

Evaluation of Infection Prevention and Control Programs at the Hospital Level Based on the World Health Organization Tool

Abstract

Background: Infection prevention and control (IPC) is a major component of health systems and affects both the health and safety of people who use health services and those who provide them. The Infection Prevention and Control Assessment Framework (IPCAF) is a tool for the assessment of IPC in healthcare centers. **Methods:** In the present study, we examined the hospitals of Tehran from this point of view. **Results:** Thirty-one hospitals were examined through IPCAF form. All the data were analyzed in SPSS version 25. Twenty-three centers (74.1%) were at the advanced level; 7 centers (22.5%) were at the intermediate level and only one center (3.2%) was at the minimum level. The lowest score was related to the field of education. There was no significant difference between private and public hospitals in terms of IPC score ($P > 0.05$). **Conclusions:** Hospitals of Tehran are at advanced level in terms of IPC, and the lowest score is related to the field of education, which needs more investigation and effort to improve it.

Keywords: Hospital, infection prevention and control, infection prevention and control assessment framework (IPCAF), Tehran city

Introduction

Infection prevention and control (IPC) is a major component of health systems and affects the health and safety of both those who use health services and those who provide them. WHO reported an average of 7% of patients in developed countries and 15% in low- and middle-income countries had at least one healthcare-associated infection (HAI) at any time, with associated mortality of 10%.^[1,2]

The annual direct cost of HAI in hospitals in the United States is 35.7 to 45 billion,^[3] while the annual economic impact in Europe is up to €7 billion.^[4]

A recent survey conducted in 28 European countries showed an approximate prevalence of patients with HAI in intensive care hospitals of about 6.5%.^[5] Furthermore, the HAI rate is equivalent to 501 disabilities per 100,000 general population and more than 90,000 deaths per year.^[6]

In recent years, global public health emergencies, such as middle east respiratory syndrome (MERS) coronavirus, Ebola, and COVID-19, have revealed gaps in the IPC review conducted by countries. In addition,

the recent review of the International Health Regulations made the need to strengthen IPC across nations even clearer.^[7]

WHO has put a lot of emphasis on creating strategies for HAI control^[7] and has published guidelines for IPC programs that give countries a path to establish and strengthen IPC activities.^[8] WHO determined eight core components (CC) that address different aspects of IPC, as follows:

IPC program (CC1), IPC guidelines (CC2), IPC education and training (CC3), HAI surveillance (CC4), multimodal strategies for implementation of IPC interventions (CC5), monitoring/auditing IPC practices and feedback (CC6), workload, staffing and bed occupancy (CC7), built environment, materials, and equipment for IPC at the facility level (CC8).^[9]

The implementation of key aspects of IPC varies widely, not only between countries with different income levels but also within countries.^[10-13] Therefore, WHO has recently published an Infection Prevention and Control Assessment Framework (IPCAF).^[14]

Previous studies have shown the applicability and feasibility of other WHO

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tools, such as the WHO hand hygiene self-assessment framework,^[15-18] as well as the water and sanitation for health facility improvement tool (WASH FIT).^[19] Studies repeatedly demonstrate the feasibility and reliability of these tools. Due to the recent publication of IPCAF, this tool has not been used in a wide range like what was said about the previous tools.

Considering the lack of necessary documents related to IPC in our country, the evaluation of IPC development in the country's hospitals seems necessary. Therefore, we decided to investigate the IPC level of affiliated hospitals of Tehran University of Medical Sciences (TUMS) by using WHO tool.

Methods

In this descriptive study, the CCs of IPC programs in affiliated hospitals of TUMS is evaluated based on the evaluation tool of WHO, IPCAF. Totally, 31 centers were included in this study in 2022. The ethics code is IR.TUMS.IKHC.REC.1399.051.

After studying the translated IPCAF-coordination with the officials of hospitals and obtaining their consent – explain necessary points to relevant personnel – collecting data in the form of interviews, visits, and viewing documents – scoring the different parts of each component and calculating the overall score – classification of hospitals according to the final score was done into 4 predetermined groups of WHO guide. The IPC supervisor and IPC nurse of each hospital and medical intern did all data gathering and interviews.

The final score is calculated by adding up the scores of all eight CCs, and accordingly, each hospital is classified into one of the following categories: Score 0-200: insufficient; Score 201-400: basic; Score 401-600: intermediate; Score 601-800: advanced.

All variables were analyzed by SPSS software version 25. For quantitative and qualitative variables, a *t*-test was used and an error rate of less than 5% was considered acceptable.

Results

This study was conducted on 31 hospitals in Tehran: 19 (61.3%) academic government centers, 2 nonacademic government centers (6.5%), and 10 private centers (32.3%).

For CC1 (program), the lowest score was related to the faculty Dentistry ward. Public hospitals with an average score of 82.9 ± 17.8 had more points than private hospitals with an average score of 72.7 ± 12.3 , but there was no statistically significant difference ($P = 0.115$).

For CC2 (guidelines), public hospitals with an average score of 90.5 ± 9.7 had more points than private hospitals with an average score of 85.0 ± 19.8 , but there was no statistically significant difference ($P = 0.302$).

For CC3 (education and training), public hospitals with an average score of 74.6 ± 11.1 had more points than private hospitals with an average score of 66.0 ± 20.9 , but there was no statistically significant difference ($P = 0.142$).

For CC4 (surveillance), public hospitals with an average score of 82.9 ± 19.1 had more points than private hospitals with an average score of 76.5 ± 14.1 , but there was no statistically significant difference ($P = 0.352$).

For CC5 (multimodal strategies) the lowest score was related to the faculty Dentistry ward without any score. Public hospitals with an average score of 75.9 ± 21.4 had more points than private hospitals with an average score of 72.5 ± 17.6 , but there was no statistically significant difference ($P = 0.663$).

For CC6 (monitoring and feedback), the lowest score was related to the faculty Dentistry ward with a score of 15. Public hospitals with an average score of 82.1 ± 17.8 had more points than private hospitals with an average score of 81.0 ± 13.8 , but there was no statistically significant difference ($P = 0.880$).

For CC7 (workload and bed occupancy), public hospitals with an average score of 71.1 ± 16.4 had fewer points than private hospitals with an average score of 81.0 ± 10.4 , but there was no statistically significant difference ($P = 0.096$).

For CC8 (Built environment and equipment), the lowest score was related to the faculty Dental ward. Public hospitals with an average score of 84.7 ± 10.6 had fewer points than private hospitals with an average score of 86.6 ± 10.1 , but there was no statistically significant difference ($P = 0.635$) [Table 1].

Comparing the averages of different CCs, the highest score was related to having a guideline for IPC and the structure of the environment, and the lowest score was related to IPC education and training [Figure 1].

Comparing the total score of IPC, the highest score was related to Meymanat Psychiatric Hospital with 775 points, followed by Bahrami Children's Hospital with 740 points.

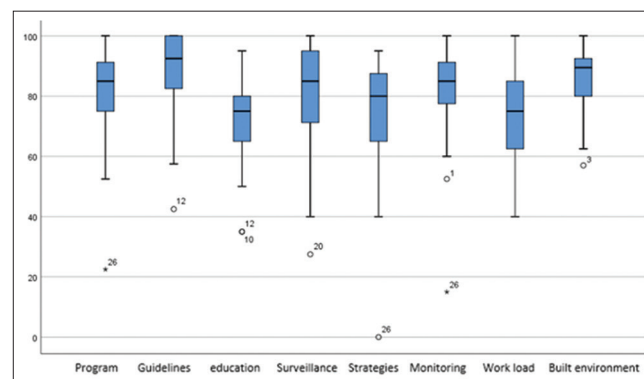


Figure 1: Box diagram comparing the average points of core components of infection prevention and control form in Tehran hospitals

Table 1: Comparison of IPC form core component scores between private and public hospitals

Type of hospital	n	Mean	Std. deviation	Std. error mean	P
Program					
Private	10	72.750	12.3294	3.8989	0.115
Public	21	82.976	17.8994	3.9060	
Guidelines					
Private	10	85.000	19.8956	6.2915	0.302
Public	21	90.548	9.7748	2.1330	
Education and training					
Private	10	66.000	20.9231	6.6165	0.142
Public	21	74.643	11.1883	2.4415	
Surveillance					
Private	10	76.500	14.1520	4.4752	0.352
Public	21	82.952	19.1422	4.1772	
Multimodal strategies					
Private	10	72.50	17.678	5.590	0.663
Public	21	75.95	21.484	4.688	
Monitoring/audit					
Private	10	81.000	13.8544	4.3811	0.860
Public	21	82.143	17.8060	3.8856	
Workload, staffing, and bed occupancy					
Private	10	81.00	10.488	3.317	0.096
Public	21	71.19	16.424	3.584	
Built environment					
Private	10	86.600	8.1677	2.5828	0.635
Public	21	84.762	10.6696	2.3283	

The lowest score was related to the faculty Dentistry ward with 320 points, followed by the Children's Medical Center Hospital with 435 points.

Overall, 23 centers (74.1%) were at the advanced level with a score higher than 600; 7 centers (22.5%) were at the intermediate level with a score between 400 and 600 and only one center (3.2%) was at the minimum acceptable level with a score of 200-400.

Discussion

A current study was conducted to investigate the degree of proximity of Tehran hospitals to the standards of IPC scores.

The highest score was related to Meymanat Psychiatric Center, which only manages psychiatric patients, accordingly the score obtained may not be accurate. Similarly, the lowest score is related to the faculty Dental ward, which due to the fact that there are no inpatient departments, so falsely could score low in most components.

In a study conducted by Aghdassi *et al.*^[20] in 2019, 736 hospitals in Germany were examined through IPCAF, which was found that 84% of the hospitals were at the advanced level and 4% of the centers were at the basic

level and no center was at the inadequate level, similar to our study that 74.1% of the hospitals were at the advanced level and only 3.2% of the centers were at the basic level, and no center was at insufficient level. In Aghdassi *et al.* study, the highest score was related to the CC8, and the lowest score was related to the CC5, which was different from our study with the highest score in CC2 and the lowest score in CC3.

In another study conducted in 2018 by Deryabina *et al.*,^[21] at 41 of Georgia's 273 hospitals using WHO's IPC tool, 78% of hospitals had IPC guidelines and only 44% of hospitals used IPC monitoring and 54% of hospitals had HAI surveillance systems which all had been lower than the current study.

In 2017-2018, a multicountry study conducted by Tartari *et al.*^[22] concluded that most countries have IPC programs and guidelines, but many less have translated them for implementation and invested adequate resources, particularly in low-income countries. National guidelines were available in 67%, but only 36.4% and 21.6% of countries had an implementation strategy and compliance with guidelines, respectively. Although the highest score in our study was related to the CC2, or IPC guidelines, but similarly, only these guidelines existed in our centers and they did not have a favorable condition in the field of implementation and adherence to the guidelines.

In this survey, we found that private and public hospitals do not have a significant difference in terms of IPC level.

limitations of this study are as follows:

- Non-cooperation of some hospitals
- We did not analyze the minor part of each component and only analyzed core components.

Finally, it is concluded that Tehran medical centers have a good level of IPC, and there are correct plans and instructions in these centers, but in the field of education and training for IPC, there are still deficiencies and weaknesses, especially in private centers, which needs to be resolved with more effort and supervision.

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Conflicts of interest

There are no conflicts of interest.

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