Volume 4, Issue 2, 2026

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

NURSES KNOWLEDGE AND PRACTICES REGARDING CRASH CART IN A PUBLIC HOSPITAL, ABBOTTABAD PAKISTAN

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DOI: https://doi.org/10.5281/zenodo.18583760

Keywords
Knowledge, practice, nursing, SPSS, Nurse.

Article History
Received: 07 December 2025
Accepted: 22 January 2026
Published: 10 February 2026

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Abstract

This study was conducted to assess the nurses" knowledge & practices regarding crash cart. "Nurses require a strong knowledge base in every area of nursing during their practices, from pathophysiology to psychology, pharmacology, policies and procedures, and everything in between". Drug administration is a fundamental part of every day in nursing profession. No medication is completely safe and protected in this manner. Therefore, nurses need to have an intensive and broad knowledge of the medications and its method of organization in the compelling treatment of patients whose life lies in her grasp. A quantitative descriptive cross-sectional study design was performed to assess the nurses" knowledge and practices regarding crash cart. Data was collected through convenience sampling technique. We select public health public hospital to collect relevant information and data of my study from nurses working in it. There are 135 nurses in hospital we selected 101 of them by using sampling technique with 5% estimate error.

Aime: *To assess nurses' knowledge and practices regarding crash cart in a public hospital Abbottabad.*

Conclusion: *we would say the areas of improvement entitle to the nursing staff with increased knowledge, practice and responsibility, accountability for improving management for crash cart within the public health hospital Abbottabad.*

Methodology: *A cross-sectional quantitative design was employed, involving 101 nurses from 135 nurses in a public hospital Abbottabad (WCH, BBSTH) selected through convenience sampling. Data were collected using a structured questionnaire. Statistical analysis was performed using SPSS version 26, utilizing descriptive and inferential statistics.*

INTRODUCTION:

A crash cart, also known as an emergency trolley, is a vital component of hospital emergency preparedness. It provides immediate access to essential medications, airway equipment, defibrillators, and other lifesaving tools that are critical during medical emergencies such as cardiac arrest or respiratory failure. In high-risk areas like emergency departments, intensive care units, and general wards, the speed and accuracy with which healthcare teams respond can mean the difference between life and death. Since nurses are often the

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ISSN: (e) 3007-1607 (p) 3007-1593

first responders in these situations, their knowledge, skills, and adherence to standard crash cart procedures play a central role in improving patient survival and reducing complications.[1]

Effective management of a crash cart requires nurses to be competent in several areas — including the organization of equipment, knowledge of emergency drugs, routine checking and restocking of supplies, accurate labeling, and compliance with institutional protocols. However, research from various healthcare settings has highlighted gaps in nurses' knowledge, inconsistent practices, and occasional neglect in crash cart maintenance. Such deficiencies can delay emergency interventions and increase the risk of adverse outcomes. Regular training sessions, simulation drills, and ongoing professional education are therefore essential to help nurses maintain confidence and proficiency in using emergency equipment.[2]

Assessing nurses' understanding and practical handling of crash carts is important not only for identifying existing strengths and weaknesses but also for guiding the development of effective training programs. These assessments contribute directly to patient safety, hospital quality standards, and the design of evidence-based policies that strengthen emergency preparedness across departments.[3]

Nurses and doctors are the first in line that provide life support to the patients and help bringing their lives in normal. They should always be aware of the location and placement of the emergency cart, their contents and their uses properly. Staff must be familiar with all of life saving equipment within their working area [4].

Emergency cart is a trolley specially designed to deal with emergency situations, used for transporting medicines and equipment's at the emergency site in life saving measures. Physicians, nurses, pharmacists, and other paramedical staff must become familiar with the contents of this cart. It contains necessary equipment's to handle an emergency. Emergency cart is enabling healthcare providers to manage medical emergencies easily and confidently [5].

The cart is easily movable and readily accessible to all areas in the department and it is easy to take equipment's and drugs during crisis. Health care environment in which a patient may suffer a medical emergency needs to have the equipment to deal with that emergency efficiently. A crash cart is the special trolley that contains different types of equipment's and drugs that are used to save lives in different departments of hospital like in emergency room, intensive care unit and other critical areas. It is moveable and readily accessible within hospital. Equipment's and drugs within it can be changed very quickly from situation to situations [6].

It is a routine work of a nurse to check the resuscitation trolley and cardiopulmonary equipment. As skilled nurses, they are required to check and refill the crash cart after every shift, verify the expiry date of every item in the crash cart. Here the investigator felt the need to assess the practice of crash cart among staff nurses and develop a protocol to help them in practicing the organized crash cart system [7].

Research Question

What is the level of knowledge and practice of nurses regarding the crash cart in a public hospital Abbottabad?

Research Objective

To assess the knowledge and practices of nurses regarding the crash cart in a public hospital Abbottabad.

Literature Review:

Crash carts are essential for emergency resuscitation, and nurses' knowledge and competency are crucial for efficient patient care. Studies have shown that nurses' knowledge and practice levels vary, with only 58.8% of nurses reporting regular checks and replacements of expired items (Akber et al., 2019). Experience and training are key factors in improving performance, with staff nurses achieving higher practice scores than student nurses. Regular training and simulation-based learning can enhance nurses' knowledge and organizational skills in managing crash carts. Standardization and policy enforcement are also crucial for consistent emergency readiness (Akber et al., 2019).

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ISSN: (e) 3007-1607 (p) 3007-1593

However, there are gaps in current research, including limited multi-center comparisons and a lack of longitudinal studies, highlighting the need for further investigation.

Methodology

Study Design: Cross-sectional descriptive study
Study Setting: A public hospital in Abbottabad (WCH & BBSTH)
Study Duration: Sixteen weeks

Sample Size:
The study included 101 registered nurses. The sample size was calculated at a 95% confidence level and a 5% margin of error. After applying finite population correction for a total of 135 nurses and including a 10% non-response rate, the final sample size was confirmed as 101 participants.
Sampling Technique: Convenience sampling

Sample Selection

- **Inclusion Criteria:** Registered nurses working in high-intensity units (e.g., ICU, CCU, Emergency, Labor Room, NICU).
- **Exclusion Criteria:** Nurses assigned to low-intensity or non-critical care wards.

Data Collection Procedure

1. **Official Permission:** Written authorization was obtained from the Medical Superintendent of the selected public hospital.
2. **Ethical Approval:** Approval was granted by the institutional ethical review committee before initiating data collection.
3. **Participant Identification:** Eligible participants were identified based on the inclusion and exclusion criteria.
4. **Informed Consent:** Participants were briefed about the study's purpose, and written informed consent was obtained to ensure voluntary participation and confidentiality.
5. **Knowledge Assessment:** Data on nurses' knowledge were gathered through a structured, self-administered questionnaire. Each participant was allotted 20–30 minutes to complete it.
6. **Practice Assessment:** Practical performance was evaluated using a structured observational checklist during regular duty hours without disrupting patient care.
7. **Confidentiality:** Data were anonymized using numerical codes to protect participants' identities.
8. **Data Verification:** Each questionnaire was reviewed daily for completeness and accuracy. Incomplete responses were excluded.
9. **Data Storage:** All records were securely stored and accessed solely by the researcher for analysis.

Data Analysis Procedure

After data collection, all questionnaires were carefully reviewed, cleaned, and coded. The data were entered into the Statistical Package for the Social Sciences (SPSS) version 22/25 for analysis.

- **Descriptive Analysis:** Frequencies, percentages, means, and standard deviations were used to summarize demographic variables and responses related to crash cart knowledge and practices.
- **Inferential Analysis:** The Chi-square test was conducted to examine associations between knowledge/practice levels and selected demographic variables. Where appropriate, independent t-tests and ANOVA were used to compare mean scores across groups.
- **Level of Significance:** A p-value of ≤ 0.05 was considered statistically significant.
- **Presentation of Results:** Findings were presented through tables, charts, and graphs, with interpretations aligned to the study's objectives.

RESULTS

This chapter includes the findings of the study conducted among 101 registered nurses working in high-intensity units of a public hospital in Abbottabad. The basic purpose is to describe the demographic profile, assess the participants' level of knowledge and practice regarding crash cart management and along with these, examine the relationship between knowledge, practice and selected demographic variables. The results are

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presented using descriptive and inferential statistics.

1. Demographic Characteristics of Participants

In this study, 101 nurses in total participated. Analysis of Age Distribution brings forth that the respondents belonged to age group 31-35 years were largest in proportion which is 33.7%, and this indicated that most of the participants among them were in their early to mid-career stage. This was followed by nurses aged 26–30 years which is 21.8% and 36–40 years which is 20.8%, which suggested that the workforce constituted of professionals ranged from young to middle-aged. A smaller proportion of participants in the group were older than 40 years of age which is 15.8% or younger than 25 years of age which is 7.9%.

Table 1: Demographic Characteristics of Nurses (n = 101)

Variable	Category	n	%
Age	20–25	8	7.9
	26–30	22	21.8
	31–35	34	33.7
	36–40	21	20.8
	>40	16	15.8
Gender	Female	91	90.1
	Male	10	9.9
Qualification	Diploma	39	38.6
	Post-RN BSN	52	51.5
	Generic BSN	10	9.9
Working Unit	ICU/CCU	41	40.6
	Emergency	23	22.8
	NICU	17	16.8
	Labour Room	11	10.9
	Other	9	8.9
Experience	<2	12	11.9
	2–5	28	27.7
	6–10	44	43.6
	>10	17	16.8

The sample we took were female on a large scale, in terms of gender, and were 90.1%, while on the other hand only 9.9% were male. This distribution brings forth the reflection of the general gender composition of the nursing profession in Pakistan overall and supports the study sample. More than half of the participants, in terms of educational qualification, had completed Post-RN BSN which is 51.5%, followed by those who only had a Diploma in Nursing which was 38.6%. Only 9.9% of the nurses had a Generic BSN degree. This indicates clearly that most nurses had got the professional nursing education beyond the basic diploma level, which is expected to influence positively, the clinical competence.

In terms of clinical placement, majority of the nurses were working in ICU and CCU and the

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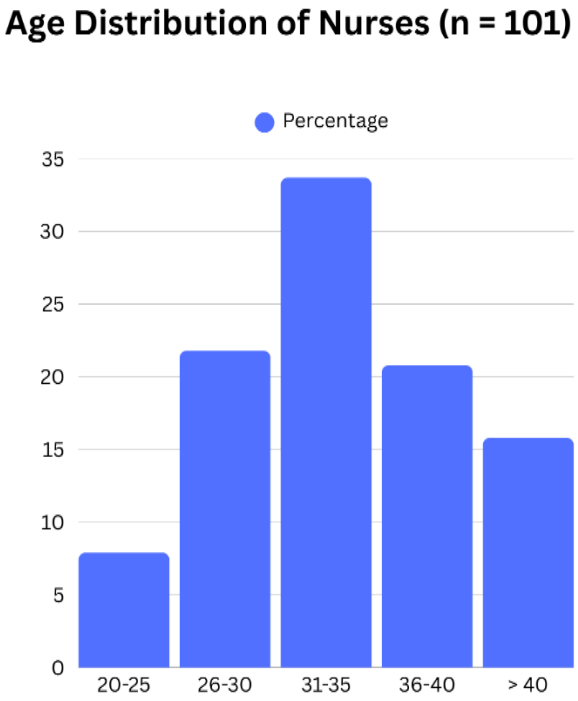
ISSN: (e) 3007-1607 (p) 3007-1593

percentage was 40.6%, followed by the Emergency Department and the percentage was 22.8%, NICU and its percentage was 16.8%, and in Labour Room which was 10.9%. All of these are high-intensity areas in clinical where emergency situations are common and crash carts are frequently used. The presence of nurses from such units improve the applicability and relevance of the findings of the study.

Analysis done for the professional experience demonstrated that participants had 6–10 years of experience in clinical which is 43.6%, while 27.7% of the participants had 2–5 years of experience, 16.8% had more than 10 years, and 11.9% had almost less than 2 years of experience in clinical. This explicitly indicates that the respondents had substantial clinical exposure in majority, which is needed for emergency care effectively and the utilization of crash cart. The demographic profile overall implies that the sample of the study constituted of experienced nurses who were professionally qualified nurses working in the environment of critical care s where crash cart management plays an important role in patient survival.



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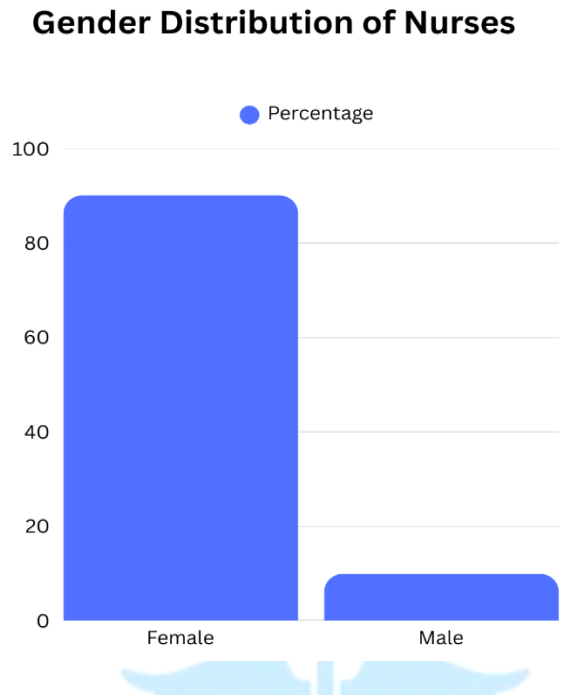
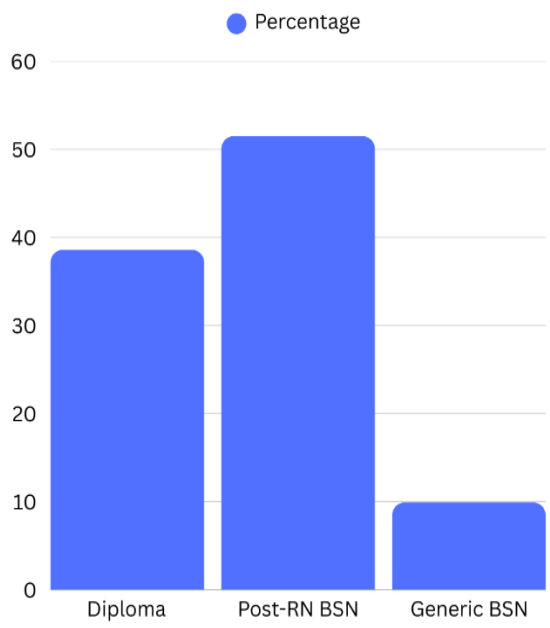
ISSN: (e) 3007-1607 (p) 3007-1593





Volume 4, Issue 2, 2026

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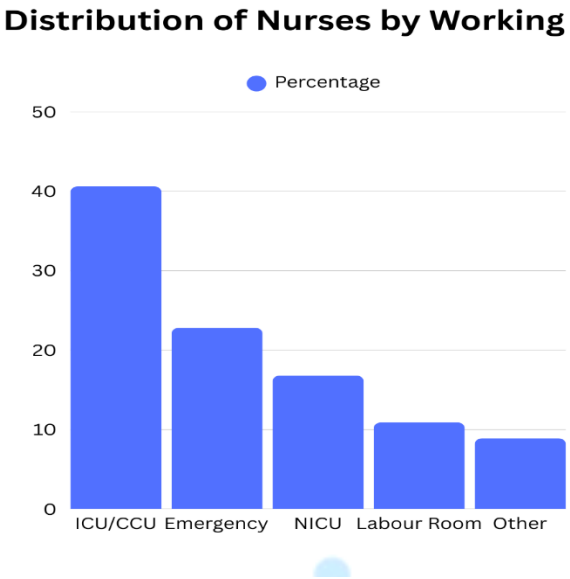

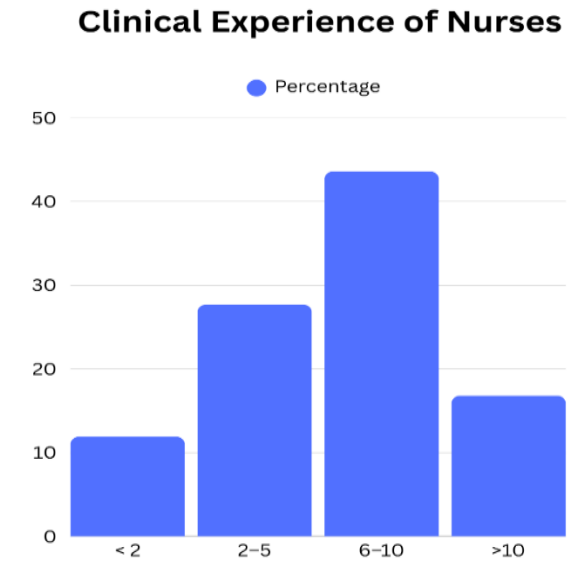

2. Knowledge Regarding Crash Cart Management

Knowledge Level	n	%
Good	46	45.5
Average	38	37.6
Poor	17	16.9
Total	101	100

Knowledge of nurses with regard to management of crash cart was assessed deeply by using a structured questionnaire and further made into categories into three levels which are good, average, and poor. The results displayed that 45.5% among the nurses had good knowledge, which indicated that nearly half of the participants were very well aware of the contents of crash cart,

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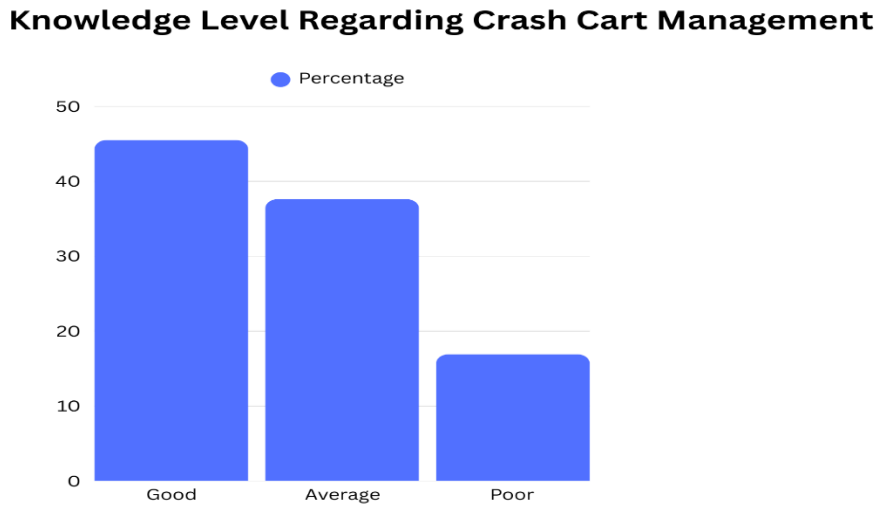
ISSN: (e) 3007-1607 (p) 3007-1593

identification of drugs, labeling, their organization and procedures of routine checking. 37.6% of nurses, however, displayed average knowledge, suggesting that they had partial understanding but lacked complete awareness of all essential components and procedures.

16.9% of the participants had poor knowledge, which means that they were unable to correctly identify essential medications, equipment, or standard crash cart procedures. This level of knowledge deficiency may result in delays, confusion, or medication errors during emergency situations. The proportion of nurses with good knowledge although is very encouraging, the combined percentage of nurses with poor knowledge and average (54.5%) shows that more than half of the workforce is not fully prepared to manage crash carts independently. This knowledge gap may compromise the effectiveness of emergency response and highlights the need for structured training and regular updates.



3. Practice Regarding Crash Cart Management

Practice Level	n	%
Satisfactory	61	60.4
Unsatisfactory	40	39.6
Total	101	100

Practice of Nurses which respect to management of crash cart were assessed using an observational checklist and categorized as satisfactory or unsatisfactory. The findings revealed that 60.4% of nurses demonstrated satisfactory practice, meaning that they checked the crash carts in routine, which ensured availability of emergency drugs, followed standard protocols and maintained proper organization, however, 39.6% of the participants displayed practice which was unsatisfactory, displaying not good compliance with the procedures of crash cart maintenance.

This result suggests that majority of nurses although performed their duties properly, a substantial proportion failed to follow consistently, the standard practices. Such practices which are inadequate may result in missing medications, malfunctioning devices and disorganized equipment all of which can delay lifesaving interventions during critical events. The presence of a large group with unsatisfactory practice indicates that existing systems for supervision, training, and accountability may not be sufficient and require strengthening.

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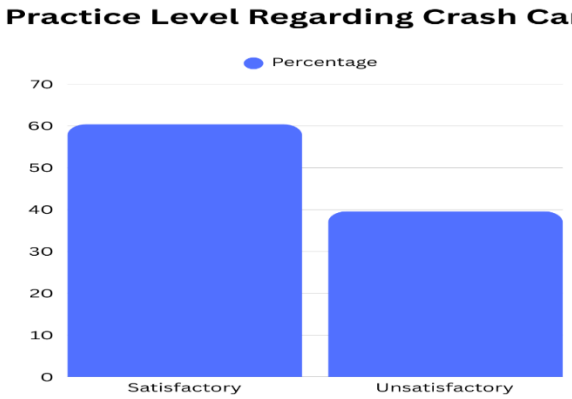
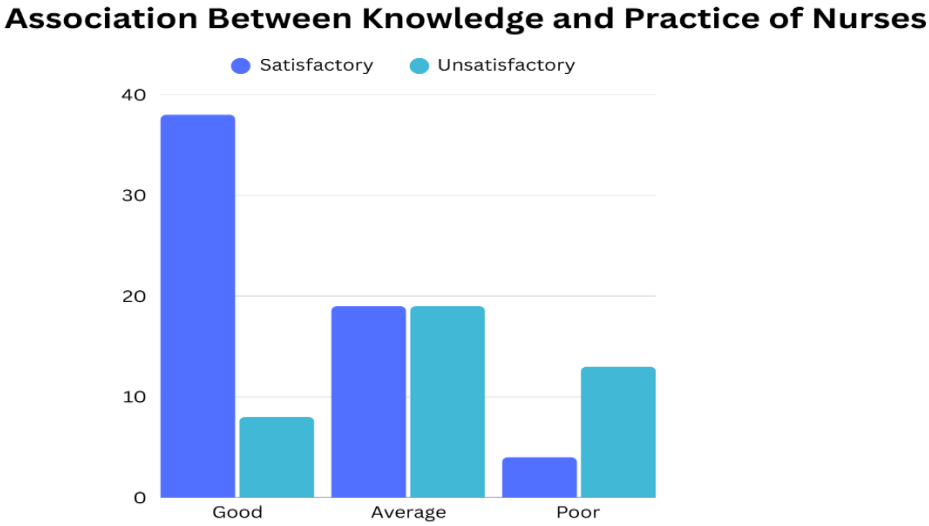


4. Association Between Knowledge and Practice

Knowledge	Satisfactory	Unsatisfactory	Total
Good	38	8	46
Average	19	19	38
Poor	4	13	17
Total	61	40	101

Chi-square test was used for examining the relationship between the knowledge of Nurses and their practice regarding the management of crash cart. The analysis brought forth a statistically significant association ($p = 0.003$) between practice and knowledge level. Nurses who had a very good knowledge were more likely to show satisfactory practice as compared to those with no or poor knowledge were more likely to show unsatisfactory practice. Exclusively, majority of nurses with good knowledge performed their duties correctly while nurses with no or poor knowledge, in most of the cases failed to meet practice standards. This finding confirms that knowledge is a strong predictor of clinical practice. It also suggests that improving the knowledge of nurses through training and education is likely to lead to better practical performance and improved emergency care outcomes.



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ISSN: (e) 3007-1607 (p) 3007-1593

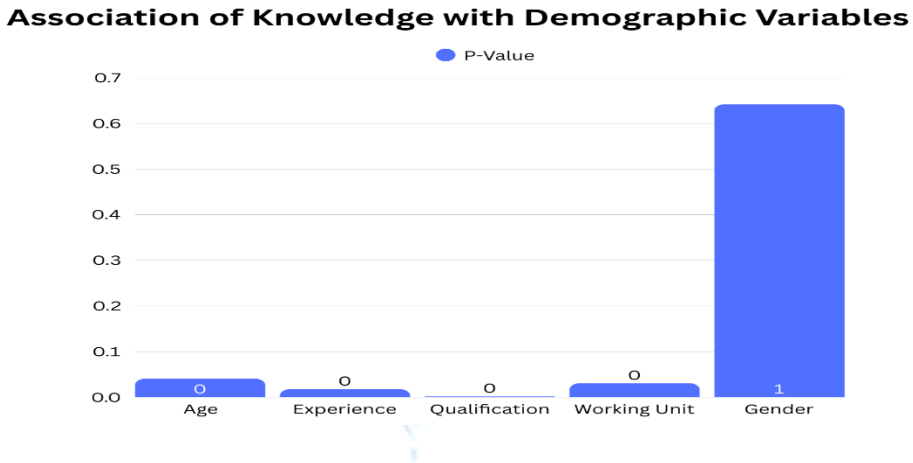
5. Association Between Knowledge and Demographic Variables

Variable	p-value	Interpretation
Age	0.041	Significant
Experience	0.018	Significant
Qualification	0.002	Significant
Working Unit	0.031	Significant
Gender	0.642	Not Significant

Analysis further showed that the knowledge of Nurses was associated with several demographic factors significantly:

- Age (p = 0.041)
- Clinical experience (p = 0.018)
- Educational qualification (p = 0.002)
- Working unit (p = 0.031)

These results show that nurses who were more experienced, older in their age, had better education and working in ICU, CCU, or emergency departments tended to have good or higher knowledge regarding management of crash cart. None of the association was found between knowledge and gender (p = 0.642), which suggested that crash cart knowledge is influenced by professional exposure rather than sex.



6. Association Between Practice and Demographic Variables

Variable	p-value	Interpretation
Experience	0.009	Significant
Working Unit	0.027	Significant
Age	0.058	Not Significant
Gender	0.711	Not Significant

Practice level was also found to be significantly associated with:

- Clinical experience (p = 0.009)
- Working unit (p = 0.027)

This clearly indicates that nurses with more and good experience and those nurses working in critical care areas were more likely to display satisfactory practice. However, gender (p = 0.711) and age (p = 0.058) did not display statistically significant associations with practice, indicating that hands-on exposure and workplace

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ISSN: (e) 3007-1607 (p) 3007-1593

environment play a more important role in shaping practice than demographic characteristics alone.

The findings of this study display that many nurses although possess enough knowledge and perform crash cart management on satisfactorily, a significant proportion still lack the necessary skills and knowledge. Knowledge was found to be strongly associated with practice and both were influenced by education, experience and working environment. These results highlight the urgent need for continuous professional training, standardized crash cart protocols and monitoring on regular basis to ensure that all nurses are prepared fully for responding effectively to life-threatening emergencies.

DISCUSSION

This chapter discusses the results in accordance with the study objectives and the questions and also highlights their implications for clinical practice, hospital management, and safety of patient.

Knowledge Regarding Crash Cart Management

The results exposed that 45.5% of nurses had good prior knowledge regarding cash cart management, 37.6% had average knowledge, and 16.9% had poor or no knowledge with respect to crash cart management. Nearly half of the participants, although displayed sufficient understanding but on the other side of the spectrum, more than half of the nurses were never fully knowledgeable. This finding brought forth the concern, as incomplete knowledge may result in delayed medication errors, late emergency response and improper use of life-saving equipment. These results are consistent with the study conducted by Akber et al. (2019) in Pakistan, which reported that a substantial proportion of nurses did not perform regular medication checks or replace expired drugs. Equivalent findings have been reported in studies from India and Nepal, where nurses working in emergency settings demonstrated only moderate knowledge of crash cart contents and procedures. This suggests that gaps in crash cart knowledge are not unique to one hospital but are a widespread issue in developing healthcare systems. The observed knowledge gaps in the present study may be attributed to the lack of structured training programs, absence of standardized crash cart protocols, and limited hands-on drills. Without regular refresher sessions, nurses may forget critical procedures or remain unfamiliar with newly introduced medications and equipment. This emphasizes the need for continuous education and competency-based training.

Practice Regarding Crash Cart Management

In terms of practice regarding Crash Cart Management, 60.4% of nurses displayed satisfactory practice, while 39.6% on the other hand displayed practice which was unsatisfactory. This explicates that nearly four out of every ten nurses were not following the recommended crash cart maintenance consistently and the handling procedures. Such insufficient practices may include failure to check expiry dates of the medication, improper organization of equipment and also the lack of documentation happening in routine. Although the proportion of satisfactory practice is higher than the unsatisfactory practices, this level is still not acceptable for a system designed for saving lives during critical emergencies. Comparable findings have been reported in the previous studies, where poor crash cart practices were correlated with missing supplies, disorganized trolleys and malfunctioning equipment. Such deficiencies

These deficiencies can cause critical delays during respiratory emergencies or cardiac arrest, slowly increasing mortality and morbidity. The discrepancy between knowledge and practice observed in this study suggests that even nurses who know the correct procedures may not always apply them in real clinical settings. This may be because of overflow workload, time limitations, supervision on insufficient basis and lack of accountability systems within the hospital.

Relationship Between Knowledge and Practice

A highly significant association was found between the knowledge of nurses and practice regarding crash cart management ($p = 0.003$). Nurses with adequate knowledge were more likely to show

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ISSN: (e) 3007-1607 (p) 3007-1593

satisfactory practice, while those on the other hand with poor knowledge were more likely to show unsatisfactory practice. This finding strongly supports the assumption that knowledge directly influences clinical performance. It also aligns with previous research from Mangaluru, India, which reported a positive correlation between knowledge and practice among nursing interns. The present study therefore confirms that improving nurses' knowledge through training and targeted education is likely to result in better practical performance and safer patient care.

Influence of Demographic Variables on Knowledge

The study demonstrated that knowledge of nurses was associated significantly with age, educational qualification, clinical experience and working unit. Nurses who were older, more experienced, more educated, and working in ICU/CCU or emergency departments tended to have higher knowledge scores. This is the fact and can have an examination that experienced nurses are more exposed to emergency situations and exposing is on frequent basis and resuscitation procedures, which increases their familiarity with contents and usage of crash cart. Similarly, nurses working in critical care areas encounter crash carts more often, which improves both their theoretical understanding and practical confidence. No significant association was found between gender and knowledge, indicating that crash cart competence is influenced by professional exposure and training rather than personal characteristics.

Influence of Demographic Variables on Practice

Practice level of the nurses was also found to be associated significantly with clinical experience and the working unit. Nurses who possessed more years of service and those working in high-intensity departments displayed better crash cart practices. This brings forth the importance of practical exposure, routine drills, and on-the-job learning in maintaining emergency preparedness. However, gender and age were not related significantly with practice, hence reinforcing the idea that professional environment and training opportunities are more important than demographic factors alone.

Implications for Nursing Practice and Hospital Administration

The findings of this study highlight the urgent need for institutional strategies to improve crash cart management, including Regular crash cart training programs for all nursing staff, simulation-based mock drills to enhance real-time response skills, standardized checklists for routine crash cart inspection, routine audits and supervision by nursing supervisors and institutional protocols which are clear and SOPs to ensure consistency. Implementation of these measures will improve significantly both knowledge and practice, ensuring that crash carts remain fully stocked, organized, and functional during emergencies.

A considerable proportion of nurses although demonstrated good knowledge and satisfactory practices, the presence of knowledge gaps and unsafe practices among a substantial number of participants highlights the need for continuous education, standardization, and monitoring. Strengthening crash cart management systems will enhance emergency response efficiency, reduce clinical errors, and ultimately improve patient survival in critical situations.

CONCLUSION

This chapter explains the conclusions from the study that we did on knowledge of nurses and practices regarding the crash cart management in a public hospital in Abbottabad. It summarizes that the key findings, highlights their implications for the patient safety and the clinical performance, and also provides recommendations for improving the emergency preparedness and nursing competency. The chapter also identifies the areas for future research to enhance evidence-based practice in hospital emergency care.

A selected number of nurses demonstrated practices on satisfactory scale and also a good knowledge but the presence of the unsafe practices and notable knowledge gaps among some number of participants is concerning at the same time. Given the critical role of crash carts during the life-threatening emergencies, even minor deficiencies in these knowledge or practice can have a very

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serious implication for patient outcomes. It was found that more than half of the participants have either poor knowledge or the knowledge along with practice skills, also they suggest the inconsistency in understanding the contents of crash cart, organization and emergency protocols. At the same time, the observation that nearly two-fifths of the nurses demonstrated unsatisfactory practices shows some challenges in the practical application of knowledge during real-time clinical situations. This discrepancy may reflect the inadequate hands-on training, a very limited exposure to the emergency scenarios, or less reinforcement of institutional policies related to crash cart management. A statistically important association between the knowledge and practice tells the importance of theoretical understanding in shaping a safe and effective clinical performance. Nurses who had better knowledge were more likely to demonstrate appropriate practices, confirming that the knowledge serves as a foundational component of the competent emergency care. This finding aligns with the existing literature, which emphasizes that the insufficient knowledge often means delayed responses, improper use of the emergency equipment, and also increased risk of clinical errors.

Overall, the findings suggest that the crash cart preparedness within the hospital remains weak and uneven across the nursing workforce. Inadequate knowledge and improper practices may also contribute to delayed emergency responses, some medication errors, and it compromises patient safety during critical events. Therefore, there is a high need to strengthen crash cart education through regular in-service training, simulation-based drills, and competency assessments.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed based on the study findings,

Simulation-Based Mock Drills

Simulation drills and the periodic mock codes must be conducted, so that confidence of nurses can be enhanced and in real life situations of emergency, practical skills must be developed.

Regular Training Programs

The hospitals must organize mandatory training done for crash cart and the sessions should be for all nurses, exclusively those who are working in high-intensity units. These sessions should also include identification, medication, equipment handling and all the other protocols of emergency.

Standardized Crash Cart Checklists

A uniform crash cart checklist should be developed and displayed on each trolley. Nurses should be assigned responsibility for routine checking and documentation.

Continuous Professional Development

Crash cart management should be a part of continuing nursing education (CNE) and the orientation programs for newly recruited staff.

Audit and Monitoring System

Hospital administration should implement the monthly audits to ensure that the crash carts are fully stocked, functional, and also up to date.

Policy Development

Hospitals must develop written SOPs, standard operating procedures and some written policies for managing crash carts so that consistency across departments can be ensured.

Study limitations:

Work load and shortage of nurses.

Observation limitation. Actual practices regarding crash cart use not observed continuously. during emergency.

Lack of training related to crash cart.

Cross sectional study design.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

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