Examining the level of standards compliance in the intensive care unit of hospitals affiliated with Mashhad University of Medical Sciences during the Covid-19 crisis

Reza Besharati
Assistant Professor, Department of Nursing, Islamic Azad University, Kashmar branch, Kashmar, Iran

Abstract
Introduction: Due to the wide range of services they provide, Intensive care units can be compared to a small hospital inside a large hospital that provides life-saving care for patients in critical situations, so compliance with standards is very important. This study was conducted to investigate the level of compliance with standards in the Intensive care unit of hospitals affiliated with Mashhad University of Medical Sciences during the Covid-19 crisis.
Method: The present research was carried out in 2021 by a descriptive-analytical method. The statistical population included 12 Intensive care units in the hospitals affiliated with Mashhad University of Medical Sciences, which were selected as the research sample by census method. The data collection tool was a researcher-made questionnaire. The content and form validity of the questionnaire were confirmed by experts' opinions and its construct validity was confirmed by using confirmatory factor analysis and its reliability was confirmed by using Cronbach's alpha coefficient (0.82) and composite reliability (0.91) was confirmed. Data analysis was done by Wilcoxon and Friedman non-parametric signed-rank inferential tests using SPSS21 and Splus software.
Findings: The highest level of compliance with the standards of the Intensive care unit in the corona crisis, respectively, is in the field of "medical equipment" (4.63±0.84), "management and leadership" (4.52±0.41), "nursing processes" (4.36 ± 0.28), "space, structure and facilities" (4.42 ± 0.55), functional (4.43 ± 0.69), safety (4.00 ± 0.03) and human resources (4.08 ± 0.31) and the lowest level was related to the field of "infection control" with an average of (3.31 ± 0.31) and this score difference in different fields was significant according to the Friedman test ($p < 0.05$).
Conclusion: Considering that the performance of Intensive care units in the field of "infection control" is not a favorable condition, therefore, the strict implementation of relevant standards, should be given more attention.

Keywords; Standard, Intensive care unit, Hospital, Covid-19

Introduction
The intensive care unit is known as the bottleneck of performance control in the hospital, and compliance with standards is very important because to achieve the goals of quality management, the services provided must comply with the pre-determined requirements (1, 2). Intensive care units due to the wide range of services they provide can be compared to a small hospital within a large hospital (3, 4), which provides life-saving care for patients with critical conditions. These life-saving cares occur as the result of multiple interactions between healthcare providers in several disciplines, patients, and medical equipment (5, 6). Patients hospitalized in ICU are highly vulnerable to medical errors due to the dysfunction of vital organs and the presence of more than one disease in their bodies (7, 8). due to the complexity of care in the ICU, it is necessary to apply standards to increase patient safety (9, 10). Formulation and application of standards in the ICU department have led to more survival of patients and saving costs, and reduced preventable deaths as a result of increasing patient safety (11), in general, the standards of the Intensive care unit can be divided into 6 areas of

management and organization, management and empowerment of human resources, design of physical space, medical equipment, facilities, technology, the compliance of safety principles, and quality improvement. Indicators such as percentage of bed occupancy, average patient stay, frequency of medical team rounds including specialist doctor, nurse, and clinical pharmacist for all hospitalized patients, annual turnover of nursing staff, the mortality rate in the unit, percentage of readmission of patients in the unit, amount of information usage Related to the rate of death and length of stay of patients, are among the important performance indicators in the intensive care unit that should be addressed with a scientific perspective (1).

At the beginning of the 2020 New Year, a report of an infectious disease from the respiratory infections branch of the coronavirus was given in Wuhan, China (12). After the increase in cases and the global spread of this virus, on January 30, 2020, the World Health Organization announced the spread of the coronavirus as the sixth cause of public health emergency worldwide (13). In the early stages of the spread of infection, medical centers faced problems and challenges following this crisis (14). In the meantime, the hospital is considered as the centerpiece and the valuable axis of activities related to emergency management, and the readiness of this effective institution to implement standards and overcome the destructive consequences of crises is not hidden from anyone (15).

In such a situation, one of the units that have a high level of involvement in critical situations caused by Covid-19, is the intensive care unit of hospitals, as the front line of treating patients, will face a large number of clients daily (16), where they will obtain experience in providing services in different conditions. Experience has shown that in such circumstances, the quality of care may be changed (17) in a way that due to more focus on expanding access to diagnostic and treatment services, the quality of services may decrease to some extent (18). Decreasing the quality of care, provided to patients, can lead to a decrease in patient satisfaction, prolongation of hospitalization, and failure to achieve desired clinical outcomes. On the other hand, unsafe care during an epidemic crisis may lead to prolonged hospitalization of patients and an increase in the possibility of disease transmission to other patients and employees (19), it also reduces the capacity of the hospital, to provide services to subsequent patients, and it has adverse economic and health-related consequences for the society (20).

The results of numerous studies show, in the intensive care unit of different hospitals, there is a big gap between the performance of the units and compliance with the standards. Yavari et al. reported that the total scores, obtained in the intensive care unit of the studied hospitals, were much lower than the considered overall score. This issue shows the gap between the performance result, and national and international standards in the intensive care unit, and a solution must be thought of, to solve (1). Malekzadeh et al.'s study also showed that the performance of the intensive care unit in the field of infection control requires more attention and effort, and it is recommended to monitor, compliance with the principles of infection control and training in this field. (21). Soares et al. In a study in Brazil, concluded that strengthening organizational factors and correct implementation of protocols, are potential goals for improving patient results and resource utilization in the ICU (22). Also, Minet et al. and Miri et al. investigated the characteristics, diagnosis, prevention, and epidemiology of venous thrombosis in intensive care units (23,24). Boddi et al. investigated the reduction of venous thrombosis in the intensive care unit (25). Jansson et al. evaluated nursing care related to tracheal tube suction (3). Soh et al. evaluated the level of patient safety in critical care units (11). Bayat Manesh et al. also stated in their research that the provision of nursing care, related to patient safety in the intensive care unit, is far from the standards. Therefore, it is necessary to conduct regular audits and efforts to improve care processes by administrators and make reforms to improve the performance of employees, especially nurses, by using continuous training from hospital officials (17). Considering the importance of this issue, the authors have always considered the importance of meeting the necessary standards, in the intensive care unit. The purpose of this study was to determine the level of compliance with the standards and to evaluate the performance of the intensive care unit of hospitals affiliated with Mashhad University of Medical Sciences during the Covid-19 crisis.

Method

This descriptive-analytical research, with a cross-sectional and applied approach, was carried out in

2021, in 12 intensive care units of hospitals affiliated with Mashhad University of Medical Sciences. The research population included all intensive care units and was selected by census method. The inclusion criteria for the study included active intensive care units in hospitals which were under the Mashhad University of Medical Sciences supervision, and the exclusion criteria included intensive care units which were not affiliated with Mashhad University of Medical Sciences. This research was carried out after obtaining permission from the officials of related hospitals and the university, and consciousconsentfrom the participants. The principles of information confidentiality have also been respected. The data collection tool was a researcher-made and standardized questionnaire, which was previously used in similar research, to evaluate intensive care units in different hospitals. To compile the questionnaire items, 25 specialists and members of theintensive care unitpromotion committee participated (5 members of the intensive care unit faculty, 10 people of the intensive care unit superintendents, 5 people of the official hospital accreditation evaluators, and 5 people of the hospitals' presidents and managers). Questionnaire items were provided based on Iran's national accreditation standards, fourth edition and "National Program To Improve The Quality Of ICU Services ICU Site Visits Internal Interview Questionnaire" checklist (1), and by using the Single Focused Group technique, including 8 dimensions with 147 questions. To measure the face validity, the questionnaire was given to 10 experts in the fields of medicine, healthcare management, and nursing. the clarity and the ability to understand and answer the questions were confirmed. Also, for content validity, the questionnaire was given to 20 intensive care specialists, anesthesiologists, and nurses from the intensive care unit. And their opinions regarding the measured concepts and the ability to understand the wording were applied. Then, construct validity (factor analysis) and reliability were tested, by the internal consistency method, among 42 hospital presidents and managers, experts, and nurses, who were knowledgeable in the intensive care unit of the University of Medical Sciences. The results showed that the Factor loading was more than 0.5 for all items and the average variance value extracted was 0.81 for the questionnaire. The value of Cronbach's alpha was 0.82 and composite reliability was 0.91, which indicated the acceptable reliability of the present study questionnaire (26).

This questionnaire contains 147 questions in 8 dimensions: human resources (13 questions), space, structure, and facilities (17 questions), medical equipment (16 questions), functional (22 questions), nursing processes (23 questions), safety (22 questions), management and leadership (10 questions) and infection control in the intensive care unit (24 questions). The scale of the questionnaire was in the form of a 5-point Likert scale, the spectrum of which varied from not taking sufficient measures to complete progress in each field (complete compliance = 5, good compliance = 4, moderate compliance = 3, poor compliance = 2, non-compliance = 1). With the opinion of related professors and other similar studies, the average scores were calculated for each dimension. Scores less than 3 were considered unfavorable, scores 3 to 4 were relatively favorable, and scores higher than 4 were considered favorable. The questions' average score of each dimension was considered as the score of that dimension. The questionnaire's overall score was obtained from the average of all the questions' total scores. The data were collected for 6 months by the members of the University's Medical Vice-Chancellor' Intensive Care Committee, consisting of the following people, and by interviewing and observing in the unit and reviewing documents: 3 specialists in the intensive care unit, 1 university nursing expert, and 1 university quality improvement expert. A briefing and coordination meeting was held with the presence of the evaluator team, and the necessary uniformity was established regarding the questionnaire's questions, and a guide for the evaluation was compiled and acted upon, to prevent the bias of the evaluators. Then, the research team informed the hospitals of the visit time in advance, so that they have the necessary preparation. To analyze the data from the collected questionnaires, descriptive statistics (tables, frequency distribution, mean, percentage, standard deviation) and Wilcoxon and Friedman non-parametric signed-rank inferential were used, by using $SPSS_{21}$ and Splus software.

Findings

The level of compliance with the intensive care unit standards was 82.3 percent of the total score, with

an average of 4.01 ± 0.24 out of 5 and "favorable". The highest score was related to the field of "medical equipment" with an average of 4.63 ± 0.84 (94.73 percent) and the lowest score was related to the field of "infection control" with an average of 3.31 ± 0.31 (68.31 percent). The fields of management and leadership, nursing processes, space, structure and facilities, functional, safety, and human resources respectively got the highest scores (Table 1).

Table 1. Compliance with standards in intensive care units

Rank	Areas	Min.	Max.	Average ± Standard deviation	Percentage of earned score
1	Compliance with the human resources standards	3.20	5.0	0.31 ±4.08	83.70
2	Compliance with nursing processes standards	3.4	5.0	0.28± 4.36	89.36
3	Compliance with management and leadership standards	3.4	5.0	0.41 ±4.52	92.52
4	Compliance with safety standards	1.0	5.0	0.03 ±4.00	82.00
5	Compliance with the space, structure, and facilities standards	3.0	5.0	0.55±4.42	90.42
6	Compliance with performance standards	2.4	5.0	0.58±4.43	86.73
7	Compliance with medical equipment standards	1.0	5.0	0.84±4.63	94.73
8	Compliance with infection control standards	2.4	5.0	0.31±3.31	68.31
Total	Compliance with the intensive care unit standards	3.19	4.58	0.24±4.01	82.3

According to Friedman's test, the difference in ranks, in eight areas, was significant ($p<0.05$). The results of this test are given in Table 2.

Table 2. Ranking of different areas of intensive care units standards

Rank	Areas	Score
1	Compliance with medical equipment standards	6.18
2	Compliance with management and leadership standards	5.19
3	Compliance with the space, structure, and facilities standards	4.44
4	Compliance with nursing processes standards	4.21
5	Compliance with performance standards	4.21
6	Compliance with safety standards	4.0
7	Compliance with the human resources standards	3.23
8	Compliance with infection control standards	2.84

According to the non-parametric one-sample Wilcoxon sign-rank test, the score obtained, from the level of compliance with the intensive care unit standards, in all eight areas except "infection control" was higher than the average standard score of 3 ($p<0.05$). (Table No. 3)

Table 3. Score test of different areas of intensive care unit standards

Rank	Areas	Z-statistic value	P

1	Compliance with the human resources standards	3.7045	0.0001
2	Compliance with the space, structure, and facilities standards	3.7853	0.0001
3	Compliance with medical equipment standards	3.7844	0.0001
4	Compliance with performance standards	3.055	0.0022
5	Compliance with nursing processes standards	3.7621	0.0001
6	Compliance with safety standards	3.6262	0.0002
7	Compliance with management and leadership standards	3.6602	0.0002
8	Compliance with infection control standards	0.6771	0.4812
Total	Compliance with the intensive care unit standards	3.5601	0.0001

The results of the research showed, that in the area of "infection control" standards, the lowest score was in the field of "designing corrective and preventive measures in the area of infection" and the highest score was in the field of "presence and availability of hand hygiene instructions for employees". In the area of "Management and Leadership" standards, the highest score was in the field of "conducting management visits at the designated times" and the lowest score was in the field of "Failure to provide funding for approved programs". In the area of "Human Resources" standards, the lowest score was in the field of "presence of specialist doctors resident in the intensive unit according to the regulatory schedule" and the highest score was in the field of "arrangement of round-the-clock schedule for the presence of specialist doctors resident in the intensive unit". In the area of "nursing processes" standards, the lowest score was in the field of "Awareness of related staff, about the isolating psychiatric patients' executive method" and the highest score was in the field of "nursing staff's awareness of the physiological care and continuous monitoring principles ". In the area of "space, structure, facilities" standards, the highest score was in the field of "Presence of vital signs monitoring, the console above the patient's head, and medical gases outlet" and the lowest score was related to "Method of identifying and controlling annoying sounds in the unit". In the area of "medical equipment" standards, the lowest score was in the field of "the presence of a fully functioning hemodialysis machine, exclusive to the intensive care unit" and the highest score was in the field of "the presence of a defibrillator with cardiac monitoring for transferring acute and critical patients".

Discussion

The results of this study showed that in general, compliance with the standards, in the intensive care units of the studied hospitals, is in favorable condition. Malekzadeh et al in a study on evaluating the performance of intensive care units during the Covid-19 crisis (21), and Ayyoubian in a study on evaluating the standards of intensive care units (27) achieved similar results which are consistent with the results of this study. The reason for the alignment of these studies can be attributed to the relative similarity of the tools that were used. But on the other hand Moini, in his research, came to the conclusion that the providing medical services standards in the intensive care units of Arak Hospital are far from the valid providing medical services standards in this unit (28), which is contrary to the results of this research. The reason for this inconsistency can be attributed to the difference in the research population of the two studies.

Among the studied areas in this research, the standards related to "medical equipment" obtained the highest average and were in a favorable condition, which is to the results of Malekzadeh et al.'s study, which evaluated the intensive care units' performance of Mazandaran hospitals, that reported the "medical equipment" as favorable during the Corona crisis (21). But it doesn't align with the results of Yavari et al.'s study, evaluating the intensive care units of Shahid Beheshti University hospitals, which showed that they are in moderate condition in terms of medical equipment standards (1). Akbari et al. also, in the study of hospital standards, have considered the provision of medical equipment for diagnosis, treatment, and training as mandatory and by noting the adverse consequences of inadequate and inappropriate equipment, They recommended proper planning in the preparation, maintenance, repair, training how to use the equipment, and designing the data management system in the field of medical equipment (29). This finding, in the current research,

2721

shows the attention, of hospital and university officials, to the efficient management of medical equipment in intensive care units, during the Corona crisis. Nowadays, medical equipment has a valuable role in helping patients to live longer and with higher quality. And failure in the evaluation and Monitoring of the work of this equipment endangers the patient's safety (30). In this regard, the Joint Accreditation Commission has also advised, the management of hospitals, to directly and independently act on implementing the programs, of the medical equipment's quality management system, using new technologies, performing periodical inspections, and reporting the defects and problems of this equipment (31,32).

According to the results of the current study, intensive care units in the area of "management and leadership" was favorable and ranked second, in terms of compliance with standards, which is aligned with the findings of studies by Malekzadeh (21), Mazhari (33) and Gazarani (34), but it is not consistent with the results of studies conducted by Yavari (1) and Asifzadeh (35). The results of the study conducted by Chaboir et al., in the intensive care unit of Australia, indicate that supportive management improves "patient safety" dimensions (36). Managers should set the necessary goals regarding the provision of 100% of required hospital standards in strategic and operational planning (37 and 29). Also, they should prioritize the improvement of safety in providing health services to 100% compliance to ensure that they can act effectively and sustainably in all conditions, especially critical conditions such as epidemics (38, 39) because the success rate in achieving organizational goals is directly related to the performance of human resources, especially managers and, managers As the main decision-makers, they play a significant and decisive role in the success and failure of the organization and in fulfilling its mission in facing various internal and external issues; Therefore, to deal with the complex challenges, present in turbulent organizations such as hospitals, it is necessary to have adaptable and flexible leaders with comprehensive, relevant and timely information for effective leadership (40).

Among the studied areas, the standards related to "nursing processes" were ranked third and in a favorable condition, which is in line with the research results of Malekzadeh et al., in evaluating the intensive units' performance in the Corona crisis (17) but according to the Menesh et al. study, regarding the nursing care' provision related to patient safety in the intensive care unit, is far from the standards and based on the results, the average compliance level of nursing care related to patient safety, compared to the checklist was 43.53 out of 100 points and it has been evaluated as unfavorable. Also, Farahani et al. (41), in their research, concluded that the average compliance with hospital standards, during the covid-19 epidemic, was at a moderate level and to improve nursing processes in the framework of effective and continuous education programs, The skills needed by nurses, including communication skills, problem-solving and critical thinking, professional ethics, and decision-making skills, should be provided and necessary arrangements should be made, for the participation of all nurses in them, so that correct clinical decision-making in nursing actions, in epidemic conditions, lead to the rational-care planning with the maximum probability of success. The results of other studies have also shown that not paying attention to the provision of nursing standards in intensive care units, can lead to damage and harm to the patient. For example, it has been mentioned, in Minet's study, the high risk of venous thrombosis in intensive care units patients is concerning, especially risk factors such as mechanical ventilation, vasoconstrictor drugs, and the use of central venous routes in these units aggravate this issue. This problem shows the importance of the nurse's role, in preventing venous thrombosis, in intensive care units (23). Based on the results of studies conducted by Minet (23) and Malato (42), unfortunately, useful DVT physical examinations, in ICU patients, are not accurate for diagnosis. Also, in Khouli's study in Colombia on patients hospitalized in the intensive care unit, the prevalence of deep leg vein thrombosis was 2.7% at the time of admission, which increased to 9.6% during hospitalization (43). In Malato's study in Italy, the incidence rate of deep vein thrombosis in intensive care units during one year period was 11.9% (42).

In the present study, the standards related to the area of "space, structure and facilities" were in a favorable condition and ranked fourth, which is in line with the results of Malekzadeh et al.'s study, which evaluated the compliance rate of the standards in this area, which was 89% in intensive care units during the Corona epidemic, as favorable condition (21). The reason for this similarity can be

related to the space and facilities improvement of these hospitals' intensive care units and the similarity in the data collection tools in these researches. But it is not consistent with the results of Yavari et al.'s study, in which the physical space axis was in an unfavorable condition with a score of 46% (1). The formulation of appropriate structural standards and their measurement leads to the improvement of the provided services' quality in the intensive care unit. Zahidpasha et al.'s research, regarding the observance of environmental-physical factors related to light and sound in neonatal intensive care units, concluded that terms evaluating the location, internal appendices, spaces, facilities, and safety of intensive care unit are important (44). In Falahinia et al. research they reported the score of standards, related to physical and structural conditions in intensive care units, with 38% in unfavorable conditions, and suggested that the executive managers should take reaching global standards into consideration, especially the improvement of structural standards which guarantees the quality improvement and optimal performance of intensive care units (45). In another study conducted by Sadeghi et al., it was concluded that the correct use of color and light in therapeutic environments, which accelerates the recovery process of patients, requires a special design (46).

The present research results showed that the score of the "functional" area's standards, in the studied units, is in fifth place and favorable condition. this finding indicates that the managers, of the units and hospitals, have been able to use the existing facilities optimally. These results are is consistent with the Malekzadeh et al. research (21). The necessity to use solutions, which include targeted and evidence-based management of organizational resources, paying attention to obstacles of safety dimensions realization, and effective continuous training of employees, is becoming more and more clear; so that hospitals achieve 100% compliance with the hospital's standard dimensions and make their mission clear and sustainable by providing a variety of high-quality, safe, appropriate, flexible, timely, fair, effective, and affordable health services (41). On that note, the results of the Kavak study in Turkey showed that 79.6% of hospital standards were functionally related to the processes of Covid-19. These standards, include risk management, health and safety of employees, patient safety, end-of-life services, infection prevention, drug management, sterilization management, laboratory services, waste management, outsourcing, adverse events, corporate communications, and social responsibility departments, are 100% related to the processes of Covid-19 (47).

In this research, the "safety" area score was ranked 6th and it was in a favorable condition, in this regard, Moini in his research came to the conclusion that all units took significant measures, for safety and quality improvement, and this has been because of the measures that were related to the issues of clinical governance and accreditation. But it should be noted that compliance with the superficial and appearance matters, by clinical governance and accreditation, should not marginalize the implementation of the current world standards in safety and quality improvement (1). In A study conducted by Asadi et al., regarding patient safety during the covid-19 epidemic, the results showed that the average total safety culture was 13.38±17.43, this means the patient safety culture, which was evaluated from the nurses' point of view, was in an acceptable (moderate) level (48). In another study conducted by Farahani et al., the results showed that the level of safety culture during the covid-19 epidemic is at a moderate level (41). The findings of Bayat Menesh et al. also showed the highest level of compliance in Nursing care, related to the safety of patients hospitalized in the intensive care unit, was related to the field of blood transfusion and prevention of its complications and it was in a favorable level; And the lowest level of compliance, related to the prevention of surgical complications, was in an unfavorable level. In other areas, the level of compliance with patient safety criteria was far from the standards and it was at an unfavorable level (17). Also, Farahani et al. believed that to improve the current state of purposeful and evidence-based management of organizational resources, it is necessary to pay attention to the obstacles that stop the realization of patient safety dimensions, institutionalizing the culture of patient safety, improving the safety atmosphere, paying attention and focusing on patient safety indicators, effective and continuous training of the academical needs of employees in the field of improving the safety of beneficiaries, especially in the covid-19 epidemic (41).

in this research, the score of "human resource" area standards, was ranked 7th. Attaining this rank, among the 8 areas of the studied standards, shows the necessity of paying attention to the quantity and

quality improvement of human resources, who work in intensive care units. The conducted studies, reported the lack of training and skills, of health service providers, as one of the most important reasons for the occurrence of health service errors and confirmed the effect of training in reducing health service errors and increasing the ability to solve problems, especially in employees with little or no experience. And often is mentioned that one of the main reasons for the occurrence of accidents and lack of competence among employees is a failure in training (49, 50). Protecting the health and safety of employees, patients, and other clients, as well as, the need for hospitals to be prepared in the event of possible incidents, epidemics, and accidents in society, puts an immense responsibility on the authorities (51). Among the various phenomena and factors that affect job performance and the level of individual efficiency, is physical and mental health (52,53). Safa et al. in their study reported that the average score of post-traumatic stress disorder in 311 nurses involved in caring for patients with covid-19, at Dr. Masih Daneshvari Hospital, was severe in 88% of them and moderate in only 12% without even a single case of mild involvement. This finding showed the depth and severity of the psychological impact of the Covid-19 crisis on nurses. (54). To have a sufficient number of human resources working in the intensive care unit, according to specified standards, is necessary. In addition, the use of these employees should be effective in some way to ensure that the tasks are assigned logically and accountability is also reasonable (55).

In the current study, the score of "infection control" area standards was placed at the last rank and in an unfavorable condition. In the study conducted by Jabali et al., it was found that among the eight areas related to accreditation standards, the fields of environmental health, waste, wage, service recipients, and infection control are among the most practical accreditation standards in facing Corona epidemic (56). In another study that was conducted in one of Pakistan's hospitals, on the level of compliance with hand hygiene during the covid-19 epidemic by healthcare workers, the results showed that due to the seriousness of this outbreak, hand hygiene has obtained particular importance among healthcare workers (57). Bayat Manesh et al.'s research showed that in the field of preventing hospital infections, the measures of the intensive care unit are far from the standards (17). In Amirzadeh's study, the performance of nurses, in infection control, was not to the standard procedures and nurses mainly had poor performance (58). A study conducted in the pediatric intensive care unit, by Randa in Egypt, showed the performance of nurses in washing hands, wearing a gown, wearing gloves, and wearing a mask is far from the standards (59). Marzban et al.'s study, in the intensive care unit, showed a high infection rate in the unit due to non-compliance with the infection control's physical and clinical standards, by the nursing and medical staff. (60) which confirms the results of the present study.

Conclusion:

The results of this research showed that the performance of intensive units, in the field of infection control, is far from the standards and they are not in a favorable condition. So hospital managers must use monitoring methods such as audits, control before, during, and after operations, feedback, results, and corrective measures should be taken to reduce the deviation from the standards and improve the quality of services. So it is suggested to conduct more research on the causes of non-compliance of care with the standards, and methods to reduce infection in the units.

References:
1. Yavari M, Seyyed Ardehali H, Moeini M. [Evaluation of Intensive Care Unit in terms of standards of care in selected hospitals in Tehran (Persian)]. J Med Counc Iran. 2015; 33(2):131-7.
2. Dorontsev AV, Vorobyeva NV, Sergeevna E, Kumantsova AM, Sharagin VI, Eremin MV. Functional Changes in the Body of Young Men Who Started Regular Physical Activity. J Biochem Technol. 2022;13(1): 65-71
3. Jansson M, Ala-Kokko T, Ylipalosaari P, et al. Evaluation of endotracheal-suctioning practices of critical-care nurses – An observational correlation study. J Nurs Educ Pract 2013; 3(7): 99-105.
4. Makurina ON, Mal GS, Dorontsev AV, Komarov MN, Romanova AV, Viktorovich M, Eremin ES, Marinina NN, Rashitovich R. Possibilities of Handball Practice in Strengthening Heart Function in University Students. J Biochem Technol. 2022;13(1):29-33

5. Johnstone M, Kanitsaki O. The Ethics And Practical Importance Of Defining, Distinguishing And Disclosing Nursing Errors: A Discussion Paper. Int J Nurs Stud 2006; 43(3): 367-76.
6. Arikawe O, Morrissey H, Ball P. Community pharmacy brief screening intervention to improve health outcomes for patients diagnosed with chronic diseases. J Adv Pharm Educ Res. 2022;12(3):1-8.
7. Ebadi Fard Azar F, Rezapoor A, Tanoomand Khoushehmehr A, et al. Study of patient safety culture in Selected Training hospitals affiliated with Tehran University of medical sciences. JHOSP 2012; 11(2): 55-64.
8. Soboleva MS, Loskutova EE, Kosova IV. Pharmacoepidemiological study of the use of e-pharmacies by the population. J Adv Pharm Educ Res. 2022;12(3):36-43.
9. Florina MG, Mariana G, Csaba N, Gratiela VL. The Interdependence between diet, microbiome, and human body health-a systemic review. Pharmacophore. 2022;13(2):1-6.
10. Alnofaiey YH, Almuqati HH, Alasmari AA, Aljuaid RE. Level Of Knowledge Toward Surgical Site Infections Among Clinical Years Medical Students In The Western Region Of Saudi Arabia. Pharmacophore. 2022;13(2):74-9
11. Soh S-E, Barker A, Morello R, et al.Measuring Safety Climate In Acute Hospitals: Rasch Analysis Of The Safety Attitudes Questionnaire. BMC Health Serv Res 2016; 16: 497-506.
12. Khan MU, Shah S, Ahmad A, Fatokun O. Knowledge and attitude of healthcare workers about the middle east respiratory syndrome in multispecialty hospitals of Qassim, Saudi Arabia. BMC public health. 2014;14(1):1-7.
13. Lai C-C, Shih T-P, Ko W-C, Tang H-J, Hsueh P-R. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): The epidemic and the challenges. International journal of antimicrobial agents. 2020;55(3):105924.
14. Raeisi A, Asefzadeh S, Yarmohammadian M. A Comparative Study On Accreditation Models In Europe And The USA. 2007.
15. Tabrizi GR GF. The position of crisis management in the Iranian accreditation model. Quarterly Scientific Journal of Rescue and Relief. 2012;4(3):35-46.
16. Woo BFY, Lee JXY, San Tam WW. The impact of the advanced practice nursing role on the quality of care, clinical outcomes, patient satisfaction, and cost in the emergency and critical care settings: A systematic review. Hum Resour Health. 2017; 15(1):63.
17. Bayatmanesh H, Zagheri Tafreshi M, Manoochehri H, Akbarzadeh Baghban A. [Patient safety observation by nurses working in the intensive care units of selected hospitals affiliated to Yasuj University of Medical Sciences. Iran South Med J. 2019; 21(6):493-506.
18. Asgari Z, Pahlavanzadeh S, Alimohammadi N, Alijanpour S. [Quality of holistic nursing care from critical care nurses' point of view. J Crit Care Nurs. 2019; 12(1):9-14.
19. Eriksson J, Gellerstedt L, Hillerås P, Craftman ÅG. Registered nurses' perceptions of safe care in overcrowded emergency departments. J Clin Nurs. 2018; 27(5-6):e1061-7.
20. Mehrabian F, Rahbar Taramsari M, Keshavars Mohamadian S. [Quality of services in training and medical emergency centers. J Guilan Univ Med Sci. 2014; 23(89):15-21.
21. Malekzadeh R, Assadi T, Mahmoudi E, Montazeriun F. [Performance Evaluation of the Intensive Care Units in Hospitals Affiliated to Mazandaran University of Medical Sciences During the COVID-19 Pandemic. Journal of ModernMedical Information. 2023; 8(4): 312-323.
22. Soares M, Bozza FA, Angus DC, Japiassú AM, Viana WN, Costa R, . Organizational characteristics, outcomes, and resource use in 78 Brazilian intensive care units: The ORCHESTRA study. Intensive Care Med. 2015; 41(12):2149-60.
23. Minet C, Potton L, Bonadona A, et al . Venous thromboembolism in the ICU: main characteristics, diagnosis, and thromboprophylaxis. critical care. 2015;;19(1).287-296.
24. Miri MM, Goharani R, Sistanizad M. Deep Vein Thrombosis among Intensive Care Unit Patients; an Epidemiologic Study. Emerg(Tehran) 2017; 5(1): e13.
25. Boddi M, Barbani F, Abbate R, et al. Reduction in deep vein thrombosis incidence in intensive care after a clinician education program. J Thromb Haemost 2010; 8(1): 121-8.
26. Behrouzi F, Shaharoun AM, Ma'aram A. Applications of the balanced scorecard for strategic

management and performance measurement in the health sector. Aust Health Rev. 2014; 38(2):208-17.

27. Ayoubian A, Navid M, Moazam E, Hoseinpourfard M, Izadi M. [Evaluation of intensive care unit and comparing it with existing standards in hospitals of Isfahan (Persian)]. J Mil Med. 2013; 14(4).

28. Moini L, Fani A, Peyroshabany B, Baghinia M. [Evaluation of the standards of health care services and comparison of predicted mortality and real mortality in patients admitted to Valiasr and Amiralmomenin Hospitals of Arak by APACHE IV scoring system (2009-2010) (Persian)]. J Arak Uni Med Sci. 2011; 14(4):79-85.

29. Habibzadeh H, Akbari F, Ghavami H, Moradi K. A Survey on the Establishment of Patient-Friendly Safety Standards in Urmia University of Medical Sciences. Journal of Urmia Nursing and Midwifery Faculty. 2019;17(7):525-34.

30. Dhruva SS, Redberg RF. Medical device regulation: time to improve performance. Plos Med 2012; 9(7): e1001276.

31. Wang B Rui, T, Balar S . An estimate of patient incidents caused by medical equipment maintenance omissions.Biomed Intrum Technol 2013; 47(1): 84-91.

32. Tsai TT, Box TL, Gethoffer H, Noonan G, Varosy PD, Maddox TM et al . Feasibility of proactive medical device surveillance: the VA clinical assessment and teaching (CART) program. Med Care 2013; 51 Supple:557-561.

33. Mazhari Z, Adel A. [Patient safety status in hospitals of Tehran-patient safety friendly hospitals standards: 2013. J Payavard Salamat. 2015; 8(5):379-89.

34. Gazerani A, Aliakbari R, Habibzadeh M, Haresabadi M. [Assessment of safety status in the operating room by the World Health Organization standards for the safety-friendly hospital (Persian)]. J North Khorasan Univ Med Sci. 2015; 6(4):895-903.

35. Asefzade S, Mehrabian F, Nikpey A, Kianmehr S. [Assessment of patient safety based on standards of patient safety friendly hospitals in education and treatment centers of Rasht City in 2013 (Persian)]. Res Med Educ. 2013; 5(1):36-44.

36. Chaboyer W, Chamberlain D, Hewson-Conroy K, Grealy B, Elderkin T, Brittin M, et al. CNE article: Safety culture in Australian intensive care units: Establishing a baseline for quality improvement. Am J Crit Care. 2013; 22(2):93-102.

37. Sabouri G, Ghafghazi M, Zare M, Asadi M. Patient Safety Status in Selected Training Hospitals Affiliated to Mashhad University of Medical Sciences, Mashhad, Iran. J Patient Safety Quality Improvement. 2020;8(3):161-5.

38. Al Thobaity A, Alshammari F. Nurses on the frontline against the COVID-19 pandemic: an integrative review. Dubai Medical Journal. 2020;3(3):87-92.

39. Kuriakose R, Aggarwal A, Sohi RK, Goel R, Rashmi NC, Gambhir RS. Patient safety in primary and outpatient health care. J Fam Medic Prim Care. 2020;9(1):7.

40. Janati A, Dadgar E, Sadegh Tabrizi J, Asghari Jafarabadi M, GHolamzade Nikjoo R. Health system professionals, attitude towards necessary criteria for hospitals managers, performance assessment. Yafteh. 2012;14(3):91-101.

41. Farahani M, Esmaeili M, Ashrafizadeh H, Hajibabaee F, Haghani SH, Ariyamloo P. Evaluation of Imam Khomeini Hospital of Tehran Compliance with the Standards of Patient Safety Friendly Hospital about the COVID-19 Pandemic: A Case Report. Iran Journal of Nursing. 2021; 34(129): 50-66.

42. Malato A, Dentali F, Siragusa S, et al. The impact of deep vein thrombosis in critically ill patients: a meta-analysis of major clinical outcomes. Blood Transfus 2015; 13(4): 559-68.

43. Khouli H, Shapiro J, Philipham V., et al. Efficacy of Deep Venous Thrombosis Prophylaxis in the Medical Intensive Care Unit. J Intensive Care Med 2006; 21(6): 352-8.

44. Zahed Pasha Y, Ahmadpour Kacho M, Alaee E, Foroozesh R, Rasouli M, Tirgar A, et al. [Light and sound consideration in the neonatal intensive care unit. J Babol Univ Med Sci. 2014; 16(5):56-61.

45. Falahinia G., ZareianA ., Ashundi K, Farhan Chi A., Moghim Beigi A. Comparison of structural

standards of intensive care units. IRANIAN JOURNAL OF CRITICAL CARE NURSING (IJCCN) 20115 ،(4):222-227.

46. Sadeghi A, Hosseini SB. [The role of color in accelerating the process of recovery in a hospital case study: Imam Khomeini Hospital. J Archit Urban Plan. 2017; 9(17):5-20.

47. Kavak DG, Öksüz AS, Cengiz C, Kayral IH, Şenel FÇ. The importance of quality and accreditation in health care services in the process of struggle against Covid-19. Turkish Journal of Medical Sciences. 2020;50(8):1760-70.

48. Asadi H HSA, Davari M, Ershadifard S. The Status of Patient Safety Culture in Nurses of Imam Khomeini Hospital in Ardabil, Iran during the Outbreak of COVID-19, in 2020. Journal of Military Medicine. 2020;22(11):1162-70.

49. Chopra V, Gesink BJ, DE JONG J, Bovill JG, Spierdijk J, Brand R. Does training on an anesthesia simulator lead to improvement in performance? Br J Anaesth. 1994;73(3):293-7. 33.

50. Straight M. One strategy to reduce medication errors: the effect of an online continuing education module on nurses' use of the Lexi-Comp feature of the Pyxis MedStation 2000. CIN: Computers, Informatics, Nursing. 2008;26(1):23-30.

51. Fathi M. Survey of the status of security in the hospitals & treatment health services of Kurdistan University of Medical Sciences in 2003. Scientific Journal of Kurdistan University of Medical Sciences. 2003;7(2):37-42.

52. Kamali Dehkordi F, Maghsoudi S, Emami Sigaroudi A, Kazemnejad Leili E. Study of Predictive factors of public health based on job satisfaction in employees of Rasht City Health Service Centers. Journal of Holistic Nursing And Midwifery. 2015;25(4):110-7.

53. Postol OL, Shchadilova IS. Using Neuro-Stimulating Physical Exercises to Restore Cognitive Functions in the Correction of the Post-COVID Syndrome. J Biochem Technol. 2022;13(3):26-31.

54. Safa M, Esmailee S, GHasembroojerdi F, Hagizadeh F, myrabzadehardekani B. Incidence of post-traumatic stress disorder after COVID-19 among medical staff of Masih Daneshvari hospital. Journal of Medical Council of Iran. 2020;38(1):27-33.

55. Mossadeg Rad AM. 2004 "Textbook of Organization and Hospital Management 2. Tehran: Art Institute of Dibagaran.

56. Jebelli B, Varahram M, Kazempour Dizaji M, Esmaili SH, Emami5 H, Ghazanchaei E. Evaluation of Compliance with Accreditation Standards during Corona Virus Pandemic among Staff of Masih Daneshvari Hospital. Journal of Hospital. 2022:20(4):12-17.

57. Roshan R, Feroz AS, Rafique Z, Virani N. Rigorous hand hygiene practices among health care workers reduce hospital-associated infections during the COVID-19 pandemic. Journal of primary care & Community health.2020;11:2150132720943331.

58. Amirzade N, Baghaei R, Feizi A, khorsandi F. [Evaluating the application of safe suction criteria by nurses working in intensive care unit in Urmia]. Nurs Midwifery J. 2013; 11(2): 92-7.

59. Adly RM, Amin FM, Abd El Aziz MA. Improving nurses' compliance with standard precautions of infection control in pediatric critical care units. World J Nurs Sci. 2014; 3S.

60. Marzban S, Moeini Naini M, Ardehali S H, hekmatyar J, Savadkouhi A.[Planning the patient safety management system using failure mode and effect analysis in ICU care: A case study in Loghman Hakim hospital Shahid Beheshti University of Medical Sciences in Tehran city. J Hospital. 2017; 16(1):81-91.