
Relation between Nurses- Patients Ratio and Nursing Outcomes at Intensive Care Units**Hanaa Adel Ragab Elabasy^{1,2}, Heba Kamal Obied³, Seham Ali Mahmoud⁴**¹Master student of Nursing Administration, Faculty of Nursing, Tanta University, Egypt²Nurse Specialist at Qoutour Hospital³Assistant Professor of Nursing Administration, Faculty of Nursing, Tanta University, Egypt⁴Lecturer of Nursing Administration, Faculty of Nursing, Tanta University, Egypt**Corresponding Author:** PG_132497@nursing.tanta.edu.eg**Abstract**

Background: Better nurses- patients staffing ratio helps to improve nurses' attitudes toward their job and prevent adverse nursing outcomes and promote nurses' health and well-being which enhance them to deliver high quality patient care. **Aim:** Assess the relation between nurses - patients ratio and nursing outcomes at Intensive Care Units. **Design:** A descriptive correlation design was used. **Setting:** Intensive Care Units at Tanta University Main and Emergency Hospitals. **Subject:** All nurses (N=476) who were working at both hospitals. **Tools:** Data were collected by using two tools: Nurses- patients ratio and Nursing Outcomes Structured Questionnaire. **Results:** The average daily nurse to patient ratio in three shifts according to unit specialty was 2.10 ± 0.59 , 87.4% of intensive care nurses had unsatisfactory level of job satisfaction, 81.7% had a low level of burnout and 54.0% of had a low level of overall intention to leave. **Conclusion:** There was a statistically significant negative correlation between overall job satisfaction and the average daily Intensive Care nurses- patients ratio in three shifts, While, there were statistically significant positive correlation between overall IC nurses' burnout and intention to leave and the average daily nurses- patients ratio in three shifts. **Recommendations:** Hospital administration need to create IC policies and guidelines for safely nurses' ratio and staffing, Hospital /unit managers should offer flexible scheduling options to accommodate the needs of nurses, such as part-time or remote work arrangements.

Keywords: Nurse- patient ratio, Nursing Outcomes (Burnout, Job satisfaction, Intention to leave)

Introduction

Nurses are the foundation of any hospital systems, which have a diverse and intricate workload. They are in charge of providing the majority of patient care (ICUs) (Naseem et al., 2018; Chamaru and Mudihanselage, 2015). Nurses are the medical professionals who work 24 hours in intensive care units (ICUs) to provide direct patient care seven days a week. In ICUs, nurses handling difficult circumstances demands on both physical and mental effort from nurses. In order for nurses to efficiently and consistently manage patient care demands, it is critical that they have a sufficient number of nurses and a manageable workload (Stalpers et al., 2017).

The nurse-to-patient ratio is a crucial indicator of the standard and quality of care. It also plays a major part in establishing safe and healthy work environments for both nurses and patients. The ratio will be lower in critical care units since patients there need more round-the-clock attention and monitoring (Marshall et al., 2017). The ratio might be larger in long-term care facilities because patients' requirements might be more concentrated on health management. Adequate nurse staffing is essential for providing appropriate care, regardless of the setting—acute care hospital or long-term care facility. When nurses are overworked, patient care deteriorates and sometimes even endangers lives (McHugh et al., 2020).

Nurses-patients Ratios (NPRs) are described as the percentage of nurses accessible per patient and are used to disperse the number of nurses available in each hospital unit (Haegdorens et al., 2019). The patient to nurse ratio in hospitals is important to keep well balanced care, otherwise, it may result in poor patient care, a high patient death rate,

and more rescue failures. A skewed patient to nurse ratio does not only have a detrimental impact patients. It can also result in nurses' job dissatisfaction, burnout and intention to leave their jobs (Huang, 2021).

Job satisfaction pertains to the degree to which nurses are delighted in their employment. It is an important component of nurses' lives that affects patients' safety, productivity, quality and performance (Ee et al., 2018). There are many aspects that can be sources of nurses' job satisfaction as leadership, organization resources, professional recognition, co-workers, remuneration and staffing (Abdullah and Nusari, 2019). High level of satisfaction help nurses to be more imaginative and productive, and they stay with the company for longer time and increase patients' satisfaction. Low levels of job satisfaction are related to nurse withdrawal, intention to leave and burnout (Mehrad and Zangeneh, 2017).

Burnout is states associated with feeling of despire and inability to cope with demands of the work (Storm and Chen, 2021). Burnout comprised of three dimensions which are emotional exhaustion, depersonalization and reduced personal accomplishments. The emotional exhaustion domain denotes a reduction or absence of energy as well as psychological resources. Depersonalization is a negative feeling with aloof and callous attitudes toward their patients. Lastly, reduced personal accomplishment is defined by a propensity to have low self-esteem, emotions of professional failure, incompetence, and discontent, and a predisposition to rate oneself unfavorably (Aguilar-Nájera et al., 2020). Burnout can lead to psychosomatic issues, marital and family conflicts, and substance abuse which can threat job performance, patient safety, and increased nurse intention to

leave (**Storm and Chen, 2021; Pérez-Francisco et al., 2020**).

Intention to leave is a multi-stage procedure including the voluntary departure of nurses from their current place, and is caused by adverse psychological reactions to internal /external job context. Intention to leave additionally had been referred to as turnover intention. It leads to insufficient number of nurses on staff, higher stress at work as a result of heavier responsibilities, and job dissatisfaction, and intent to resign and switch to other health-care organizations (**Ghandour et al., 2019**). Higher nurse turnover negatively impacts the patients' requirement for adequate, high-quality care providing and accrue greater expenses as a result of the requirement to replace nurses, hire, train, and oversee temporary employees to guarantee high-quality services (**Albougami et al., 2020**).

Significance of the study

Nurses play pivotal role in ICUs although; there is a nursing shortage that leads to lower nurses-patients ratios. The standardized nurse to patient ratio enhancement is a continuous discussion overall the world that would require an exact nurses-patients ratio to employ for hospitals. Nurse staff a appropriateness aids in achieving financial and medical advancements in patient care, comprising improved patient satisfaction, decrease in drug mistakes, falls, pressure ulcers, infections related to healthcare, patient death, length of hospital stay and readmission, and patient care expenses. As well as decrease nurses' fatigue, and burnout (**Sharma and Rani, 2020**). Accordingly, providing enough nurses especially in ICU show a workplace significant role in creating healthy and safe for workplace (**Chuang et al., 2020; Rivaz et al., 2021**).

The present study aims to: Assess the relation between nurses-patients ratio and nursing outcomes at intensive care units.

Research question:

What is the relation between nurses-patients' ratio and nursing outcomes at intensive care units?

Operational definition:

Nursing outcomes are variables which present perception of the nurses for their practice environment as job satisfaction, burnout, and intention to leave or stay in the job.

Subjects and method

Design Descriptive -correlational design was used in this study (**Thomas et al., 2022**).

Setting

The study was conducted in Intensive Care Units (ICUs) at Tanta University Hospitals (Main and Emergency Hospitals) which affiliated to the Ministry of High Education and Scientific Research

Subjects

The study subjects consisted of all intensive care nurses (n=476) from the previously mentioned setting and available at time of data collection as follows:

The Main University Hospital ICUs nurses

Neonatal ICU (n=89), pediatric ICU (n=40), neurological ICU (n=52), cardiac ICU (n=60), ophthalmology anesthesia ICU (n=20), chest ICU (n=18), and general medical ICU (n=37).

Emergency Hospital ICUs nurse

Emergency anesthesia ICU (n=60), emergency medical ICU (n=65), traumatology ICU (35).

Tools of data collection:

To fulfill the purpose of this study, the following two tools were utilized.

Tool I: Nurse -Patient Ratio Structured Questionnaire:

This tool was developed by investigator and guided by **Chen et al. (2019)** and **Yeh et al. (2008)** to assess nurses-patients ratio.

It included three parts as follow:

Part (1): Intensive care units nurses' personal data included age, gender, marital status, and residency and education level.

Part (2) Work characteristics data included unit name, units size (bed capacity), weekly working hours, sleeping hours, major shifts in the past three months, total work tenures (years), how many patients nurses take care of at morning shift per week, how many patients nurses take care of at afternoon shift per week, how many patients nurses take care of at night shift per week and number of assigned days per week.

Part (3): Nurse -Patient Ratio Equation
The nurses-patients ratio was calculated by

Asking the nurses how many patients do you take care of in day, noon and night shifts?

The average daily nurses- patients ratio in three shifts =No. of assigned patients in (day +noon +night shift) / No. of assigned days per week.

Tool II: Nursing Outcomes Structured Questionnaire

This tool was used to assess nursing outcomes. It consisted of three parts as follow;

Part 1: Assessment of Nurses' Job Satisfaction

This part developed by investigator and guided by **Ramos-Villagrasa et al. (2019)** and **da Silva joao et al. (2017)** to assess nurses' job satisfaction. It consisted of 36 items divided into six subscales as the following:

Satisfaction with leadership, included 12 items, **Satisfaction with organization resources**, included 8 items, **Satisfaction with professional recognition**, included 4

items, **Satisfaction with co-worker** included 5 items, **Satisfaction with recognition and remuneration**, included 5 items, **Satisfaction with staffing**, including 2 items.

Scoring system:

Nurses' responses was measured on a three points Likert Scale ranging from 1= dissatisfied, 2= neither satisfied nor dissatisfied and 3= satisfied.

The total score was calculated by summing scores of all categories. The total score represent varying levels of nurses' satisfaction according to cutoff point and as follows:

Satisfactory level >75%

Unsatisfactory level ≤ 75%

Part 2: Nurses' Burnout Structured Questionnaire

This part developed by **Maslach (1996)** was modified by **Al Mutair et al. (2020)**, **Al Mutair et al. (2020)** and **Lim et al. (2019)** to assess nurses' experience with job burnout. It consisted of 22 items divided into three subscales included:

Emotional exhaustion included 9 items, **Depersonalization** included 5 items, and **Personal accomplishment** included 8 items.

Scoring system:

Nurses' responses were measured on a three points Likert Scale ranged from 1= rarely, 2= sometimes and 3= often. The total score was calculated by summing scores of all categories. The total score was representing varying levels of nurses' burnout based on cutoff points as follows:

High level of burnout >75%

Moderate level of burnout from 60 % to 75%

Low level of burnout < 60%

Part 3: Nurses' Intention to Leave Structured Questionnaire

This part developed by investigator and guided by **Vermeir et al. (2018)** and **Viklund (2017)** It consisted of 12 item.

Scoring system:

Nurses' responses was measured on a three categories ranging from 0= No, 1= I do not know and 2= Yes.

The total score calculated by summing scores of all categories. The total score represented varying levels of nurses' intention to leave according to cutoff point as follows:

High level of intention to leave > 75%

Moderate level of intention to leave from 60 % to 75%

Low level of intention to leave < 60%

Ethical consideration:

1. An official permission to conduct the study was obtained from the dean of Faculty of Nursing to responsible authorities of Tanta University Hospitals (Main and Emergency).
2. An approval of The Scientific Research Ethics Committee of the Faculty of Nursing was obtained at (16-3-2021).
3. Nature of the study was not causing any harm or pain to the nurses.
4. Nurses' consent to participate in the study was obtained after explaining the aim of the study.
5. Privacy and anonymity was maintained regarding data collection and the participants had the right to withdrawal.
6. Confidentiality was taken into consideration regarding data collection. A code number was used instead of names.
7. The tools were designed and translated into Arabic by the investigator based on related literature.
8. The tools were revised by supervisors and then submitted to a jury of five experts from field of nursing administration to check content and face validity, as well as clarity of the questionnaire. The five experts were three professors of nursing administration, one assistant professor and one lecturer at the Faculty of Nursing, Tanta University.
9. The experts' responses were represented in four points Rating Scale

ranging from (1-4): 1= not relevant 2=little relevant 3=relevant 4=strongly relevant. Necessary modifications were done including: clarification and simplifying work related words.

10. The face validity of tool II, part I Nurses' Job Satisfaction structured questionnaire was 96.4%, part II Nursing burnout structured questionnaire was 97.2% & Nurses intention to leave structured questionnaire part III was 96.3%.
11. A pilot study was carried out on a sample (10%) of nurses (n=48) nurses, and they were excluded from the main study sample during the actual collection of data. A pilot study was carried out after the experts' opinion and before starting the actual data collection. The pilot study was done to test clarity, sequence of items, applicability, and relevance of the questions and to determine the needed time to complete the questionnaire .
12. According to feedback from the pilot study, the tools were modified by the investigator. The estimated time needed to complete the questionnaire items from nurses was (20-30) minutes.
13. Tools were tested for their reliability by Cronbach Alpha coefficient factors, to measure the internal consistency of the items. Nurses' Job Satisfaction structured questionnaire reliability was 0.933, nursing burnout structured questionnaire reliability was 0.802; Nurses intention to leave structured questionnaire reliability was 0.838.
14. The investigator met the respondents' nurses in their working areas under study in small groups according to their work load in nurses' room and conference room during working hours at (morning and noon shifts) to distribute the questionnaire. The subjects recorded the answer in the presence of the investigator to ascertain that all questions were answered. The data was collected over period of four months starting from December 2021 to March 2022.

Statistical analysis of the data: Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp) Qualitative data were described using number and percent. The **Kolmogorov-Smirnov** test was used to verify the normality of distribution Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Significance of the obtained results was judged at the 5% level.

The used tests were:

Mann Whitney test: For abnormally distributed quantitative variables, to compare between two studied categories.

Kruskal Wallis test: For abnormally distributed quantitative variables, to compare between more than two studied categories.

Pearson coefficient: To correlate between two normally distributed quantitative variable

Results

Table (1) shows the intensive care nurses' personal data. It was clear that around half (45.8%) of IC nurses were under thirty years of age with mean age 32.04 ± 7.98 . The majority (90.1% and 80%) of IC nurses were married and female, respectively. Around two thirds (60.3%) of IC nurses lived in rural area and more than half (50.2%) of them had Associate Nursing Degree.

Table (2) shows the average daily nurses-patients ratio in the three shifts according to unit specialty. It was noticed that the highest mean scores of daily nurses-patients ratios were (2.50 ± 0.86 , 2.18 ± 0.42 and 2.16 ± 0.42) in ophthalmology anesthesia ICU, chest ICU and cardiac ICU respectively. While, the lowest mean scores were (1.92 ± 0.55 , 1.93 ± 0.47 and 2.02 ± 0.56) in general medical ICU, pediatric ICU and neonatal ICU respectively. The total average daily nurse

patient ratios in the three shifts were 2.10 ± 0.59 .

Table (3) presents levels of IC nurses' job satisfaction dimensions. As observed from the table, the majority (87.6%, 86.6% and 81.9%) of IC nurses had unsatisfactory level of job satisfaction regarding recognition and remuneration, hospital resources and staffing dimensions, respectively. Furthermore, high percent (76.9% and 61.9%) of IC nurses had unsatisfactory level of satisfaction regarding leadership and professional recognition dimensions, respectively. While, more than two thirds (70.6%) of them had a satisfactory level regarding co-workers dimension.

Table (4) illustrates the levels of IC nurses' burnout dimensions. This table shows that high percent (81.9%, 80.9%) of IC nurses had a low level of personal accomplishment as well as depersonalization respectively, while more than quarter (30.9%, 27.5%) of them had moderate and high levels of emotional exhaustion.

Table (5) represents the correlation between the average daily nurses-patients ratio in three shifts and nursing outcomes. As noticed from this table the all dimensions as well as overall job satisfaction had a statistically significant negative correlation with the average daily nurses-patients ratio in three shifts While, over all IC nurses' burnout and the intention to leave had a statistically significant positive correlation with the average daily nurses-patients ratio in three shifts .

Figure (1) demonstrates the level of overall intensive care nurses' job satisfaction. As evidenced from the figure the majority (87.4%) of IC nurses were unsatisfied regarding their job. While, low percent (12.6%) had an overall satisfaction regarding their job.

Figure (2) shows the levels of overall IC nurses' burnout, it was observed that the majority (81.7%) of IC nurses had a low level of burnout, around fifth (16.2%) of them had a moderate level and only low percent (2.1%) had a high level of burnout.

Figure (3) displays the levels of overall intensive care nurses' intention to leave. As evident from the figure more than half (54.0%) of IC nurses had a low level of overall intention to leave , while, less than quarter (22.5%) of IC nurses had a high level of intention to leave.

Table (1): Intensive care nurses' personal data (n=476)

Nurses' personal data	No.	%
Age		
<30	218	45.8
30-<40	145	30.5
40-<50	102	21.4
≥50	11	2.3
Min. – Max. (Mean ± SD).	21.0 – 52.03 (2.04 ± 7.98)	
Gender		
Male	95	20.0
Female	381	80.0
Marital status		
Married	429	90.1
Unmarried	47	9.9
Residency		
Rural	287	60.3
Urban	189	39.7
Educational levels		
Diploma Nursing Degree	113	23.7
Associate Nursing Degree	239	50.2
Bachelor Nursing Degree	124	26.1

Table (2): Ranking of average daily nurses- patients ratio in the three shifts according to unit specialty (nurse=476)

Unit specialty	IC nurse- patient ratio/I	H	P
	Mean ± SD.		
Ophthalmology Anesthesia ICU	2.50 ± 0.86	16.734	0.053
Chest ICU	2.18 ± 0.42		
Cardiac ICU	2.16 ± 0.62		
Emergency Medical ICU	2.15 ± 0.61		
Neurological ICU	2.14 ± 0.54		
Traumatology ICU	2.12 ± 0.75		
Emergency Anesthesia ICU	2.09 ± 0.53		
Neonatal ICU	2.02 ± 0.56		
Pediatric ICU	1.93 ± 0.47		
General Medical ICU	1.92 ± 0.55		
Total average daily IC nurses-patients ratio in three shifts	2.10±0.59		

Table (3): Levels of IC nurses' job satisfaction dimensions (N=476).

IC nurses' Job Satisfaction dimensions	Unsatisfactory ($\leq 75\%$)		Satisfactory ($\geq 75\%$)	
	No.	%	No.	%
Leadership	366	76.9	110	23.1
Hospital resources	412	86.6	64	13.4
Professional recognition	293	61.6	183	38.4
Co-workers	140	29.4	336	70.6
Recognition and remuneration	417	87.6	59	12.4
Staffing	390	81.9	86	18.1

Table (4): levels of Intensive care nurses' burnout dimensions (N=476)

IC nurses' Burnout dimensions	Low level of burnout ($\leq 60\%$)		Moderate level of burnout from (60 % to 75%)		High level of burnout ($\geq 75\%$)	
	No.	%	No.	%	No.	%
Emotional Exhaustion	198	41.6	147	30.9	131	27.5
Depersonalization	385	80.9	66	13.9	25	5.3
Personal Accomplishment	390	81.9	63	13.2	23	4.8

Table (5): Correlation between the average daily nurses- patients' ratio in three shifts and nursing outcomes

Nursing Outcomes	The average daily nurses- patients ratio in three shifts	
	R	P
Job Satisfaction		
- Satisfaction with the leadership	-0.131*	0.004*
- Satisfaction with the hospital and resources	-0.196*	<0.001*
- Satisfaction with professional recognition	-0.118*	0.010*
- Satisfaction with the co-workers	0.122*	0.008*
- Satisfaction with recognition and remuneration	-0.116*	0.011*
- Satisfaction with staffing	-0.157*	0.001*
Overall Job Satisfaction	-0.164*	<0.001*
IC nurses' Burnout		
- Emotional Exhaustion	0.153*	0.001*
- Depersonalization	0.073	0.112
- Personal Accomplishment	0.062	0.178
Overall IC nurses' Burnout	0.128*	0.005*
Overall IC nurses' Intention to Leave	0.131*	0.004*

**Figure (1):** Levels of overall intensive care nurses' job satisfaction

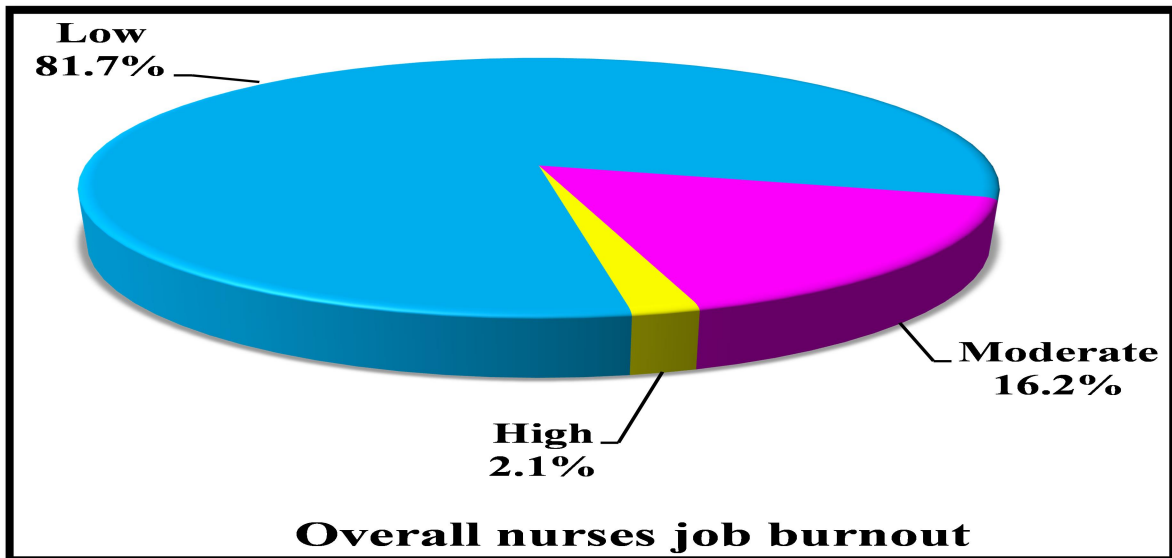


Figure (2): Levels of overall intensive care nurses' burnout (n = 476)

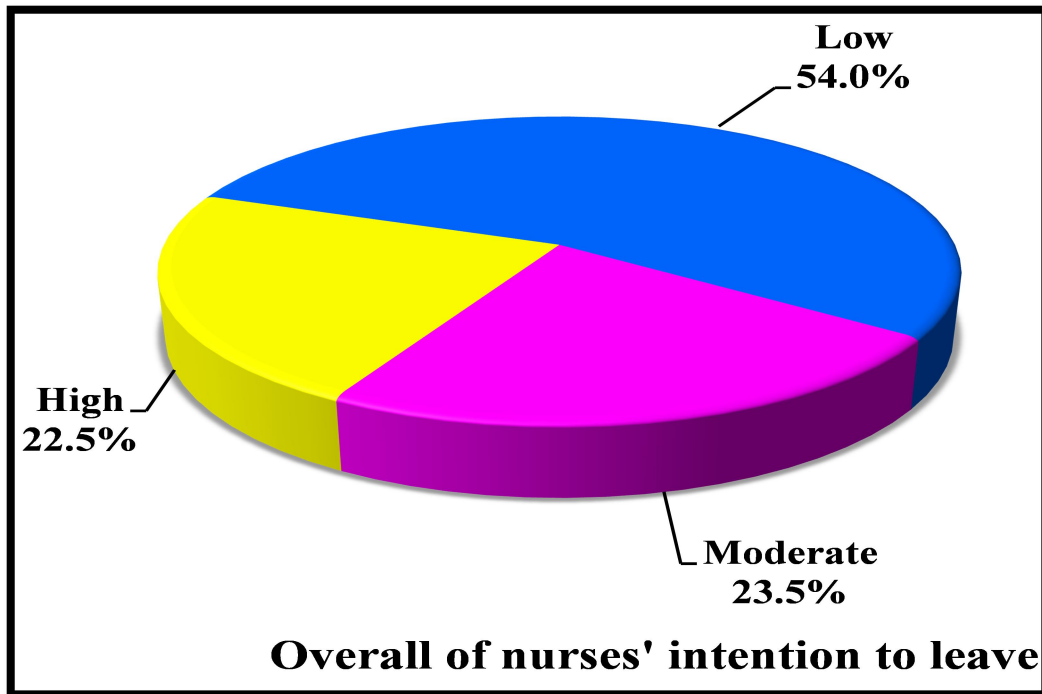


Figure (3): Levels of overall intensive care nurses' intention to leave.

Discussion

Concerning nurses- patients ratio

The current study's results revealed that, the total average daily nurse- patient ratios in three shifts was 2.10 ± 0.59 which mean that IC nurses take more than two patients to provide nursing care each shift. This may lead to IC nurses inability to take care of clinically unstable and ventilated patients also it may increase nurses' work load, decrease nurses' satisfaction, increase nurses' burnout and intention to leave. This result may be due to inadequate or nursing shortage in some units, high rate of patient admission, or may be due to inappropriate assignment of nurses in some units.

In the same context the result of **Dima et al. (2020)** determined that the nurse-to-patient ratio in the IC is determined by patient acuity and nursing accessibility, but normally ranges from one to three. And the result of **Azimi et al. (2019)** and **Jones (2014)** found The average nurse-to-patient ratio was 2.7 to 2.8, indicating that IC nurses care for more than two severely ill patients per shift.. Also the result of **Cho (2009)** reported that few percent of nurses cared for two patients per shift and about one quarter provided care for more than three patients. As well as **Graf et al. (2010)** showed that one nurse was responsible for a mean number of 2.7 patients.

There was contradiction between the present study result and the study of **Liu et al. (2021)** found that the nurses- patients ratio was 1:2 in more than half of ICUs. Also **Falk & Wallin (2016)** found that the vast majority of reported cases the nurse to patient ratio was 1:2 patients while, minority were found the nurse to patient ratio of 1:1 in chest ICU. Also, the nurse-to-patient ratio among ICU's in Belgium: 1:2. As well as **Neuraz et al. (2015)** reported that an average of 1.8 patients per nurse.

Nursing outcomes

I- Intensive care nurses' job satisfaction

The present study results showed that the majority of the IC nurses were unsatisfied regarding their job. This result can be justified as the majority of IC nurses were unsatisfied with recognition and remuneration, hospital resources, staffing as well as leadership dimensions of job satisfaction.

The present study findings were corroborated by the results of **Heidari et al. (2022)** and **Abou Shaheen & Mahmoud (2021)** discovered that the majority of nurses were not very satisfied with their jobs. On the same line **Labrague et al. (2020)** indicated that nurses' job satisfaction was low during the COVID-19 pandemic. And **Clark & Lake (2020)** determined that more than two thirds were dissatisfied. Also **Elsherbeny & El-Masry (2018)** they discovered that the majority of the studied nurses indicated that they were dissatisfied with their jobs. As well as **Ee, (2018)** revealed that the overall high prevalence of nurses encountering low job satisfaction.

In contrary, the present finding disagreed with the study finding of **Tenorio et al. (2021)** reported that the majority of respondents were satisfied. And **Jan et al. (2020)** determined that A substantial percentage of nurses were satisfied with their professions, salaries, and working hours/time. As well as **Ghawadra et al. (2019)** reported that most nurses were satisfied with their jobs. Also **Ayalew et al. (2019)** found that about two thirds of nurses expressed satisfaction with their job.

II- Intensive care nurses' burnout

The current study outputs showed that the majority of the nurses had a low level of job burnout While, around one fifth of IC nurses had moderate level of burnout. This finding may be due to IC nurses treat patients from ethical perspective as ICU include critically ill patients with great suffering in addition to, some IC nurses can handle and deal with their work problems

with the good relation with their colleagues, they can manage the excessive workload. Furthermore, IC nurses expressed moderate emotional exhaustion while they reported low levels of depersonalization and personal accomplishment. These results were in the line with **Nassar et al. (2019)** clarified that IC nurses demonstrated low level of burnout. Also **Durand et al. (2019)** revealed that the majority of nurses have low level of job burnout. As well as, **Nogueire et al. (2018)**, **Sillero (2018)** and **Mazhar et al. (2019)** found that the degree of general nurses' burnout was low.

Present study results were contraindicated with **Batayneh et al. (2019)** and **Zaki et al. (2016)** found that nurses had high level of burnout. Also **Awajeh et al. (2018)** found that the majority of nurses working in critical care departments experienced high levels of burnout in all dimensions of burnout (depersonalization, emotional exhaustion and personal achievement).

III- Intensive care nurses' intention to leave

The present study results showed that more than half of IC nurses had a low level regarding overall intention to leave and only less than one quarter had intention to leave. This result may be due to IC nurses concern about losing their job as their job provide them with the emotional security regarding difficult living circumstances especially it can be difficult for them to find another job. Where, it requires passing certain courses and interviews. As a result of competitive work environment.

Also, this may be due to they were accustomed to working in their job and it is difficult for them to get used to another place and work. As well as, IC nurses reported that they not applied for a new job during the last year, they didn't planning to leave this hospital and they didn't actively looking for a new job.

Our results came in the same line with **Smith et al. (2023)** revealed that only one third of nurses intended to leave their current workplace within the next year. Also **Al-faouri Ibrahim et al. (2021)** found that around third of nurses reported that they will leave their work in the next year. In addition to, **Halcomb & Bird (2020)** revealed that low level of nurses intended to leave and most participants intended to stay in nursing. As well as **Vermeir et al. (2018)** demonstrated that the turnover intention was low among half of nurses and high among very low present of them. As well as, **Sokhanvar et al. (2018)** around third of nurses stated that if they find a better opportunity, they will quit their current career. Our findings disagreed with **Wali et al. (2023)** reported that around half of nurses had the intention to leave their current work. Also **Maleki et al. (2023)** showed that around half of nurses tended to leave the profession. Also **Zhang et al. (2023)** found that more than half of nurses exhibiting a high level of turnover intention. In addition, **Zhang et al. (2021)** reported that about two thirds of nurses intended to leave their jobs.

Correlation between variables

The current investigation found a statistically significant negative correlation between the average daily nurses- patients ratio and overall job satisfaction in three shifts. While, there was a statistically significant positive correlation between the average daily nurses- patients ratio and overall IC nurses' burnout and the intention to leave.

This result could be due to increased average daily nurse- patients generates work overload where many tasks to be done in a limited period of time. Furthermore, high levels of stress at work are excessive and incompatible with one another. Continuing to satisfy these responsibilities will be emotionally distressing, and the workplace might be a source of tiredness, physical and mental

exhaustion, and frustration and anxiety which lead to decrease overall job satisfaction and increase overall IC nurses' burnout and the intention to leave.

Present study results was supported by the finding of **Shin et al. (2018)** disclosed that a significant correlation between higher P/N ratios and adverse nurse outcomes (job satisfaction, burnout, intention to leave). Also **Wynendaele et al. (2019)** indicated that higher nurse-to-patient ratios were consistently linked to higher levels of burnout, higher levels of job dissatisfaction, and higher levels of intention to leave among nurses. And the study of **Chen, et al. (2019)** reported that nurses with higher (average daily nurse- patient ratio) ADPNR may have a higher risk of quitting and positively associated with client-related burnout and job dissatisfaction.

The current study results were not in the same line with the study result of **Bea (2021)** they were not found significant relationships between the number of patients per nurse and other adverse nurse outcomes. And the study of **Shin et al. (2020)** demonstrated that nurse Staffing levels on day, evening, and night shifts, as well as average daily nurse staffing levels, did not significantly affect nurses' intent to leave or job satisfaction in comprehensive nursing care units. **Zhang et al. (2021)** reported that about two thirds of nurses intended to leave their jobs.

Correlation between variables

The present study revealed that there was a statistically significant negative correlation between the average daily nurses- patients ratio and overall job satisfaction in three shifts, While, there is a statistically significant positive correlation between the average daily nurses- patients ratio and over all IC nurses' burnout and the intention to leave .

This result could be due to increase average daily nurse- patients generates work overload where many tasks to do in a period of time. Also, a high

level of stress demands at work is excessive and incompatible with one another. Continued attempts to meet these demands will be emotionally distressful workplace can be a source of fatigue, physical and mental exhaustion, frustration and anxiety which lead to decrease overall job satisfaction and increase overall IC nurses' burnout and the intention to leave.

Present study results was supported by the finding of **Shin et al. (2018)** showed that a significant association between higher P/N ratios and adverse nurse outcomes (job satisfaction, burnout, intention to leave). Also, **Wynendaele et al. (2019)** demonstrated that greater nurse-to-patient ratio was consistently associated with higher degree of burnout among nurses, increased job dissatisfaction, and higher intent to leave. And the study of **Chen et al. (2019)** reported that nurses with higher (average daily nurse- patient ratio) ADPNR may have a higher risk of quitting and positively associated with client-related burnout and job dissatisfaction.

The current result not in the same line with the study result of **Bea (2021)** they were not found significant relationships between the number of patients per nurse and other adverse nurse outcomes. And the study of **Shin et al. (2020)** they demonstrated that nurse staffing levels on the day, evening, and night shifts as well as the average daily nurse staffing levels did not have a significant impact on nurses' intent to leave, job satisfaction, in the comprehensive nursing care units.

Conclusion

In light of the current study findings, it can conclude that the average daily nurses- patients ratio in three shifts according to unit specialty was two point ten. Also the majority of IC nurses had unsatisfactory level of job satisfaction, the majority of IC nurses had a low level of burnout and more than half of them had a low level of overall intention to leave. Moreover, there was a

statistically significant negative correlation between overall job satisfaction and the average daily nurses- patients' ratio in three shifts. While, there were statistically significant positive correlation between overall IC nurses' burnout and intention to leave and the average daily nurses- patients ratio in three shifts.

Recommendations:

The following suggestions are made in light of the current study's findings:

For hospital administration:

- Set policies to guide appropriate nurse to patient ratio and staffing mix in ICUs.
- Offer flexible scheduling options to accommodate nurses' needs, such as part-time or remote work arrangements
- Implement recognition program to acknowledge nurses' contributions to patient care and the organization, Including awards, bonuses and incentives based on performance,
- Ensure availability of necessary equipment and supplies to enhance nurses' ability to provide quality care for patients.
- Lunching hospital website and telecommunication pages to facilitate nurses reach to work schedules and express their related opinion.
- Regular assessment of nurses' physical and psychological condition.
- Ensure the appropriateness of nurses' salary to tasks performed and to labor market scales.
- provide nurses with more sense of appreciation, valuation and respect
- Encourage nurses long life learning
- Design and implement a clear system for career ladder system.
- Provide leadership training for supervisors to enhance their leadership skills.

For Nurse Managers:

- Adjust workload to minimize non nursing activities and proper planning of duty schedule.
- Provide challengeable work by recognizing capacity and ability of each IC nurses to keep the active all the time at work site.

- Promote team spirit among nurses to improve interpersonal relationship among supervisors and nurses.
- Furnish nurses' break area to help nurses rest including coffee corner and private lockers.
- Early detection of burnout signs and thus takes corrective actions to reduce its occurrence.
- Pay attention to the requirements and sentiments of the IC nurses.

For ICU nurses:

Focus on own health and wellbeing, caring for self, identify and recognize own capabilities which would decrease the level of burnout and promote quality care.

Further research:

Investigate the effect of nurse-to-patient on the nursing profession conducts and outcomes.

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