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Original Article

Assessment of the Knowledge of Radiology Student About Emergency Crash Cart

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ABSTRACT

Background: Emergency crash carts play a critical role in life-threatening situations by providing essential medical supplies, medications, and equipment for rapid intervention. Despite their importance, radiology students often lack formal training in crash cart management, potentially delaying emergency response times. As radiology professionals frequently encounter contrast-induced anaphylaxis, cardiac arrests, and respiratory distress, their preparedness in handling crash carts is crucial. This study aims to assess the knowledge levels of radiology students regarding crash carts and identify gaps in emergency preparedness training. **Aim:** The primary objectives of this study are to evaluate radiology students' awareness of crash cart components and their role in emergency response, determine the impact of prior training on knowledge levels, and analyse how academic year influences emergency preparedness. The study further seeks to recommend structured training interventions to enhance crash cart competency among radiology students. **Methodology:** A quantitative, cross-sectional study was conducted among 100 radiology students using a structured questionnaire assessing their knowledge of crash cart organization, emergency drug usage, and resuscitation protocols. Participants were categorized based on age, gender, academic year, and prior training exposure. Chi-square tests were used to examine statistical associations between demographic variables and knowledge levels. **Results:** The findings revealed that 51% of students demonstrated good knowledge, 45% had moderate awareness, and 4% exhibited low knowledge of crash carts. The study found no significant relationship between age or gender and knowledge levels ($p > 0.05$), suggesting that emergency preparedness is not inherently influenced by these factors. However, academic year and prior training had a significant impact on crash cart knowledge. Third-year students scored significantly higher than first- and second-year students ($p = 0.03$), and students with prior training performed better than those without ($p = 0.02$). These results emphasize the importance of structured training programs in enhancing radiology students' emergency response skills. **Conclusion:** The study highlights moderate crash cart awareness among radiology students, with significant gaps in practical emergency response training. While prior training and clinical exposure significantly improve knowledge levels, a structured approach to emergency preparedness education is needed. Integrating hands-on simulation training, interdisciplinary emergency drills, and standardized crash cart protocols into radiology curricula can bridge these gaps and ensure optimal emergency response competency among future radiology professionals.

Keywords: Radiology, Emergency Crash Cart, essential medical supplies, medications, equipment for rapid intervention

INTRODUCTION

Emergencies in healthcare settings are unpredictable and require immediate intervention to prevent mortality and minimize complications. Medical emergencies can occur in various departments, including emergency rooms, intensive care units, operating theaters, radiology departments, and outpatient clinics. These emergencies may range from cardiac arrest, respiratory failure, anaphylactic reactions, and trauma injuries to other acute conditions such as stroke, sepsis, or shock [9]. According to the World Health Organization (WHO), millions of lives are lost each year due to the lack of timely emergency interventions, particularly in under-resourced healthcare systems [15]. The ability of healthcare providers to respond promptly to emergencies significantly influences patient survival and recovery. Studies have highlighted that early recognition of critical conditions and the implementation of effective life-saving measures within the "golden hour" can drastically reduce mortality rates [14]. Healthcare emergencies require a well-coordinated approach, involving

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

multidisciplinary teams that include physicians, nurses, radiology technicians, and other healthcare professionals. The success of emergency management depends on preparedness, staff training, and the availability of essential equipment, such as the emergency crash cart. This ensures that medical personnel have rapid access to the necessary drugs, instruments, and devices required for immediate intervention.

1.1.1 Importance of Timely Emergency Response

Timely response to medical emergencies is a critical determinant of patient outcomes. Delays in providing appropriate medical care can lead to irreversible complications or fatalities. The American Heart Association (AHA) emphasizes that "time is tissue," referring to the significance of early interventions in cardiac arrest, stroke, and trauma cases [2]. The quicker the response, the better the chances of survival and full recovery. In cardiac emergencies, studies show that each minute of delay in defibrillation decreases the survival rate by 7–10% [9]. Similarly, in stroke management, the early administration of thrombolytic therapy within the first 4.5 hours of symptom onset significantly improves neurological recovery [1]. In trauma cases, such as severe bleeding or airway obstruction, immediate medical intervention is crucial to prevent hypoxia and organ failure [3]. The importance of a structured emergency response system has been widely recognized in medical literature. Hospitals employ emergency codes, rapid response teams, and crash cart protocols to enhance their ability to handle emergencies efficiently. In radiology departments, timely response to contrast-induced anaphylaxis, cardiac arrest during imaging procedures, or acute deterioration of critically ill patients undergoing scans is essential. Radiology personnel must be trained in basic life support (BLS), advanced cardiac life support (ACLS), and emergency cart management to ensure patient safety [13]. Moreover, technological advancements such as automated external defibrillators (AEDs) and telemedicine consultations are improving emergency response in various healthcare settings [4]. Hospitals that implement standardized emergency response protocols and staff training programs report better patient outcomes, reduced errors, and increased efficiency in handling life-threatening conditions [6].

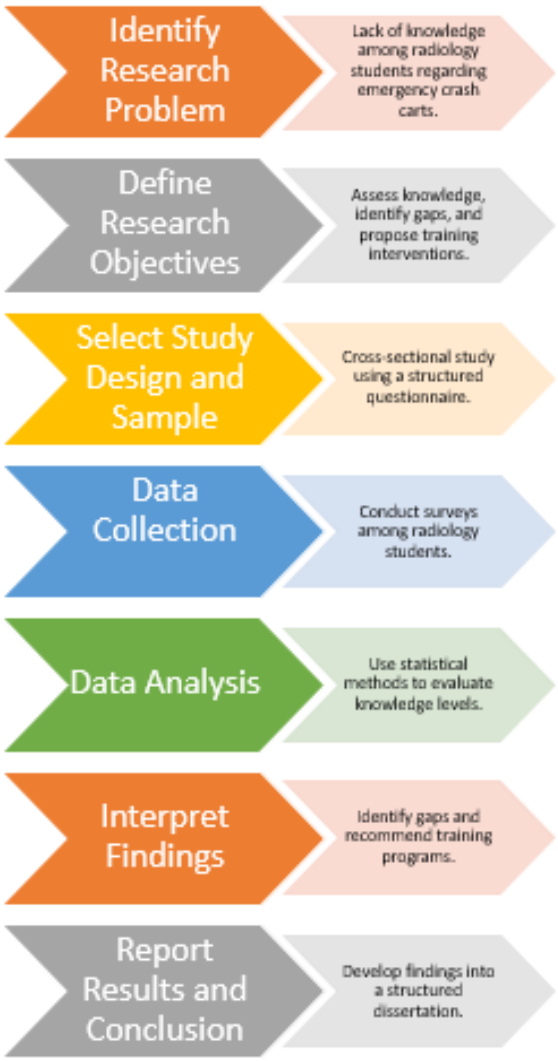
1.1.2 Role of Emergency Crash Carts in Patient Management

An emergency crash cart is a portable medical trolley that contains life-saving drugs, medical devices, and essential resuscitation equipment. It is strategically placed in various departments to facilitate rapid response during emergencies. The crash cart is designed to ensure easy accessibility, mobility, and organization of emergency supplies, allowing healthcare professionals to quickly retrieve and use essential tools when responding to critical situations [5]. The primary role of a crash cart is to provide immediate support during cardiac arrests, respiratory failures, anaphylactic reactions, and other life-threatening conditions. It typically includes:

- Defibrillators and Suction Devices: Used for resuscitation and airway clearance.
- Advanced Cardiac Life Support (ACLS) Drugs: Epinephrine, Atropine, Amiodarone, Lidocaine, and Sodium Bicarbonate.
- Intubation and Airway Management Equipment: Endotracheal tubes, Ambu bags, Laryngoscopes.

METHODS AND MATERIAL

This chapter outlines the research methodology adopted for the study, detailing the research approach, design, study setting, sampling methods, data collection techniques, ethical considerations, and analysis procedures. The methodology ensures systematic and structured data collection to evaluate the knowledge of radiology students regarding emergency crash carts and propose recommendations for enhanced training. The research methodology follows a structured flow to ensure accuracy and reliability in data collection and analysis



RESULT

This chapter presents the statistical analysis and interpretation of the collected data. The analysis includes frequency distributions, descriptive statistics, and crosstab analysis, highlighting the knowledge levels of radiology students regarding emergency crash carts.

Frequency Distribution

Table: Frequency Table for Age

Age Group	Frequency	Percent
18-21 years	30	30.0%
22-25 years	31	31.0%
26-30 years	39	39.0%
Total	100	100.0%

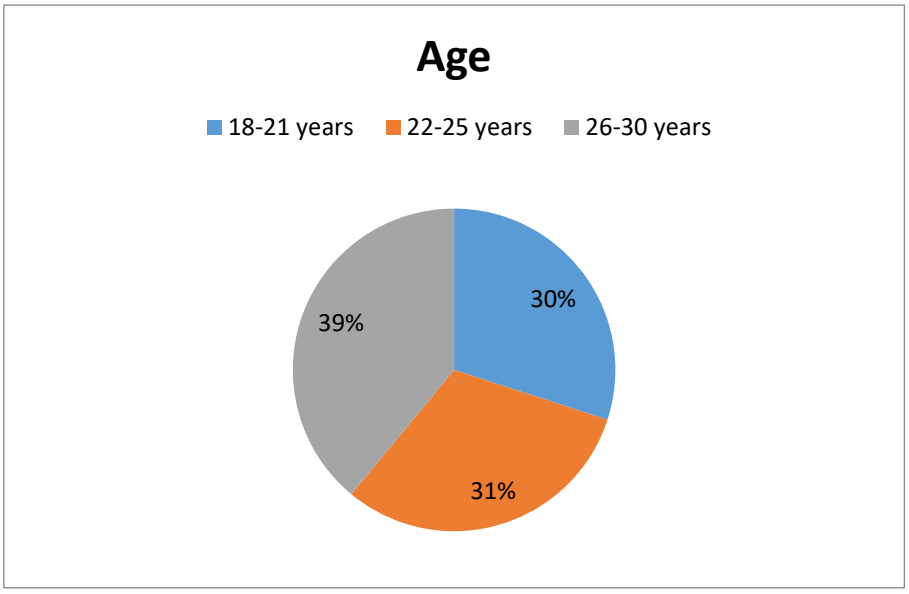


Figure: Frequency distribution for Age

Interpretation: The majority of participants (39%) fall within the 26-30 years category, followed by 31% in the 22-25 age group, and 30% in the 18-21 age group. This balanced distribution ensures a diverse representation of radiology students across different experience levels.

Table: Frequency Table for Gender

Gender	Frequency	Percent
Male	52	52.0%
Female	48	48.0%
Total	100	100.0%

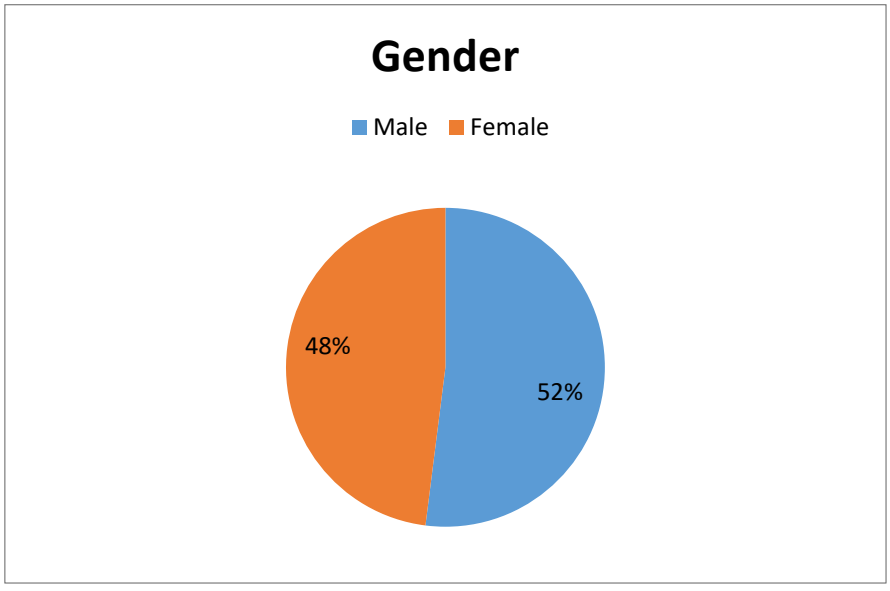


Figure: Frequency distribution for Gender

Interpretation: The gender distribution is **almost equal**, with **52% male** and **48% female**, ensuring a **balanced representation** in the study.

Table: Frequency Table for Academic Year

Academic Year	Frequency	Percent
First Year	30	30.0%
Second Year	31	31.0%
Third Year	39	39.0%
Total	100	100.0%

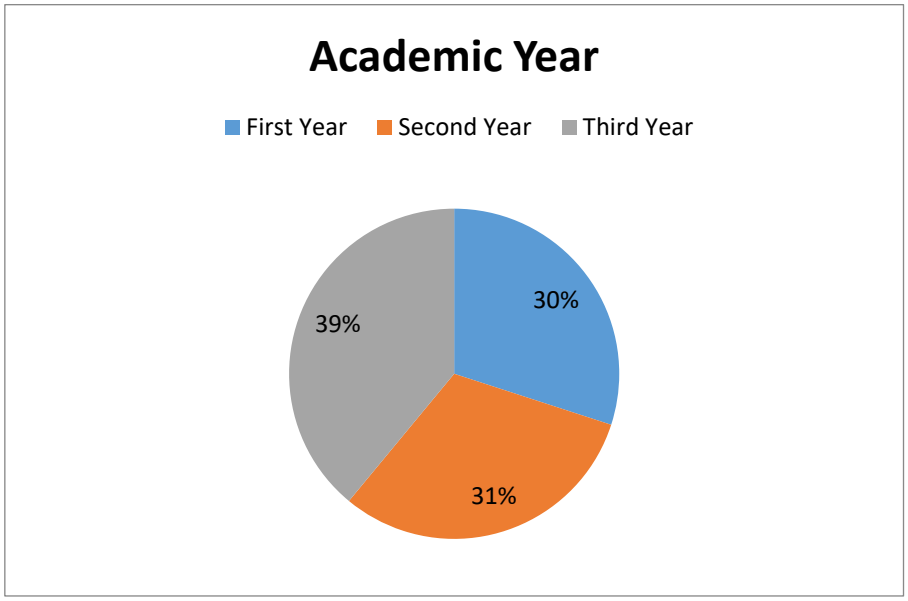


Figure: Frequency distribution for Academic Year

Interpretation: The majority of participants belong to the third-year group (39%), followed by second-year students (31%), and first-year students (30%).

Table: Frequency Table for Prior Training

Prior Training	Frequency	Percent
Yes	43	43.0%
No	57	57.0%
Total	**100**	**100.0%**

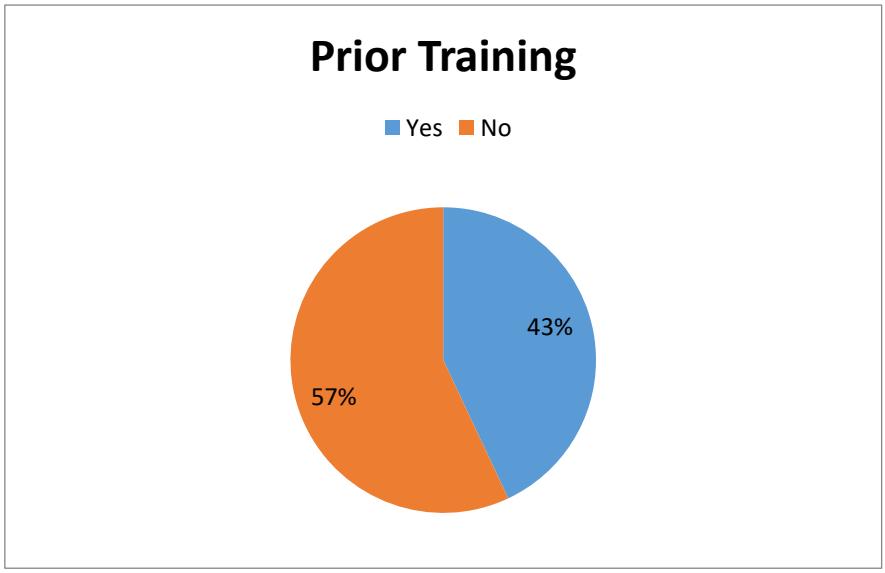


Figure: Frequency distribution for Prior Training

Interpretation:

Only 43% of students reported having prior training in crash cart usage, while 57% had no prior exposure, indicating a significant gap in emergency preparedness training.

Findings and Discussion

This study aimed to assess radiology students' knowledge of emergency crash carts, focusing on their awareness of crash cart organization, emergency drug administration, and resuscitation protocols. The findings were analyzed using frequency distributions, descriptive statistics, and crosstab analysis with chi-square tests to determine the statistical significance of relationships between knowledge levels and demographic factors such as age, gender, academic year, and prior training. This section presents an in-depth discussion of the findings and their implications for radiology education and emergency preparedness.

Key Findings from Frequency Distributions

The age distribution of the participants was relatively balanced, with 30% of students in the 18-21 age group, 31% in the 22-25 group, and 39% in the 26-30 category. The findings showed no significant correlation between age and crash cart knowledge, indicating that knowledge levels were not necessarily influenced by age. Although older students (26-30 years) scored slightly higher on the knowledge assessment, the chi-square test results showed no statistical significance ($p = 0.25$). This suggests that other factors, such as education level and training exposure, may play a more prominent role in determining crash cart knowledge. These findings align with research by Vukmir (2006) [14], which emphasizes that emergency preparedness is more closely related to hands-on experience rather than age. Additionally, the World Health Organization [15] reported that knowledge retention in medical education is influenced by repetitive exposure and practice rather than age differences among students. This reinforces the importance of structured emergency training programs rather than relying on age as a predictor of emergency preparedness. The gender distribution was almost equal (52% male, 48% female), ensuring a balanced representation of radiology students. The findings revealed no significant gender-based differences in crash cart knowledge ($p = 0.53$), indicating that both male and female students had comparable awareness

CONCLUSION

This study provides valuable insights into the knowledge levels of radiology students regarding emergency crash carts. The findings confirm that prior training and academic exposure significantly impact crash cart competency, while age and gender do not influence knowledge levels. Despite moderate awareness among students, there remains a significant gap in practical emergency response training, particularly among first-year students and those without prior training. To address this, structured training programs, hands-on simulation exercises, and interdisciplinary collaborations should be implemented across radiology education programs. The study highlights the importance of ensuring that all healthcare personnel, including radiology students, are equipped with the necessary skills to assist in emergency situations. By introducing structured crash cart training, increasing clinical exposure, and conducting competency assessments, medical institutions can enhance students' confidence, improve emergency response times, and ultimately contribute to better patient outcomes.

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