which may be used to assess nurses' understanding of toxicology and poisoning management. The level of practice of emergency room nurses in the management of toxicology related cases does not rely on age, sex, and length of service. It has no significant relationship as the basis of appraisal. However, educational attainment and previous participation in any toxicology related activities have a substantial impact on the level of practice of emergency room nurses. In terms of nurses' knowledge and practice on the emergency management of various toxicology incidents. It has been identified that there is no significant relationship that can support higher or satisfactory level of knowledge could lead to better or satisfactory level of practice. It means that their degree of practice has no bearing on their level of knowledge.

Based on the results of the study, the researcher recommended the following: Utilization of the proposed emergency nursing care guidelines in managing toxicology cases for emergency room nurses. Develop written work instructions, references, flowcharts, or standardized protocols outlining the various essential nursing interventions performed by nurses throughout the care of toxicology cases, incorporate the written output into the institution's nursing manual and regularly review and update for latest evidence-based nursing practice. Increase nurses' participation in different seminars, trainings, workshops, and conferences relevant to toxicology nursing and other toxicology related activities. These training programs should be focused on the general and specific guidelines of managing toxicology cases, common toxic agents, and other emerging sources of poisoning. Implement regular monitoring and assessment of nurses' knowledge and practices in providing emergency management to a variety of toxicology cases through staff mentoring and evaluation. Establish continuous communication and partnership with nearby or in-house poison center, other toxicology specialists or experts within the area to gain guidance and experience of dealing with toxicology cases.

Nursing administrations and academic institutions may also incorporate in-depth discussions and simulation-based skills training on various toxicology topics. These will prepare future nurses to deal with different cases concerning toxicology. The study may be replicated with the following recommendations: Conduct the study at different private hospitals to assess their nurses' knowledge and practices in toxicology case management; Involve other medical practitioners who handle toxicology cases as research participants to assess

their toxicology knowledge and practices; Evaluate the effectiveness of proposed emergency nursing care guidelines in the management of various toxicology cases; Assessment of nurses' practices using an observational tool to validate the level of practices derived from this study; Conduct research on various toxicology cases and develop specific nursing care guidelines for every case; and research on nurses' lived experiences with various toxicology situations.

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