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Assessment of Safety Care Practices Regarding Intrahospital Transfer of Critically Ill Patients

Mohamed Ezzat Fahmy[1], Zeinab Hussein Ali[2], Sabah Nagah Hassan,[3]

1. *Clinical Instructor, Al Ryada University for Science and Technology,*
2. *Professor of Medical Surgical Nursing,* Faculty of Nursing-Helwan University
3. *Assistant Professor of Medical Surgical Nursing,* Faculty of Nursing-Helwan University.

Abstract

Background: Critically ill patients' transportation represents a challenging task as patients are often moved in unusual environments. Nurses are essential members of the transfer team, and their role in preventing complications and achieving optimal therapeutic outcomes is undeniable. **Aim**: This study aimed to assess nurse's safety care practices regarding intrahospital transfer of critically patients. **Design**: A descriptive exploratory research design was utilized to achieve the aim of this study. **Setting**: The study was conducted at critical care unit affiliated to Menofia University Hospital in Menofia government. **Sample**: A convenient sample of 70 nurses working at the intensive care unit and convenient sample of all available patients 70 who were transferred from the intensive care unit. **Tools**: two tools were used in this study; self-administered questionnaire included 3parts: personal and work-related characteristics, nurses' knowledge assessment questionnaire and nurses' safety care practices. Interview questionnaire included 3 parts: demographic data for the patients, preparedness factors and intrahospital transfer related complications. **Results**: The current study illustrated that about more than one half and around two thirds of the studied nurses had satisfactory knowledge and unsatisfactory practices regarding intrahospital transfer respectively and around two thirds of the studied patients had mild risk during intrahospital transfer **Conclusion**: There was a statistically significant satisfactory knowledge and unsatisfactory practice of the studied nurses in addition to around two thirds of the studied patients had mild risk during intrahospital transfer. **Recommendations**: This study recommended periodic educational program for nurses including defining of intrahospital transfer and further studies are needed to assess the relationship of patients' medical characteristics with their risk of complications during intrahospital transfer.

Keywords: *Critically ill patients, Intrahospital Transfer Safety Care Practices.*

Introduction

Intrahospital transport (IHT) is defined as the movement of patients between different units in the hospital for diagnostic and therapeutic objectives. IHT is an important and inevitable part of medical care delivery in the intensive care unit (ICU) setting. The process of IHT often includes moving a patient on their bed or stretcher with the ventilator, intravenous pumps and other equipment to other units within the hospital (e.g., medical imaging) for a specific period. Although it usually does not take long to complete, IHT can be a hazardous process for critically ill patients because of the sudden change of treatment environment, monitoring, or medical resources. These circumstances can make it difficult to detect Important changes in the patient's condition or manage the occurrence of adverse events ***(Song et al., 2022).***

Intrahospital transportation is described as a high-risk intention that demands time and leads to feelings of worry and insecurity. Good teamwork and a safety culture reduce the risk of complications during IHT. Ineffective communication in the transport team or when the staff does not have enough training in IHT may impair patient safety during transport. Incidents that cause deterioration in patients' vital parameters are lower in hospitals where specialized IHT teams are responsible for IHT ***(Skoglund et al., 2024).***

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To avoid transfer complications, there are safety care practices should be applied as: employing trained personnel and suitable equipment, monitoring all movements throughout the process (including diagnostic procedures), and using a checklist to ensure the correct delivery of services and resources the benefits of using checklists include their comprehensive nature, optimizing the usage of resources, and enhancing the performance of the treatment team. Undoubtedly, there are downsides to checklists as well, some of which concern the time they require (due to too many items), dependency on observation criteria, likelihood of bias on the part of the person who fills them, lack of attention to details, fatigue, and improper usage. In fact, checklist provides a standard and safe method for assessing intrahospital transfer ***(Akrami et al., 2019).***

Nurses are essential members of the transfer team, and their role in preventing complications and achieving optimal therapeutic outcomes is undeniable; consequently, it is necessary for them to develop their nursing care knowledge to maintain professional standards. While transferring critical patients, nurses endure a great deal of stress because of their high vulnerability. Cognitive performance is negatively affected by increasing fatigue and stress. Stressful situations can also lead to errors in judgment, impair the implementation of standard procedures, and prevent nurses from exercising their skills fully ***(Akrami et al., 2019).***

Significance of the study

The overall incidence of adverse events during inter-hospital transfer reported in the global literature was approximately 68% with serious adverse events occurring in between 4.2% - 8.9%.4 The rates of cardiac arrest during transfer were reported as 0.38% to 1.6%. Haemodynamic and respiratory complications are among the most common complications during transfer of critically ill patients with artificial airways. Problems with ventilation, blood pressure control, and arrhythmias are common according to the current evidence ***(Punchihewa & Perera., 2024)***. In Egypt, the number of critically ill patients admitted to intensive care unit at Menofia University Hospital were 2482 in 2024***(statistical center of Menofia university hospital,2024)***.

Nurses are essential members of the transfer team, and their role in preventing complications and achieving optimal therapeutic outcomes is undeniable; consequently, it is necessary for them to develop their nursing care knowledge to maintain professional standards. While transferring critical patients, nurses endure a great deal of stress because of their high vulnerability. Cognitive performance is negatively affected by increasing fatigue and stress. Stressful situations can also lead to errors in judgment, impair the implementation of standard procedures, and prevent nurses from exercising their skills fully ***(Akrami et al., 2019).***

Aim of the Study

This study aimed to assess safety care practices regarding intrahospital transfer of critically ill patients, through the following objectives:

1- Assess nurses' knowledge regarding intrahospital transfer of critically patients.

2- Assess nurses' safety care practices regarding intrahospital transfer of critically patients

3- Assess preparedness factors that causing complications during intrahospital transfer of critically ill patients.

4- Assess intrahospital transfer related complications for critically ill patients.

Research questions:

The objective of study was achieved through answering the following questions:

1-What is the nurses' level of knowledge regarding intrahospital transfer of critically patients?

2-What are nurses' safety care practices regarding intrahospital transfer of critically ill patients?

3-What are preparedness factors that causing complications during intrahospital transfer of critically ill patients?

4-What are intrahospital transfer related complications for critically ill patients?

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Research design

A descriptive exploratory research design was utilized to achieve the aim of this study.

Descriptive design involves direct exploration, analysis and description of phenomenon. Exploratory design doesn't aim to provide the final and conclusive answers to research questions, but merely explores the research topic with various levels of depth ***(Hunter et al., 2019)*.**

Setting

The study was conducted at the critical care unit affiliated to Menofia University Hospital in Menofia government. The critical care unit contains 18 beds, 8 ventilators and one dialysis machine. There were 70 nurses, 12 nurses every shift and 2 physicians.

Subjects

Two types of subjects were included in this study:

1. A convenient sample of 70 nurses working at the intensive care unit was included in the study.
2. A convenient sample of all available patients (70) were transferred from the intensive care unit during the time of the study.

Tools of data collection: -

Data was collected by using two tools as the following: -

Tool (I): Self-administered questionnaire: Part (I): Personal and work-related characteristics of the nurses:

This part was developed by the investigator to assess personal and work-related characteristics of the nurses studied as age, gender, years of experience at ICU, previous training courses, workshops related to patient's safety during intrahospital transfer and educational level.

Part (II): Nurses knowledge assessment questionnaire:

This part was developed by the investigator based on review of related literature **(Abo El abas et al.2022& Hashemain et al. (2023))** It was used to assess nurses' level of knowledge regarding intrahospital transfer of critically ill patients, It included 12 items covering 3 main domains: definition of intrahospital transfer (5 items), patient's monitoring during intrahospital transfer(4 items) and complications of intrahospital transfer(3 items).

Scoring system of nurse s' knowledge assessment questionnaire:

Each correct answer had score 1 and the incorrect answer had score zero. Total scores of knowledge ranged from 0 to 12 degrees and were categorized as:

-Satisfactory if the total score is 80% or more.

-Unsatisfactory if the total score is less than 80%. (**Younis et al., 2022).**

Part (III): Nurses' safety care practices observational checklist.

This checklist was developed by the investigator based on reviews of related literature ***(Rinders et al., 2022) Megahed et al., (2023)***. It was used to assess nurse's safety care practices before, during and after transfer of critically ill patients. This checklist included 29 items, covering 4 main domains; preparation of patient (9 items), preparation of equipment (10 items), nurses practice during intrahospital transfer (5 items) and nurses practice post hospital transfer (5 items).

The scoring system of nurses' practices observational checklists:

Each step that was done had score 1 and the step that wasn't done had score zero.

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Total scores of practices ranged from 0 to 29 degrees and were categorized as:

- Satisfactory if the total score is 80% or more.
- Unsatisfactory if the total score is less than 80% ***(Younis et al., 2022).***

Tool (II): Interview questionnaire:

Part (I): Demographic and medical data of the patient.

This part was developed by the investigator based on related literature **(Reinders et al., 2022)** and this part was used to assess demographic data and medical characteristics of the patients; as age, gender, diagnosis, level of consciousness, duration of intensive care unit stay, the reason for intrahospital transfer, Past medical history included previous history for complications during transfer, history of chronic disease and previous operations.

Part (II): Preparedness factors that affect intrahospital transfer complications:

This part was adopted from (**Elsayed., 2022)** This scale was used to assess the risk of intrahospital transfer complications of critically patients. It included 23items as age, body mass index, central nervous system (3 items), cardiovascular system (5 items), ventilation and perfusion (9 items) and equipment (4 items).

Scoring system of preparedness scale:

The total score ranged from zero to 60 and was categorized as: zero mean no risk, 1- 34 mean low risk, 35-59 high risk and score 60 mean a dangerous risk.

Part (III): Intrahospital transfer related complications questionnaire:

This part was developed by the investigator after reviewing related literature ***Akpinar et al. (2020); Khan et al. (2021); Jain et al. (2023)*** to assess the complications during intrahospital transfer of critically ill patients and included 38 items covering 2 main domains:

- Intrahospital transfer complications regarding equipment (13 items) as complications regarding mechanical ventilation (3 items), complications related to monitoring (4 items), complications related to intravenous lines (3 items), and complications related to infusion pump (3 items)
- Intrahospital transfer complications regarding patients (25 items) as cardiovascular complications (7 items), metabolic complications (4 items), respiratory complications (9 items) and central nervous system complications (5 items).

Validity:

The developed tool was formulated and submitted to five experts in medical surgical nursing to assess content validity, needed modifications were done.

Reliability:

Cronbach's Alpha was used to determine the internal reliability of the developed tool. Reliability of the tools was tested to determine the extent to which the tools items are related to each other. Reliability score for nurses' knowledge assessment questionnaires was 0.738 and for nurses' safety care practices regarding intrahospital transfer of critically patients was 0.919. Additionally, the reliability score for preparedness risk factors scale that affect intrahospital transfer complications was 0.747 and for intrahospital transfer related complications was 0.867.

Ethical consideration:

An official permission to conduct the proposed study was obtained from the scientific research ethics committee. Participation in the study was voluntary, and subjects were given complete full information about the study and their role before signing the informed consent. The ethical consideration

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included explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it wasn't accessed by any other part without taking permission of the participants. Ethics, value, culture, and beliefs were respected.

Pilot study:

The pilot study was done on 10% of the sample (7 nurses and 7 patients) to examine the clarity of questions and time needed to complete the study tools. Based on the results, minor modification was done (if necessary) subjects included in the pilot study were excluded from the study and replaced by another.

Field work:

1. Data were collected within 6 months from May 2024 to October 2024.
2. The investigator visited the intensive care unit two days per week (Tuesday and Thursday) during the morning shift (9am: 2Pm).
3. **Data was collected through two phases:**

Phase (I): **from the studied nurses:**

4. The purpose of the study was simply explained to the nurses who agreed to participate in the study prior to any data collection.
5. A self-administered questionnaire was used to assess personal and work-related characteristics of the nurses and nurses' knowledge assessment regarding intrahospital transfer of critically ill patients it was taken 10-15 minutes for each nurse.
6. Assessment of nurses' safety care practices regarding intrahospital transfer observational checklist it took 15- 20minutes.
7. The nurses studied were indirectly observed for their safety care practices pre, during and post intrahospital transfer of critically ill patients. They were observed during their preparation of equipment and patients before intrahospital transfer, their monitoring of patients' condition during transfer and their practices post transfer.

Phase (II): from the studied patients:

8. The structured interview was made to conscious patients and families of unconscious patients to collect the demographic and medical data of the patients that included questionnaire was filled in by the investigator it was taken 10-15 minutes for each patients.
9. Preparedness scale that used to assess preparedness factors that affect intrahospital transfer complications for critically ill patients took 20-25 minutes. Assessment of Intrahospital transfer related complications questionnaire it took 15-20minutes.
10. The patient was assessed for the risk factors of intrahospital transfer before their preparation for transfer.
    a. -Some clinical parameters were assessed from patient's records as body mass index cervical spine injury and Glasgow coma scale. Other parameters were assessed through observing monitors as systolic blood pressure, pulse, ECG changes, temperature, respiratory rate and oxygen saturation.
    b. -The investigator assessed patients for agitation by using Richmond agitation sedation scale (RASS) and mechanically ventilated patients were monitored for friction of inspired oxygen (FIO2) and positive ended expiratory pressure (PEEP).
    c. -The investigator monitored patients for use of emergency medications, the need for intravenous therapy, gastrointestinal loss as vomiting or bleeding and the number of invasive devices.
    d. -The investigator assessed patients' risk for falling by using Morse fall risk scale.

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e. -The investigator assessed for the availability or the indications for some equipment during patients' transfer as oxygen cylinder, portable mechanical ventilation, portable pulse oximeter or portable syringe pump or infusion pump.

11. The patients were monitored for the incidence of intrahospital transfer complications including complications related to equipment such as mechanical ventilation, monitors, intravenous lines and infusion pumps and complications related to patients such as cardiac, respiratory, metabolic or central nervous system complication.

IV- Statistical item:

Upon completion of data collection, collected data were organized, tabulated and analyzed using Statistical Package for Social Science (SPSS), version 24 for analysis. For quantitative data, numbers, percentage, mean, and standard deviation (SD) were used to describe results. For qualitative data which describe a categorical set of data, frequency and percentage of each category were calculated. Appropriate significance was adopted at $P \leq 0.05$ for interpretation of results **(Siregar, 2021)**. The observed associated differences were considered as not significant if $p>0.05$ and significant if $p \leq 0.05$. Appropriate inferential statistics such as chi square test were used as well.

Results

Table (1): Frequency and percentage distribution of the studied nurses according to their demographic data (n=70).

Items		No	%
Age	20 to less than 30 years	34	**48.6**
	30 to less than 40 years	25	35.7
	40 to less than 50 years	7	10.0
	50- ≤ 60 years	4	5.7
Mean ± SD	**32.157 + 8.158**		
Gender	Male	21	30.0
	Female	49	**70.0**
Years of experience at ICU	<1 year	13	18.6
	1- <5 years.	23	**32.9**
	5- <10 years.	22	31.4
	>10 years	12	17.1
Mean ± SD	**5.800 + 4.0836**		
Attending training courses related to patients' safety regarding IHT	Yes	42	**60.0**
	No	28	40.0

IHT Intrahospital transfer

Table 1: shows that 48.6 % of the studied nurses aged from 20 to less than 30 years with a mean age 32.157 ± 8.158, 70% of them were females. Regarding nurses' experience, 32.9% of them had 1- < 5 years of experience at ICU and 60% of the studied nurses attended training courses related to safety care practices regarding IHT.

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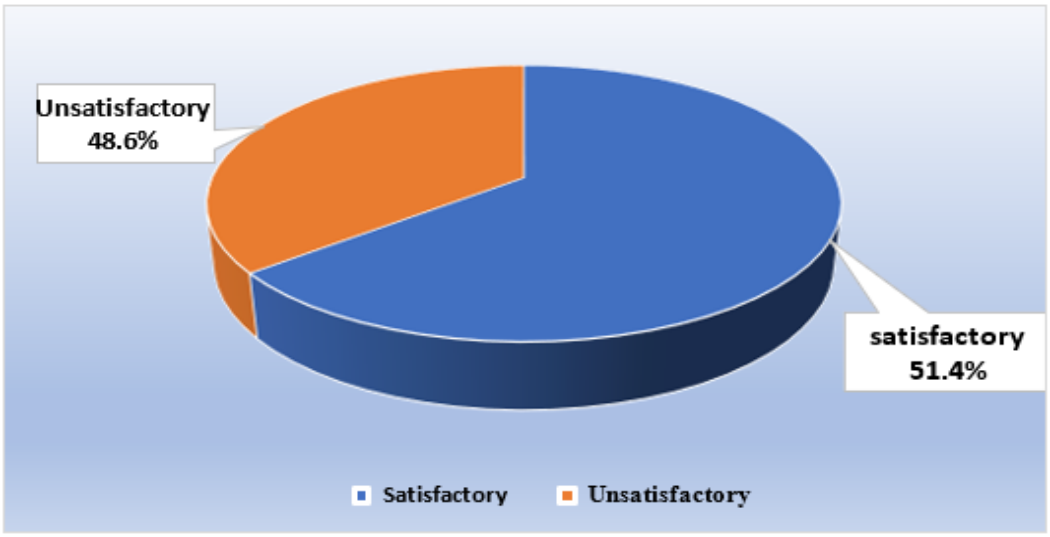

Figure (1): Frequency and percentage distribution of the studied nurses according to their total safety care practices regarding intrahospital transfer (n=70).

Fig (1): illustrates that 64.3% of the studied nurses had incompetent practices regarding intrahospital transfer and 35.7% of them had competent practices.

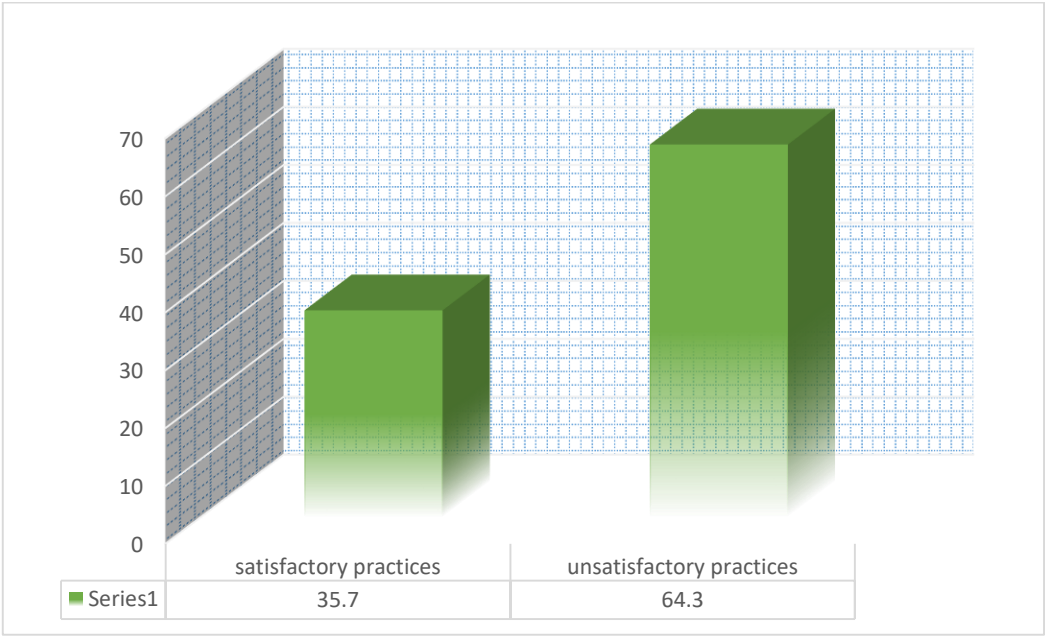

Figure (2): Frequency and percentage distribution of the studied nurses according to their total safety care practices regarding intrahospital transfer (n=70).

Fig (2): illustrates that 64.3% of the studied nurses had unsatisfactory practices regarding intrahospital transfer and 35.7% of them had satisfactory practices.

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Table (2): Frequency and percentage distribution of the studied patients according to their demographic and current medical data (n=70).

Items		No	%
Age	20 to less than 30 years	5	7.1
	30 to less than 40 years	11	15.7
	40 to less than 50 years	16	22.9
	50- ≤ 60 years	20	**28.6**
	> 60 years	18	**25.7**
Mean ± SD	**52.357 ± 15.656**		
Gender	Male	39	**55.7**
	Female	31	44.3
Diagnosis (*)	Stroke	9	12.9
	Cerebral hemorrhage.	13	**18.6**
	Myocardial infarction.	10	14.3
	Rood traffic accidents.	26	**37.1**
	COPD	7	10.0
	Acute kidney injury	3	4.3
	Gastrointestinal bleeding	9	8.6
	Diabetic ketoacidosis	5	7.1
	Other (pneumothorax, emphysema)	12	**17.2**
Level of consciousness	Conscious.	33	**47.1**
	Semi-conscious.	18	25.7
	Comatose.	19	27.1
Duration of ICU stay	1- 5 days	43	**61.4**
	6- 10 days	20	28.6
	11- 20 days	6	8.6
	More than 20 days	1	1.4
Mean ± SD	**5.3143 ± 5.499**		

COPD Chronic obstructive pulmonary disease
(*) mean this value isn't mutually exclusive

Table 2: reveals that 28.6% and 25.7% of the studied patients aged from 50- < 60 years and more than 60 years respectively with a mean age 52.357 ± 15.656, 55.7% of them were males. Regarding patients' diagnosis, 18.6% of the studied patients had cerebral hemorrhage, 37.1% had RTA and 17.2% of them had other diagnosis as pneumothorax, emphysema and pulmonary embolism. Concerning patients' medical data, 47.1% of them were conscious and 61.4% of them stayed for 1-5 days at intensive care units with a mean duration 5.3143 + 5.499.

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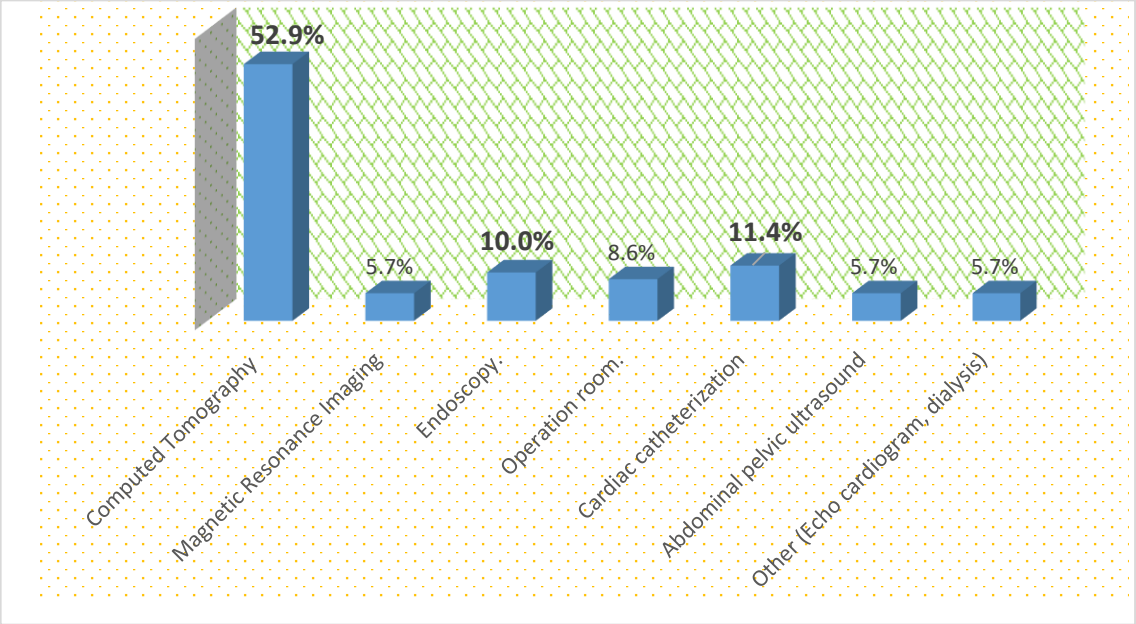

Figure (2): Frequency and percentage distribution of the studied patients according to their reason for intrahospital transfer (n=70).

Fig (2): illustrates that 52.9% of the studied patients were transferred from ICU for having computed tomography. As well, 11.4% and 10% of them were transferred for cardiac catheterization and endoscopy respectively.

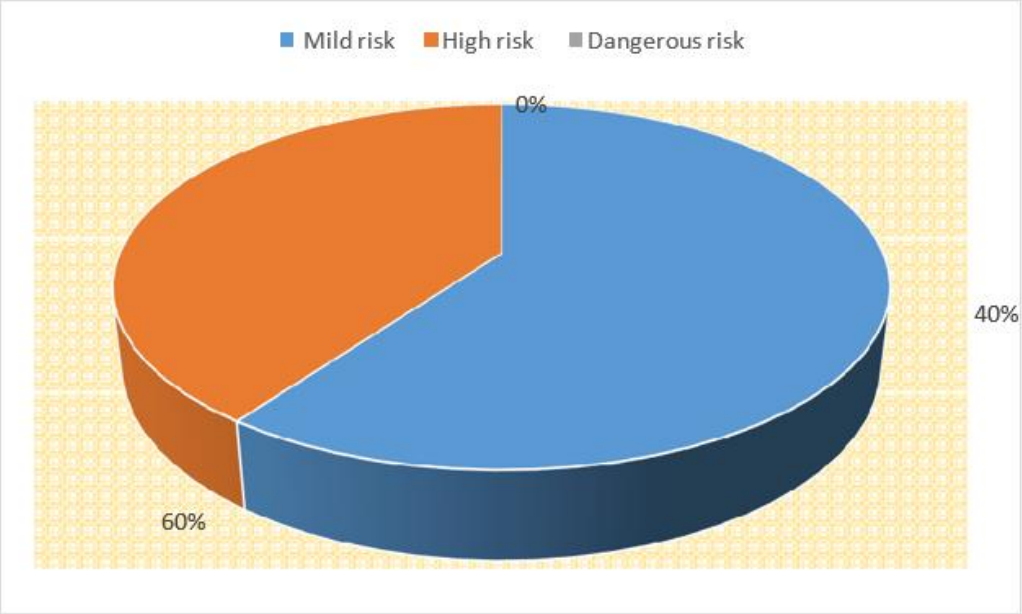

Figure (3): Frequency and percentage distribution of the studied patients according to their total preparedness risk score (n=70)..

Fig (3): illustrates that 60% of the studied patients had mild risk during intrahospital transfer and 40% of them had high risk, while 0% of them had dangerous risk during intrahospital transfer

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Table (3): Frequency and percentage distribution of the studied patients according to intrahospital transfer complications regarding patients (n=70).

Items	Present		Absent	
	No	%	No	%
Cardiovascular complications				
Hypertension.	5	7.1	65	92.9
Hypotension.	28	**40**	42	60
Tachycardia.	20	28.6	50	71.4
Bradycardia.	19	27.1	51	72.9
Bleeding.	24	34.3	46	65.7
ECG changes.	38	**54.3**	32	45.7
Cardiac arrest.	9	12.6	61	87.4
Metabolic/Acid base complications				
Metabolic acidosis	10	14.3	60	85.7
Respiratory acidosis.	13	18.6	57	81.4
Metabolic alkalosis.	0	0.0	70	100.0
Respiratory alkalosis.	0	0.0	70	100.0
Respiratory complications				
Oxygen desaturation.	23	**32.9**	47	67.1
Increase pressure in the air way	10	14.3	60	85.7
Blockage of air way secondary to secretion	10	14.3	60	85.7
Loss of the chest tubes.	5	7.1	65	92.9
Accidental extubation.	11	15.7	59	84.3
Pneumothorax.	8	11.4	62	88.6
Pulmonary embolism.	8	11.4	62	88.6
Bronchospasm.	12	17.1	58	82.9
Excessive cough.	19	27.1	51	72.9
Central venous system complications				
Raised intracranial pressure.	14	20.0	56	80.0
Agitation.	33	**47.1**	37	52.9
Spinal cord traction.	4	5.7	66	94.3
Cervical spine injury.	6	8.6	64	91.4
Exacerbation of existing trauma.	8	11.4	62	88.6

Table (3): reveals that 45.7% and 54.3% of the studied patients had hypotension and ECG changes as cardiovascular complications during intrahospital transfer. 32.9% of them had respiratory complications as oxygen desaturation and 47.1% of them had central nervous system complications as agitation.

Table (4): Correlations between total knowledge and practices of the studied nurses (n=70).

Items		Total knowledge score
Total practice score	Pearson Correlation	0.944
	Sig. (2-tailed)	0.009 *

Table (4): reveals that there was a statistically significant positive correlation between total knowledge and practices of the studied nurses with p value (0.009).

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Table (5): Correlations between intrahospital transfer complications of the studied patients and total knowledge and practices of the studied nurses (n=70).

Items		Intrahospital transfer complications
Total knowledge score	Pearson Correlation	- 0.999
	Sig. (2-tailed)	0.000 **
Total practice score	Pearson Correlation	- 0.917
	P value	0.013 *

Table (5): reveals that there was a high statistically significant negative correlation between total knowledge of the studied nurses and intrahospital transfer complications among the studied patients with p value (0.000). There was a statistically significant negative correlation between total practices of the studied nurses and intrahospital transfer complications among the studied patients with p value (0.013).

Table (6): Correlations between intrahospital transfer complications and total preparedness risk score of the studied patients (n=70).

Items		Intrahospital transfer complications
Total preparedness risk score	Pearson Correlation	0.958
	Sig. (2-tailed)	0.000 **

Table (6): reveals that there was a high statistically significant positive correlation between total preparedness risk score of the studied patients and intrahospital transfer complications with p value (0.000).

Discussion.

In relation to demographic and work-related data of the studied nurses, the results of present study show that about half of the studied nurses aged from 20 to less than 30 years, more than 2 thirds of them were females this related to most of the nurses that working at ICU were female. This study is consistent with **Hashemain et al (2023)** who conducted an across section study in Iran about "Evaluation of safety status of intrahospital transfer of critically ill patients from the perspective of emergency and ICU nurses" and mentioned that more two thirds of the studied nurses were female

Relating to total nurses knowledge regarding IHT, this study indicated that more than one half of the studied nurses had satisfactory knowledge about IHT, this related to attendance of training courses related to patients safety during IHT among less than two thirds of them in addition to the application of the transfer checklist at the study setting, this result is in an agreement with **Abo El abbas et al. (2022)** who conducted an Egyptian study titled "Risk factors associated with intra- hospital transportation among critically ill patient" and illustrated that the majority of the studied nurses had satisfactory level of knowledge about transfer of critically ill patients.
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Concerning total nursing practices, the current study illustrated that about two thirds of the studied nurses had unsatisfactory practices regarding intrahospital transfer and about one third of them had satisfactory practices, this finding may be related to many factors can affect their practice as the urgency of the transfer process and the workload. These finding in disagreement with **Dong et al., (2024)** who conducted cross sectional study in china about "Status of knowledge, attitude and practice of clinical nurses towards the intrahospital transport of critically ill patients" and illustrated that the minority of the studied nurses had low level of practice

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In relation to Studied patients' demographic and current medical data and past medical history, the current study illustrated that less than one third of the studied patients aged from 50- < 60 years and more than 60 years and more than one half of them were males. These finding is dissimilar to **Deng et al**., (**2024)** who mentioned that the minority of the patients were male.

Regarding patients' diagnosis the current study indicated that the highest percentage of them had RTA, cerebral hemorrhage, myocardial infarction or stroke.These results agree with **Akrami et al., (2019**) who conduct an interventional study in Iran, titled "Assessing the effect of training the safe transfer checklist on the quality of intrahospital patient transfer" and mentioned that less than one quarter of cases had neurological problems as cerebral hemorrhage and stroke.

This result also agrees with **Wulandari et al. (2020)** who conduct study in Malaysia its title " Study on the incidence of adverse events during intra-hospital transfer of critical ill patients from emergency department" and reported that minority of cases has neurological diseases.

Concerning patients' medical data, this study reported that about half of the studied patients were conscious and more than half of them stayed for 1-5 days at intensive care units. These findings could be related to patient diagnosis of myocardial infarction, COPD, pneumothorax, emphysema among about half of the patients. This study is similar to **Yonis et al., (2022)** who mentioned that about half of patients were had conscious level from 13:15.

This study illustrated that more than half of the studied patients were transferred from ICU for having computed tomography. Whereas the minority of them was transferred for cardiac catheterization and endoscopy respectively, this related to high percentage of patients who had cerebral hemorrhage therefore more than one half of them are transferred to CT for making CT brain follow up. These findings agreed with **Kwack *et al.* (2018)** who conducted A cohort study, titled "Effectiveness of intrahospital transportation of mechanically ventilated patients in medical intensive care unit by the rapid response team" and mentioned that about one half of the studied patients transferred to CT and minority of them transferred to endoscopy department.

The current study revealed that most of the patients had no previous history for complications during transfer, and more than half of them had a history of chronic diseases and the most of them had no history of previous operations. These findings are similar to **Mostafa et al., (2024),** who mentioned that there are about one half of the studied patients had previous history of chronic diseases and a minority of them has previous history for surgery.

As regards total preparedness risk score, the current study illustrated that about two thirds of the studied patients had mild risk during intrahospital transfer and more than one third of them had high risk, while none of them had dangerous risk during intrahospital transfer. This study finding matches with a study of **Zhang *et al.* (2021)** who conducted a study in India about Proactive risk assessment of intrahospital transport of critically ill patients from emergency department to intensive care unit in teaching hospital and its implications and reported that more than two thirds of patients during intrahospital transfer had a mild risk, while one third were identified as high risk, with no patients in the dangerous risk category.

The current study reveals that there was a statistically significant positive correlation between total knowledge and practices of the studied nurses. This finding is congruent with **Dong et al. (2024)** who showed a positive correlation between knowledge and practice scores. Additionally there was a high statistically significant negative correlation between total knowledge of the studied nurses and a statistically significant correlation between nurses practice scores and intrahospital transfer complications among the studied patients. This result is dissimilar to **Ghanem et al., (2023)** who conducted study in Egypt about "effect of intra-hospital safe transportation guidelines for critically ill patients on nurses' performance and Patients' clinical outcomes", and illustrated that the study variables and the adverse events that happened showed a strong statistically positive correlation.

The current study revealed that there was a high statistically significant positive correlation between total preparedness risk score of the studied patients and intrahospital transfer complications, thus indicating that

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increasing preparedness risk score lead to increasing patients risk for incidence IHT complications these findings is congruent with **Williams et al., (2020)** who approved that there was a high statistically significant positive correlation between total preparedness risk score of the studied patients and incidence of intrahospital transfer complications.

According to statistics, the most common complications that occur during intrahospital transfer of critically ill patients were interruption in oxygen supply due to reduced reserve in the cylinder and failure of battery of the infusion pump or the syringe pump and these complications are related to equipment , but there were another common complications related to patients as ECG changes, oxygen desaturation and agitation.

There were many factors affected the incidence of these complications as nurses knowledge and practices regarding IHT, in addition to the studied patients preparedness risk score which had statistically significant relation to patients diagnosis, level of consciousness and reason for transfer.

Conclusion

Based on the main findings of the study, it can concluded that:

There was a statistically significant satisfactory of knowledge and unsatisfactory practice of the studied nurses in addition to studied patients had a mild risk for intrahospital transfer. The majority and the most of the patients who were transferred with mechanical ventilator and infusion pump had complications and about half of them had cardiovascular, respiratory and central nervous system complications.

Recommendations:

Based on the results of the present study the following recommendations are suggested: Implementing recommendations for organizations:

1. Implementing periodic educational program for nurses including definition of IHT of critical ill patients, risk factors, the expected complications and how to manage these complications.
2. Intrahospital transfer strategies should be applied to improve patients' safety and prevent any complications.
3. Providing ICUs with standardized procedures in the form of a checklist constitutes a significant step towards reducing the number of IHT related AEs.

Recommendations for further studies:

1. More studies are needed to identify risk factors of intrahospital transfer complications**.**
2. Further studies are needed to assess the relationship of patients' medical characteristics with their risk of complications during IHT.
3. The study should be repeated on a larger sample for generalization of the study results.

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