Readmission to Intensive Care Unit: Frequency, Causes and Related Factors

Seyedeh Sareh Mohammadi[1], Vida Shafipour[2], Jamshid Yazdani Cherati[3], Mohammad Ali Heidari Gorji[4]*

[1] MSc Student in Critical Care Nursing, Nasibeh School of Nursing and Midwifery, Mazandaran University of Medical Sciences, Sari, Iran.
[2] Assesstant Professor, Nasibeh School of Nursing and Midwifery, Mazandaran University of Medical Sciences, Sari, Iran.
[3] Associate Professor, Department of Biostatistics, Health Sciences Research Center, School of Health, Mazandaran University of Medical Sciences, Sari, Iran.
[4] Asociate Professor, Diabetes ResearchCenter, Mazandaran University of Medical Sciences, Sari, Iran.

ABSTRACT

There is a worldwide shortage of the specialized intensive care beds needed to meet the demand of eligible patientsand this is one of the principal factors limiting intensive care unit (ICU) admis¬sions. Methodology: To assess the frequency, common causes and risk factors of patients readmitted in ICU within 72 (after transferred of ICU), during the study period, 242 patients were transferred from ICU, 25 (10.3%) patients were readmitted. (patients who were readmitted to the ICU with diagnosis) Renal failure during the initial ICU stay was higher compared with among patients who were readmitted to the ICU. Finding: The reasons for admission to ICU was significant difference with readmission. Time transferred from the ICU was significant difference with readmission. 69% in the evening, 23.6% in the morning, 7.4% in the night. Conclusions: Many risk factors for early ICU readmission were identified in this study including type of disorder at the time of admission to ICU and the time of transfer from the ICU. Studies are required to identify other factors and to determine whether interventions may reduce ICU readmission.

Key Words: Readmission, ICU, Related factors.

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INTRODUCTION

Readmission to intensive care during the same hospital stay has been associated as a marker of quality of care. There is lack of published research that individualise the risk of readmission to the intensive care unit during the same hospital stay.And it has notbeen extensively evaluated in the literature of Iran country.

The introduction of advanced technologies, the increasing number of elderly, and the severity of cases have resulted in increasingly expensive intensive care, making the clinical effectiveness and cost-effectiveness of intensive care units (ICUs) aspects of utmost importance in the care of critically patient [1-3]. Discharge from ICU at the earliest appropriate time reduces excessive and unnecessary use of this expensive health care facility and improves the availability of beds for other critically ill patients requiring ICU admission [4]. Early discharge may result in ICU readmission during the same hospitalization with the possibility of a worsening of the patient's original disease process, increased morbidity and mortality rates, a longer length of stay and increased total costs [5].Unexpected readmission of these patients in ICU is considered to be an important quality indicator [6, 7]. Patients who have recently been transferred from ICU to a general ward represent a vulnerable group who often have complex care needs which places them ‘at risk’ because general ward staff may not have the knowledge or skills

Corresponding author: Mohammad Ali Heidari Gorji
Address: Asociate Professor, Diabetes ResearchCenter, Mazandaran, University of Medical Sciences, Sari, Iran.
E-mail: ✉ heydarigorji @ yahoo.com
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to provide appropriate care [8, 9]. Bledon et al. [10] demonstrate that an increased rate of medication errors, lack of care coordination and poor communication between medical and nursing staff occur with more acute patients on the ward, and assert that health system reform must address these problems. in the study by Cooper et al. [11] found that teaching hospitals had higher readmission rates than nonteaching hospitals (8.6% in comparison ◦4.3%). also ICU readmission rates reported in the literature vary from 0.9% to 19% with mortality rates for readmitted patients ranging from 26% to 58% [12]. Medical patients were 10 to 40% more likely to be readmitted than surgical patients [13-15]. proposed reasons for ICU readmission include recurrence of the initial complaint, complications arising from treatment, poor responsiveness to therapy, comorbid complications, onset of new medical conditions and failure of the receiving unit to cope with the level of care demanded by the patient [2, 16, 17]. Moreover, respiratory problems, cardiovascular conditions, gastrointestinal hemorrhage, and neurological complications appear to be common [8, 18, 19]. There is need to analyze the causes of readmission so that effective strategies can be devised to address this important risk factor of readmission ICU.

MATERIALS AND METHODS

The study was approved by the institutional ethics committee. The study was carried out at intensive care unit (ICUs) and general wards of hospitals affiliated to Babol University of Medical Sciences, Iran 18 months in 2015- 2016. This prospective observational study describes the frequency, common causes and risk factors of patients readmitted in ICU within72 hours of discharge in general wards. All patients aged 18 years or above, of both genders, last 24 hours of stay at the ICU and only data associated with early readmission within 3 days following discharge from the ICU, were eligible for inclusion in the study. Direct discharge from ICU to home or to another hospital were cretria excluded from the study. Data were collected by researcher using a check listconsisting of three parts: (1) ICU admission, (2) at time of ICU transfer, and (3) monitoring following ICU discharge. The first part was performed within 24 hours of ICU admission and enabled the recording of patients 'clinical and Basic demographic characteristics, including identification, gender, age, primary admission diagnosis, source of initial ICU admission (elective, emergency and of operation room) and comorbidities. In cases of ICU transfer, total length of stay in ICU, Glasgow Coma Scale (GCS) score, presence of a tracheostomy, mechanical ventilator, time of ICU discharge central venous catheter access on discharge, nutrition route at discharge and the last arterial blood gas analysis were surveyed. Following discharge during the same hospital stay were assesed patients at least daily for the first 3 days after ICU discharge until readmission to the ICU. During assese, the patient clinically assessed, include, most abnormal physiological parameters and laboratory tests, changes level of consciousness, nutrition change route and reason for readmission. Check list involved careful reviewing of the patient's medical records including various flow sheets, medication records, changes to treatment, medical and nursing notes of patients discharged from ICU on the ward within 24 hours of leaving the unit and then every 24 hours thereafter, up to 72 hours after discharge from the ICU. The final part was filled in after completing all study patients' monitoring to identify discharges, deaths, and readmissions. Descriptive statistics (average, median, range and percentage where appropriate) were used to analyses the study with using SPSS 16.0 and chi-square test of equal proportion according to data type. Multivariate logistic regression model was constructed to identify variables which were associated with ICU readmission.

RESULT

Of the 242 patients were transferred from ICU to the general wards during the18 months study period, 25(10.3%) patients required readmission in ICU within 72 hours after their discharge. Mean age of readmitted patients was 62.16± 2.88 years. Age did not significantly correlate with readmitted and had a higher proportion of non-elective initial admissions to the ICU. In the primary admission in ICU, 44% were from operating room, 33.5% were direct admissions from the emergency, 18.5% from general wards, 4 % from other hospitals. Male to female ratio was 1.2:1. Mean length of stay of the patients in the ICU was 8 days before to the first discharge to the ward. There were no statistical significant differences with readmissions regarding the mean length of ICU stay. During their first admission to the ICU, 112 patients (51.6%) had required invasive mechanical ventilation, patients (41 %) were supported by noninvasive ventilation (with mask and nasal) and (7.4%) spontaneous breathing. 82% of have antecedents of diseases. There were no statistical significant differences with readmissions. The frequency of discharges from the ICU in the evening 69%. , In the morning 23.6%. And In the night 7.4%. Were significant difference with readmission? And renal failure during the initial ICU stay were higher among patients who were readmitted to the ICU. Major cause was renal disorders (29.4% vs 70.6%). gastrointestinal disorders (13.3% vs 86.7%). cardiovascular and respiratory disorders (11.3% vs 88.7%). neurological disorders (6.1% vs 93.9 %), Cancer (5.8% vs 94.2%). Impaired respiratory status during the

stay in ICU was significantly different with readmission. But patients required to Mechanical ventilation during the stay in ICU were not significantly different with readmission. readmitted patients had a significant change on the clinical deterioration (performed either on the ward) at time of Before readmission patients to ICU, The odds of readmission than non-readmission Laboratory changes 2.68 equal, Changes (decrease) level of consciousness 3.8 equal, Changes in vital sign (Unstable) 3.5 equal and Changes in the method of feeding (Change of oral to gavage) 10.89 equal. History Drug Addiction (Opium) was significant different with readmission. Characteristics of patients admitted to the ICU then discharged to a general ward, by readmission status, are presented in Table 1. Finally, the patients were transferred from ICU, 87.3 % Discharge of hospital, 10.3% readmission to ICU and mortality1.2%.the mortality rate was significantly lower in the study present in table2. Factors examined that were not significant included admission type (elective or emergency), admission source, Age, gender, mean length of stay ICU, the presence of antecedents of diseases , Pco2, PH,Hco3, BS, creatinine, intubation support, and time from intubating to discharge.

Table 1. Clinical and demographic characteristics of the intensive care units and ICU of discharge and within 72h in general wards

FACTOR		Readmission to the ICU		Non readmission		P-Value
		Percentage	Number	Percentage	Number	
Number	242	10,3	25	88.7	217	
Gender	Female	11.1	14	88.9	112	0.67
	Male	9.5	11	90.5	105	
Mean Age(years)		62.16		60.37		0.64
Admission Primary Diagnosis	Cardiovascular and respiratory disorders	11.3	7	88.7	55	0.04
	Neurological disorders	6.1	3	93.9	46	
	Gastrointestinal disorders	13.3	6	86.7	39	
	Renal and infectious diseases	29.4	5	70.6	12	
	Cancer	5.8	4	94.2	65	
Respiratory status	Normal	32	8	1.4	3	0.001
	distress	68	17	98.6	214	
Respiratory Support	With Intubation	24%	6	51.6	112	0.004
	Mask And Nasal	52%	13	41%	89	
	Spontaneous Breathing	24%	6	7.4	16	
Need Mechanical ventilation	Yes	5.2	6	94.8	109	0.001
	No	15%	19	85	108	
Time of ICU transfer	Morning	12.3	7	87.7	50	0.001
	Evening	8.4	14	91.6	153	
	Night	22.2	4	77.8	14	
Change Of Vital Sing within 72h in the wards	Yes	72	18	0.9	2	0.01
	No	28	7	99.1	215	
Loss Of Conssuesnes within 72h in the wards	Yes	73.9	17	0.5	1	0.01
	No	26.1	6	99.5	215	
Need Nasogastric nutrition within 72h in the wards	Yes	90.9	20	99.1	212	0.01
	No	9.1	2	0.9	2	
Laboratory abnormalities within 72h in the wards	Yes	63.2	12	1.2	2	0.01
	No	36.8	7	98.8	167	
Antecedent of abuse Drug(Opium)	Yes	28	23	72	59	0.04
	No	13	2	156	87	

Table 2: Outcome the patients were transferred from ICU

Variable	Percentage	Number
Readmission	10.3	25
Sent to other medical centers	1.2	3
Mortality	1.2	3
Discharge of Hospital	87.3	211

DISCUSSION

this is the first study regarding readmission to ICU was conducted in Iran readmissions following ICU discharge have been widely discussed in the international literature, but several published studies have been limited by the retrospective nature of the data collection, and heterogeneity of the populations involved [11, 20, 21] this study, prospective observational describes patient predominantly elderly, mostly females, mainly due to Dialysis-related disorders. The rates of readmission (10.3%) within 72hours of discharge from ICU unlike the ranges reported in the international literature, suggesting the prevalence of early discharges and confirming the need for and importance of defining the criteria for ICU discharge. Prevalence studies of ICU readmission conducted in Brazil, Europe, Canada, and Australia have reported values ranging from 0.9 to 19% and this study fall within that prevalence range [22, 23]. Rosenberg and Watts reported a 6% mean readmission rate (range 5 to 14%) [22]. in a systematic review of studies that included 4,684 patients [12]. In another recent review of 20 studies, Elliot reported 7.8% mean readmission rate (range 0.89 to 19%) [2, 24]. The readmission rates reported in the literature for [24] surgical ICU patients range from 0.89 to 9.4) [25, 26]. Nishi et al reported a 0.89% readmission rate, but they only considered those that occurred within 48 hours of discharge (early readmissions) [22]. In our study, the early readmission was72h of dischargewhile only a few studies report readmission rates within 72hours [5, 8, 11, 20, 27]. this study data regarding the patients' age corroborate previous studies, which indicate a preponderance of elderly in ICUs, albeit without significant differences between groups regarding readmission and There was no significant difference with readmission in the length of ICU stay during the first admission, unlike other studies that have reporting readmitted patients' stays to be at least twice as long as that of the non-readmitted patient [11, 20]. Patients with specific primary diagnoses on initial ICU admission Also have greater odds of readmission. The main reasons for readmissions in populations studied were Dialysis-related disorders33.3% then cardiovascular disorder and need for intensive care following after surgery disorders respectively. Rosenberg and Watts, chen et al ,Durbin et al and Yen Lee et al. [12, 19, 25, 28] reported in their Systematic review that the most common reasons for ICU readmission are pulmonary complications (hypoxemia, inadequate pulmonary hygiene, pneumonia, and respiratory failure) and cardiac abnormalities(Arrhythmias, congestive heart failure, and cardiac arrest), followed by upper-gastrointestinal bleeding and Neurological deficit [12, 29]. following ICU discharge to general wards showed a decrease in the level of (sensory) consciousness than to the GCS on the day of ICU discharge. During their first admission to the ICU, 112 Patients (51.6%) had required invasive mechanical ventilation, patients (41%) were supported by noninvasive ventilation (with mask and nasal) and (7.4%) spontaneous breathing. Several reports share concerns about ICU readmissions, and readmissions after discharge from ICU within 72 h have been discussed as an index of ICU quality of care. Our study Medical patients were more likely to be readmitted than surgical patients according chen et al study [28]. unlike tom et al patients with neurological diseases constituted the highest proportion of readmissions [18]. In this s study changes in GCS score influence ICU readmission As A few previous studies identified the GCS score upon discharge and within 72h of discharge from ICU at wards as a risk factor for ICU readmission [19, 30, 31].

Our study The frequency of discharges from the ICU in the evening 69%. Were significant difference with readmission. Unlike Renton et al That is in the night [8]. patients in our study who were admitted to the ICU from the operating theatre had a higher risk of readmission than patients admitted from the emergency department or general ward, In contrast Frost et al. [27] and according Metnitz et al found no difference [13].

between admission categories in rates of readmission and non-readmission to the ICU. And, according,

Ho et al. [32] found that patients who were initially admitted to the ICU from the operating theatre had a higher risk of readmission to the ICU than patients admitted to the ICU from the emergency department or ward.

They were predominantly Our study has some limitations. due to the observational nature of our study, we could not determine whether readmissions were appropriate or not. However, we identified some risk factors for readmission that may be useful in risk stratification of patients discharged from the ICU. Prospective studies with predefined criteria based on risk factors reported from observational studies such as the present are warranted.

The limitations of the study include problems with the initial patient assessment and arranging to simultaneously. Furthermore, routine tests and blood gas tests were not performed or sent to the laboratory in some of the medical centers surveyed. The small number of candidates meeting the inclusion criteria and the subsequent prolonged duration of sampling and the absence of similar Persian studies and therefore the impossibility of drafting a strong discussion were some other limitations of the study.

The findings showed that of all the patients admitted to the ICU, 10.3% were later readmitted, 1.2% were sent to other medical centers, 87.3% were discharged and 1.2% died. Functional significance of the findings is that the time of transfer to the general ward and the type of disease as risk factors for readmission. It is recommended to conduct a study on the role of liaison nurses in changing attitudes and increasing general ward nurses' knowledge, understanding and skills.

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