

Nurses' Knowledge Regarding CT Scan Procedures a Study at Tal Afar General Hospital and Health Centers

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Abstract:

Computed tomography (CT) is a fundamental imaging sensory system utilized to investigate a broad range of medical circumstances. Nurses play an important function to the preparation and education of patients for CT scans, to ensure safety protocols to effect communication with potential radiologists and relative healthcare providers. Although there are scarce studies to uncover the nurse's knowledge with regards to CT scan processes, particularly in the areas with limited resources, this study seeks to assess the level of knowledge as well as level of awareness among nurses in the region of Tal Afar General Hospital and other health facilities and other similar health clinics with regards to CT scan procedures.

A numerical cross-sectional analysis was conducted with the use of a structured questionnaire distributed to 150 assigned health workers, especially the nurses. The data was analyzed through SPSS version 25, which focuses on the descriptive statistics and independent samples t-tests, as well as Pearson correlation. The study indicated that the nurses contained a modest to maximum stage of knowledge in areas with that has link with patients' preparation, in radiation safety, and the CT scan process steps. And it was indicated that there were no numerically significant variations in knowledge between female and male subjects. The potent agreement was recorded in question Q1 (94.7%), while the least arrangement was found in Q14 (47.3%).

While broad knowledge of CT scan processes among the nurses was sufficient, which targets training is recommended to deal with specific chasm. Enhancing knowledge in radiation protection and patient alignment can improve investigation precision and patient safety.

1. Introduction:

Computed tomography (CT) has transformed investigative imaging through enabling swift and comprehensive visualization of internal body systems. Since its introduction in the 1970s, CT technology is indispensable with regards to the emergency medicine, trauma evaluation and oncology and neurology because of its ability to create high-resolution and cross-sectional images in seconds [1,2]. CT scans provide conventional radiography which includes excellent contrast resolution and the capability to reconstruct three dimensional pictures [3,4].

Nevertheless, the benefits of CT imaging should be followed by the expected challenges and the need for stern procedural guidelines. These potential challenges offer vital function to ensure patient safety and optimum imaging results. Nurses should be responsible for patient arrangement, monitoring and communication to make their knowledge of CT procedures important [5,6].

Numerous studies have stressed the significance of nurses being educated in the radiation protection ethics and the indications for CT usage and patient care procedures before, during and of course, after imaging [7,8]. Sufficient knowledge in these domains may lead to the process of delays and as well increase patient anxiety or faulty diagnosis [9,10].

While CT scan usage has increased universally, research evaluating nurses' level of knowhow in the less-developed zones is still very minimal. In Iraq, especially in the area of Tal Afar, there is insufficient data that is published on the examination of nurses to perceive and manage CT processes. This study attempts to fill this existing gap through the assessment of their knowledge levels and provide insight into the possible educational demands to support them in the evidence-inclined practice. [11,12].

2. Objectives:

The main purpose of this study is to evaluate the knowhow level of nurses with regards to the CT scan processes in Tal Afar General Hospital and the related health centers.

Precise objectives include the following:

- 1- To assess nurses' perception of patient arrangement before taking a CT scan.
- 2- To evaluate the knowhow of radiation safety as well as protection in the process of CT imaging.
- 3- To regulate awareness of nurses with regards to contraindication and the risks connected with CT contrast agents.
- 4- To examine whether the key factors like gender, education, and age level of the CT level of the CT-inclined knowledge.
- 5- To find out the zones where additional training or educational programmes may be required for nursing staff.

3. Methodology:

I- Study Design and Setting

This study used a quantitative as well as cross-sectional design. The study was carried out at Tal Afar General Hospital and primary health facility in Tal Afar health centers in Tel Afar, the ninth governorate in Iraq.

II- Population and Sample

The target population comprised of nurses who work in the radiology departments, emergency units and inpatient wards. About 150 nurses with at least one year of clinical experience that took place in the study utilizing convenience sampling.

III- Data Collection Tool

The main tool for data collection in this study was a projected questionnaire that is structured in form. The instrument comprised of primary data collection tool for this study comprised of closed ended questions which cover the key areas regarding media administration, positioning processes, radiation safety conventions and patient preparation. The complete data was gathered via a self-administered survey to allow the nurses at the health center to independently complete the allocated questionnaire for real perception.

IV- Data Analysis

SPSS version 25 was utilized for the purpose of data collection and analysis. The numerical statistics were later used as well as the t-tests to compare the subjects involved and finally the Pearson correlation was used to identify associations among knowledge items.

V- Ethical Considerations

Knowledgeable consent was obtained from all participants. The study protocol was approved by the administrative and moral committee of Tal Afar General Hospital.

4. Results:

There are around 150 nurses that contributed in this study as indicated viz; 60.7% were male and 39.3% female, with a mean age of 29.79 ± 6.45 years.

I- Descriptive Statistics

Table 1. Descriptive Statistics for Questionnaire Items.

Question	Mean	Standard Deviation
Q1	0.95	0.3
Q2	0.85	0.35
Q3	0.81	0.4
Q4	0.72	0.45
Q5	0.73	0.45
Q6	0.67	0.47
Q7	0.69	0.47
Q8	0.67	0.47
Q9	0.59	0.49
Q10	0.63	0.48
Q11	0.63	0.48
Q12	0.67	0.47
Q13	0.68	0.47
Q14	0.47	0.5
Q15	0.56	0.5

II- Gender-inclined Comparison

Table 2. Independent Samples T-Test by Gender

Question	t-Statistic	p-Value
Q1	0.4713	0.6381
Q2	1.1059	0.2706
Q3	0.6709	0.5033
Q4	-0.5627	0.5745
Q5	-0.0472	0.9624
Q6	0.47	0.6391

Q7	1.6299	0.1052
Q8	-0.5877	0.5576
Q9	1.0198	0.3095
Q10	1.1652	0.2458
Q11	0.4712	0.6382
Q12	-1.2987	0.1961
Q13	0.0427	0.966
Q14	0.6416	0.5221
Q15	-0.2477	0.8047

No numerically significant variations were found between male and female nurses.

III- Correlation Analysis of Questionnaire Items

To assess the internal reliability and possible connections between different items in the questionnaire, a Pearson correlations matrix was obtained, as indicated in Fig. X. this matrix offers a detailed overview of the linear links among the 15 items comprised in the survey.

As indicated in the projected heatmap, most relationships seem positive but weak, also with coefficients broadly ranging between correlations 0.10 and 0.30. The potent relationships were recorded between Q2 and Q3 ($r = 0.37$), Q13 and Q14 ($r = 0.28$), and Q14 and Q15 ($r = 0.32$), to indicate a modest connection of these items. These findings deal with the conceptual alignment among some compulsory items, especially in the sections related to the nurses' perception of CT scan arrangement and safety processes.

The lack of powerful correlations ($r > 0.5$) shows that whereas some elements are related, it will be likely to evaluate the distinct dimensions to knowhow, which seems favourable to ensure content coverage and to avoid redundancy in the applied instrument.

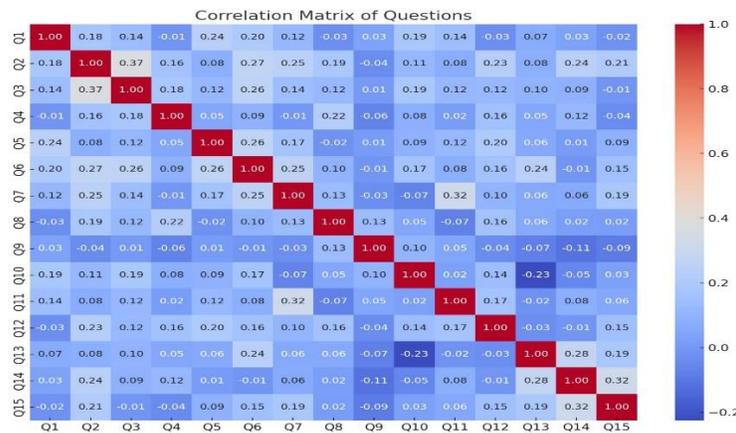


Fig. (1): Correlation Matrix indicating Pearson's r Between Questionnaire Items.

5. Discussion:

The findings of this study offer an essential result in the current study which deals with CT-inclined knowhow among the nurses in Iraqi region. The participants indicated relatively potent understanding in the basic concepts like the patient arrangement and general CT processes. These findings are in consonance with international observation on the essence of imaging literacy among the nursing members [1,2].

However, remarkable deficiencies were recorded in specific zones like the radiation safety and possible contrast warnings. The result shows an alignment with studies that indicate under-resourced healthcare systems observed elsewhere, innovative imaging topics were neglected in

standard nursing education [3,4]. The lack of gender-inclined variations reinforces the view that knowledge acquisition is dependent on educational exposure and organizational support than on the demographic tenets [7,8].

The weak associations between knowledge items and the further show that perception in a certain domain cannot predict efficacy level. This topic-inclined educational interventions rather than generalized sessions tailored the potential investment in the nursing education to cover the existing knowledge chasm [9, 10]. So, Tal Afar is facing a limited resource tendencies but it seeks to promote effective clinical outcomes [13, 14].

The relationship matrix (Figure X) shows numerous modest and meaningful relationships between questionnaire items of Q13 and Q14, as well as in Q14 and Q15. These items are related to nurses' knowledge on CT scan safety processes and patient arrangement to suggest the participants that are knowledgeable in a specific area to indicate awareness in some areas.

The modest correlation between Q2 and Q3 ($r = 0.37$) in addition shows a potential group of knowledge with regards to procedural steps prior to the scan. This connects with CT preparation and radiation risks usually happens among the trained nursing staff the reliability of this process can be observed with the employment of these criteria.

6. Conclusion:

In conclusion, this study was carried out at the province of Tal Afar General Hospital, the study thus, revealed a striking gap in the focused knowledge of nursing officers with regards to CT scan processes. This also highlights an urgent demand for a comprehensive educational intercession of various kind. The findings realized unfolds that although the nurses both seniors and juniors have the foundational clinical abilities, their perception of some unique protocols, especially with regards to media management, patient arrangement and the safety of the radiation is direly inadequate, of which, they can showcase their optimum quality and safety. This shortage will underscore the necessity for hospital seminar and workshops. Dealing with this potential chasm is necessary to improve nursing competence, decrease technical faults and eventually raise the feasible standard of diagnostic imaging works in the ecosystem.

6. Recommendations:

- a. The need to execute a structured training sessions that is focused on CT scan processes with regards to radiation safety and management.
- b. The need to engage analytic imaging education into nursing school curricula.
- c. The need to establish a continues professional growth (CPD) projects with the use of interactive and real-world formats
- d. The need to use digital and tele-education arenas to reach nurses in distanced zones.
- e. The need to inspire hospital administrators to participate in educational infrastructure for radiology-inclined nursing education.
- f. The need to conduct regular follow-up evaluations to display knowledge enhancement over time.

7. References:

1. H. Kalender, "Computed Tomography: Fundamentals, System Technology, Image Quality, Applications," Publicis, 2011.
2. P. B. Naylor, "The evolving role of CT in clinical diagnosis," Radiologic Clinics of North America, vol. 56, no. 1, pp. 1–12, 2018.

3. A. Bushberg et al., "The Essential Physics of Medical Imaging," 3rd ed., Lippincott Williams & Wilkins, 2011.
4. S. Brenner and E. Hall, "Computed tomography — an increasing source of radiation exposure," *New England Journal of Medicine*, vol. 357, no. 22, pp. 2277–2284, 2007.
5. M. Alotaibi and M. Alqurashi, "Knowledge of radiation protection among nurses working in radiology departments," *Radiography*, vol. 25, no. 2, pp. 158–163, 2019.
6. T. Sweeney and S. Akhtar, "Nursing roles in CT imaging: A review," *British Journal of Nursing*, vol. 29, no. 10, pp. 582–587, 2020.
7. A. Rahman et al., "Assessment of knowledge about radiation protection among healthcare workers," *Journal of Clinical and Diagnostic Research*, vol. 14, no. 5, pp. TC06–TC10, 2020.
8. R. Singh and B. Singh, "CT scan awareness among nurses: a cross-sectional study," *Journal of Medical Imaging and Radiation Sciences*, vol. 51, no. 3, pp. 466–470, 2020.
9. H. Ali and M. Alnassar, "Contrast media reactions: nursing responsibilities and patient safety," *Radiologic Technology*, vol. 92, no. 3, pp. 248–256, 2021.
10. M. Elmokadem et al., "Educational needs for radiology nurses in contrast-enhanced imaging," *International Journal of Nursing Sciences*, vol. 7, pp. 112–117, 2020.
11. J. Wilson and T. Pope, "The impact of continuing education on radiology nursing practices," *Journal of Radiology Nursing*, vol. 39, no. 1, pp. 27–33, 2020.
12. K. Hammad and R. Qasim, "Radiological education gaps in low-resource countries," *BMC Medical Education*, vol. 20, no. 1, pp. 1–7, 2020.
13. Ministry of Health – Iraq, "Annual Report on Health Workforce Distribution," 2023.
14. A. Younis and N. Hasan, "Challenges in nursing education in post-conflict Iraq," *Nursing Reports*, vol. 11, no. 4, pp. 957–964, 2021.