



Evaluation of the Implementation of WHO Infection Prevention and Control Core Components Among Health Care Facilities

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Abstract: Programs for infection prevention and control comprise a range of action plans, including antiseptic regulations, a healthcare worker training program, and the monitoring of healthcare-associated infections. The purpose of the study is to evaluate the World Health Organization's implementation of infection prevention and control programs in Ranya tertiary and healthcare facilities. A cross-sectional study was conducted at eight healthcare institutions in the Ranya administration in the Kurdistan Region of Iraq from February 2023 to the end of August 2023 using the World Health Organization Infection Prevention and Control Assessment Framework (IPCAF) checklist. The IPCAF consists of eight segments, and each part has a score of 100, hence the greatest score of 800. The respondents in this study were the heads of facilities and employees engaged in IPC-related tasks. The results show that 6 healthcare staff (75%) had basic IPC levels, and they scored 235, 207.5, 222.5, 330, 362.5, and 347.5 out of 800 points, respectively. Further, 2 healthcare staff (25%) had inadequate IPC levels, and they scored between 200 and 180 points. In addition, among the 8 IPC core components, the built environment and materials/equipment at the facility level (C8) had the highest scores, while minimum scores were observed in education, training (C3), and healthcare-associated infection surveillance (C4). In conclusion, the Ranya HCF facilities have certain working IPC aspects without appropriate implementation; further, practically all components need significant improvement.

1. Introduction

Healthcare personnel are constantly more likely to be exposed to biological agents because the healthcare environment is hazardous, and it is impossible to exclude infection [1]. According to the World Health Organization (WHO), healthcare-associated infections (HAIs) affect about 15% of hospitalized patients globally [2]. In addition, the prevalence of HAIs in low- and middle-income nations fluctuates between 5.7% to 19.1% at any given time [3].

Despite the most recent advancements in infection control methods. HAIs continue to be essential because of their frequency, cost, mortality, and role in the development of antibiotic resistance [4–8].

WHO recommends healthcare facilities implement and practice an Infection prevention and control (IPC) program using best practices [9]. The primary stage in adopting IPC in healthcare facilities is to establish the Hospital Infection Control Committee (HICC) and the IPC program. A training program

for healthcare personnel, antiseptic policies, HAI surveillance, and other action measures are all included in IPC initiatives [10].

The national guide to the infection control program in Iraq dates back to 2009. The organizational structure of the infection control program in Iraq is represented at all different levels, centrally at the level of the Ministry of Health and then at the level of health departments and various health institutions. The Iraqi Ministry of Health has placed infection control on its list of priorities, and this guide was prepared with technical support from the WHO. The National Guide to the Infection Control Program is the first unified reference in Iraq for infection control procedures and policies, and it is the first step on the way to establishing unified foundations, standards, and protocols at the country level.

In the Kurdistan Region (KRG), the Infection Control Department dates back to 2010 through a group of experts who played a key role in developing the mapping program and developing infection control guidelines, which depends on the Iraqi National Guide to Infection Control. Nevertheless, there is no study in the Kurdistan Region and/or Iraq on the implementation of WHO IPCAF regarding hospital evaluation. This study intended to evaluate the implementation of infection prevention and control programs level in Ranya tertiary, healthcare facilities and health specialist centers. A tertiary care hospital offers complete general medical services, pediatrics, maternity, and various branches of surgery. The specialist centers provide services for one medical special issue and dental health.

2. Materials and Methods

A cross-sectional study of 8 healthcare facilities was carried out in Ranyah administration in KRG from February 2023 to the end of August 2023 using the World Health Organization Infection Prevention and Control Assessment Framework (IPCAF). The IPCAF is a systematic tool that can provide both a preliminary evaluation of the IPC program and activities inside a healthcare facility and ongoing assessments through repeated administration to monitor progress and promote development [11]. The Raparin administration has five hospitals (Ranya Teaching Hospital, Ranya Maternity and Pediatric Teaching Hospital, Shahidan Qaladze Teaching Hospital, Hajiawa General Hospital, And Chwarqurna Hospital), and 2 medical centers (Ranya Hemodialysis and Thalassemia Center), in addition to one dental health center and X-ray center. Because the thalassemia center was a part of Ranya Teaching Hospital and had the same IPC, it was not included.

The Respondents in the study were the heads of facilities and personnel engaged in IPC-related tasks. The study did not include the other staff members who were not involved in the implementation of the IPC. Ethical approval was obtained from the scientific committee of the College of Nursing/University of Raparin, Ranya general directorate of health, Health care facilities, and the participant.

2.1 Study Instrument and Technique

IPCAF's tool was used to evaluate the IPC program. The IPCAF's tool has a specified structure with indicators and components. Furthermore, the tool is made up of 81 quantifiable indicators that consider IPC rules and the eight essential IPC system components; IPC Program, IPC Guidelines, IPC Education, HCAs Surveillance System, Multimodal Strategies in IPC, Monitoring/Audit/Feedback, Workload, Staffing, and Bed Occupancy within Facility, Environments, Materials, and Equipment in the Facility are the components listed in that order.

The tool assigns an identical score of 100 to each component, and the total possible score for all eight factors is 800. The tool specifies how much weight is assigned to each indication state across all components. Questions marked "yes/no" or "choose one answer" generally require the participant to select only one response. Multiple responses are permitted for some questions. The participant can select all of the options that apply to their facility by selecting at least one of the questions with the notation "please tick all that apply" on them. Each question's individual response receives points based on how significant it is with the corresponding core component. The facility falls into one of four categories for IPC practice and advancement based on the overall score earned in the eight components:

1. Inadequate: The IPC's fundamental components are not being implemented. A significant advancement is necessary.
2. Basic: The IPC fundamental components have some of their elements in place, but they are not fully completed. More development is necessary.

3. Intermediate: A significant number of the IPC core components have been conducted correctly. The establishment must concentrate on creating long-term plans to maintain and grow the current IPC program activities while continuing to improve the scope and quality of performance.

4. Advanced: The WHO standards are Completely implemented, and the IPC key components are suitable for the facility's requirements [11].

Table 1: The categorization of the final IPCAF's assessment score.

IPCAF score overall	IPC level
0–200	Inadequate
201–400	Basic
401–600	Intermediate
601–800	Advanced

3. Results

3.1 The distribution of IPCAF scores

Following the analysis of IPCAF data from 8 HCFs, the findings that 6 HCFs (75%), had basic IPC levels which are Ranyah Teaching Hospital, Shahidan Qaladze Teaching Hospital, Pediatric & Maternal Hospital, Haji-Awa General Hospital, Hemodialysis center, and they scored 362.5, 347.5, 330, 235, 222.5, 207.5, respectively. Out of 800 points and 2 HCFs (25%), Chwarqurna hospital and X-ray center had inadequate IPC levels (scored 200 and 180 points). In addition, among the 8 IPC core components, the IPC built environment, and materials equipment for IPC at the facility level (C8) had the highest scores, while IPC Education & Training (C3) and HAI Surveillance (C4) had the lowest scores.

Table 2: Distribution of the overall results score and level of IPCAF among participating healthcare facilities and health centers.

#	Healthcare facilities	Core components*								Total	IPCAF Level
		C1	C2	C3	C4	C5	C6	C7	C8		
1	Ranyah General Hospital	40	65	15	25	40	45	50	82.5	362.5	Basic
2	Shahidan Qaladze General Hospital	37.5	57.5	15	30	45	45	40	77.5	347.5	Basic
3	Pediatric & Maternal Hospital	35	57.5	15	25	30	50	40	77.5	330	Basic
4	Haji-Awa Hospital	10	30	0	7.5	15	40	50	82.5	235	Basic
5	Artificial Kidney Hospital	10	27.5	5	7.5	10	40	40	82.5	222.5	Basic
6	Ranyah Dental Center	10	27.5	5	2.5	15	35	40	72.5	207.5	Basic
7	Chwar Qurna Hospital	5	15	0	0	15	40	50	75	200	Inadequate
8	Ranyah X-Ray Center	2.5	25	0	0	5	35	40	72.5	180	Inadequate

*C1=IPC Program, C2=IPC Guidelines, C3=IPC Education & Training, C4=HAI Surveillance C5=Multimodal Strategies, C6=Monitoring/audits of IPC practice and feedback, C7=Workload, Staffing and bed occupancy, C8 Built environment, materials equipment for IPC at the facility level, and IPCAF= The Infection Prevention and Control Assessment Framework.

3.2 The core components of the IPCAF score

3.2.1 Core component 1: IPC Program

Of the eight sites, three (37.5%) have an IPC program that is currently in place and is supervised by at least one IPC member and a notification of some kind of his/her function (Fig 1). The other 5 (62.5%) HCFs did not also have an IPC program. None of the 8 facilities were scored above 40 points in the core components of the IPC program.

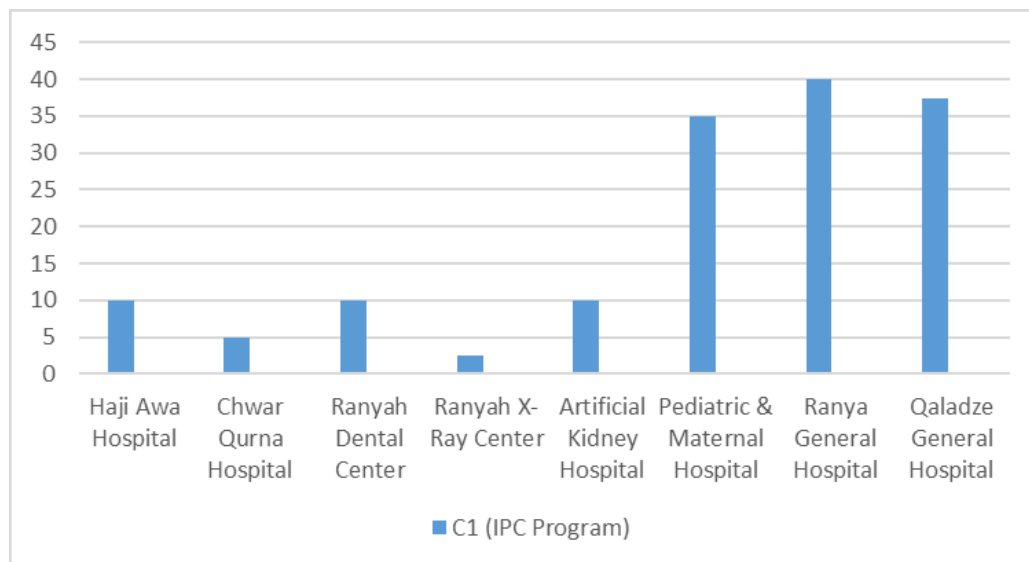


Figure 1: The level of the IPC program at 8 participating healthcare facilities according to IPCAF score results.

3.2.2 Core components 2: IPC Guideline

The result shows that 3 (37.5%) HCFs have either developed or implemented IPC guidelines in their establishment. They got scores of 65, 57.5, and 57.5 points respectively on core components of the IPC guideline. The rest of the 5 HCF scored below 50 points.

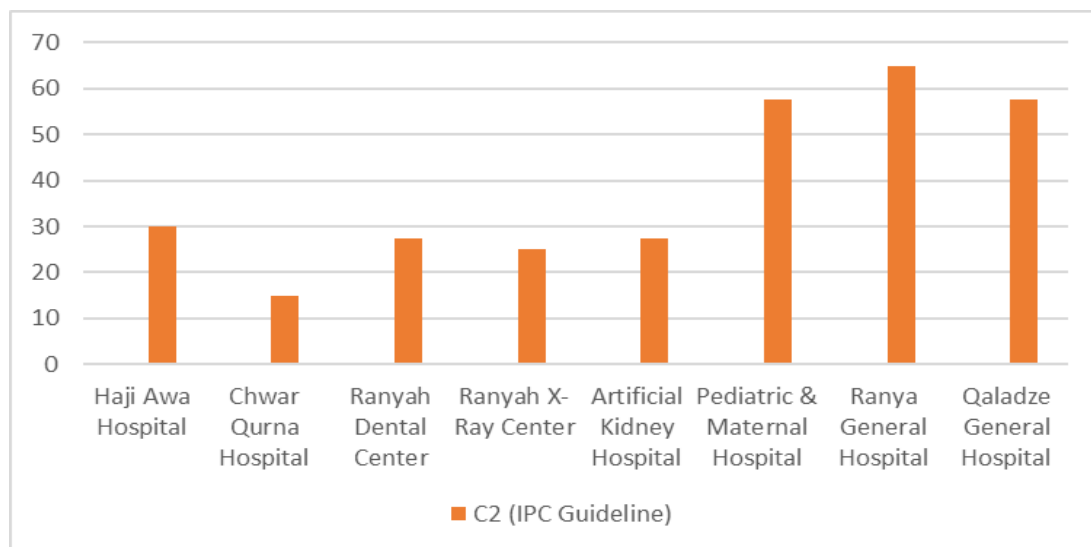


Figure 2: The level of the IPC guidelines at 8 participating healthcare facilities according to IPCAF score results.

3.2.3 Core Components 3: IPC Education

Regarding IPC training, the study found few healthcare workers who did training in IPC at their facilities. The majority of facilities lacked a framework of ongoing education and training for IPC implementation and practices. The Maximum score of this section was 5 points.

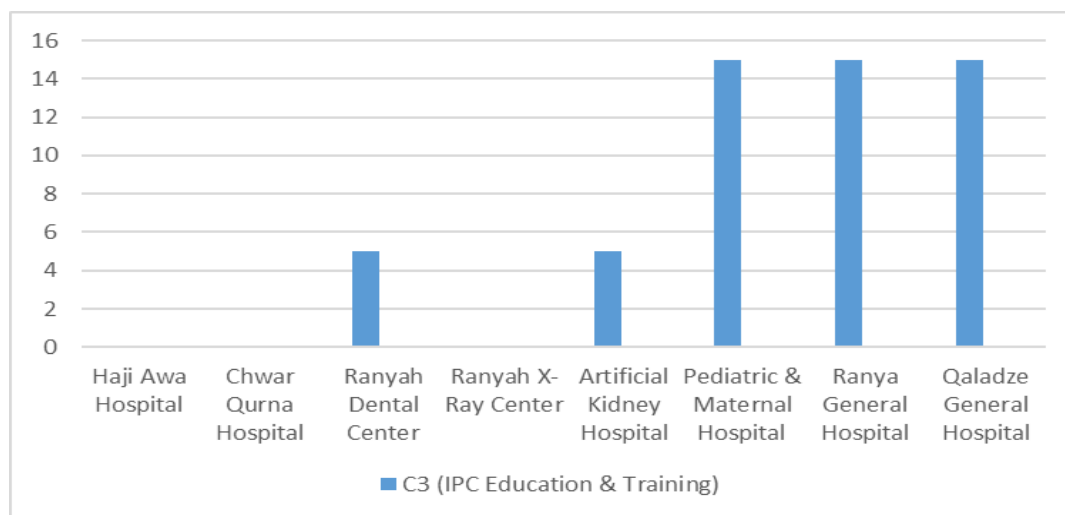


Figure 3: The level of IPC Education at 8 participating healthcare facilities according to IPCAF score results.

3.2.4 Core components 4: HCAIs Surveillance

Nearly all the HCFs have no existing HCAI surveillance system in place. There is no ongoing evaluation or monitoring that complies with the facility's priorities and current needs. Some facilities conduct manual HCAI monitoring, but no committed staff is available to conduct HCAI surveillance with supporting logistics. (Fig 4) The minimum score for this section was 30 points.

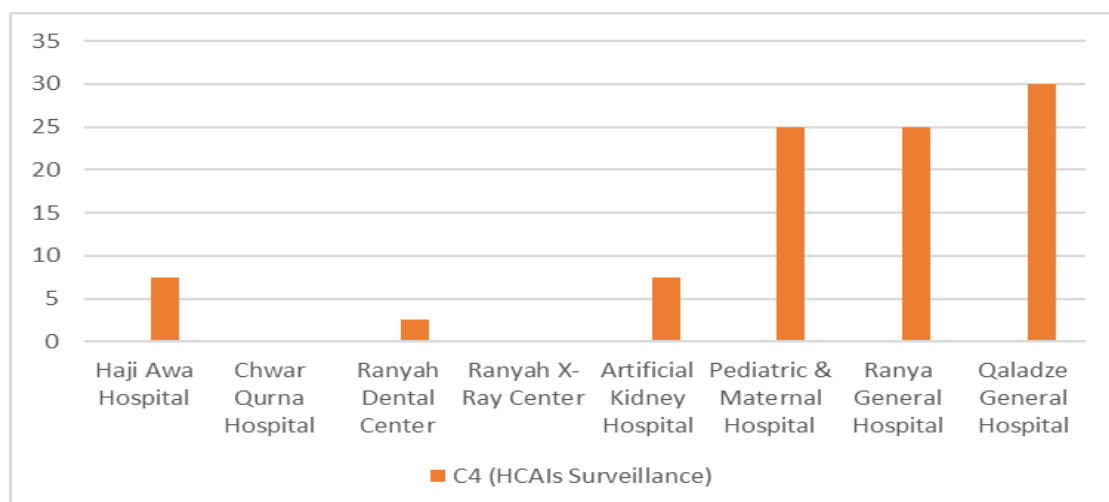


Figure 4: The level of HCAIs Surveillance at 8 participating healthcare facilities according to IPCAF score results.

3.2.5 Core components 5: Multimodal Strategies

Multimodal strategies are not well established in all HCFs. The capability-building system and training are inappropriate, and the multidisciplinary team used to implement IPC multimodal strategies is not in place.

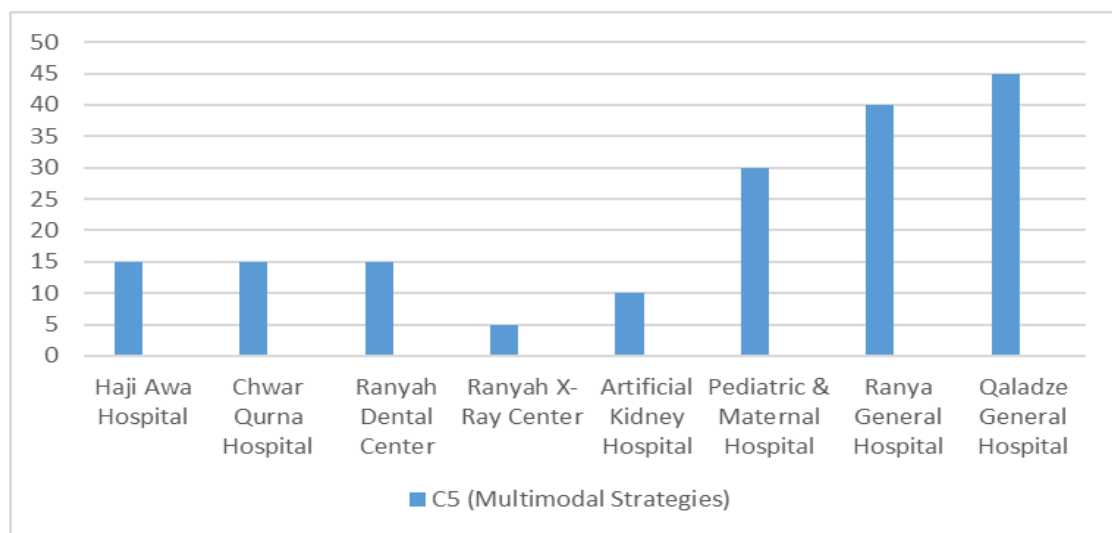


Figure 5: The level of Multimodal Strategies at 8 participating healthcare facilities according to IPCAF score results.

3.2.6 Core components 6: Monitoring/Audit of IPC Practices and Feedback

Some of the healthcare settings in the Ranya administration have built monitoring and audit systems of IPC. There is a fair auditing and feedback system in place at three facilities. 50 points were the maximum possible result for the monitoring/audit of IPC procedures and input.

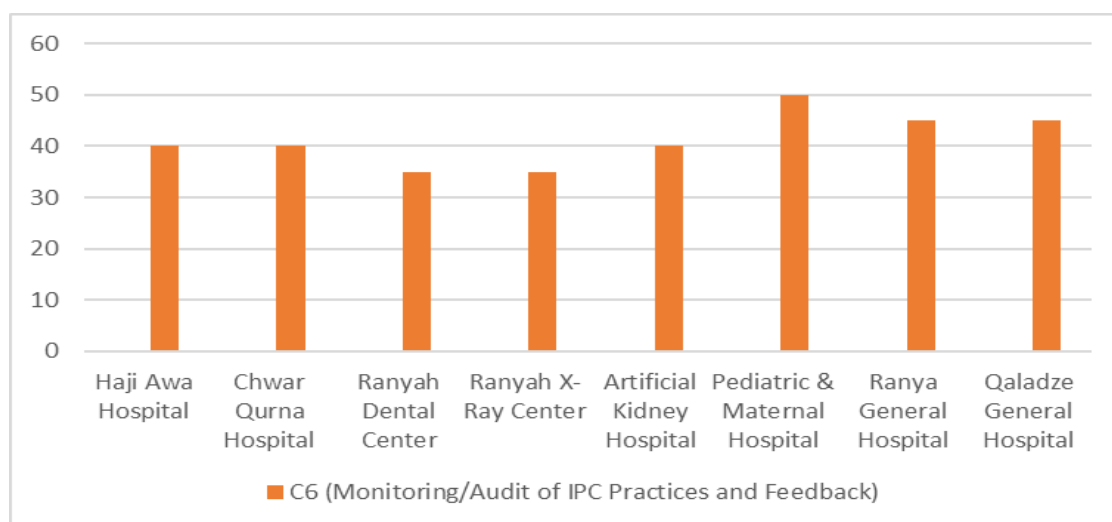


Figure 6: The level of Monitoring/Audit of IPC Practices and Feedback at 8 participating healthcare facilities according to IPCAF score results.

3.2.7 Core Components 7: Workload, Staffing, and Bed Occupancy

The majority of healthcare facilities have good scores for healthcare professionals (medical staff) involved in patient care and service delivery. The institution has adequate staffing levels that are determined by the workload of the patients. This means there was enough amount of healthcare to the number of the patients, and most hospitals adhered to the WHO recommendation to keep patient beds at least one meter apart in all departments.

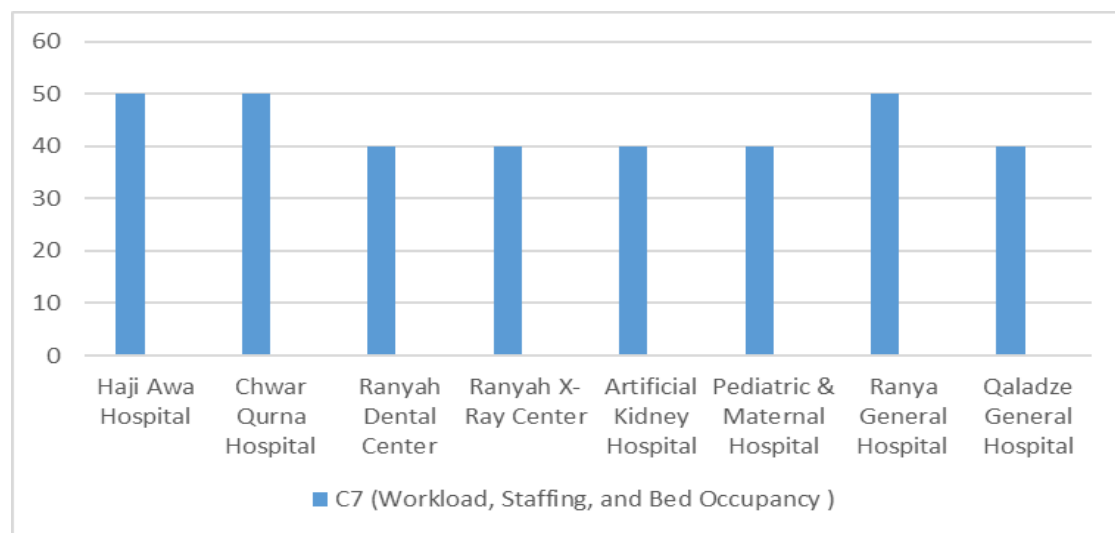


Figure 7: The level of Workload, Staffing, and Bed Occupancy and Environments, Materials, and Equipment for IPC at 8 participating healthcare facilities according to IPCAF score results.

3.2.8 Core Components 8: Environments, Materials, and Equipment for IPC

The majority of HCFs have effective inventory and supply control for IPC supplies and equipment. In most hospitals, there were readily available water and power services for all kinds of purposes. Additionally, there are operational handwashing facilities (with alcohol-based hand rub or soap and water) accessible at all locations of care. Ambient ventilation and an adequate supply of energy or power are both readily available and in good working order. The minimum score for this section was 75 points.

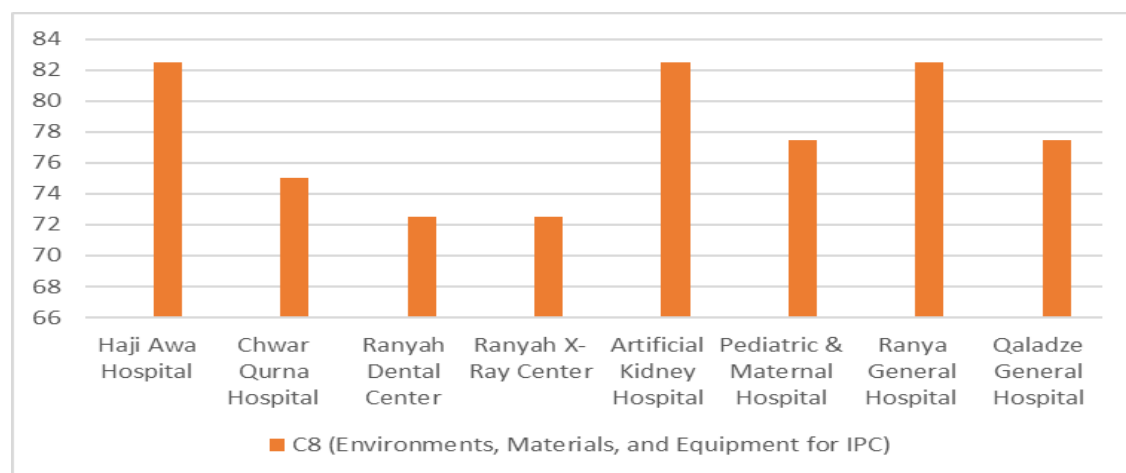


Figure 8: The level of Workload, Staffing, and Bed Occupancy and Environments, Materials, and Equipment for IPC at 8 participating healthcare facilities according to IPCAF score results.

4. Discussion

The Ministry of Health (MoH) in the Iraqi Kurdistan Regional Government was established in the early 1990s, and it adopted the Iraqi MoH's fundamental organizational framework and system. Due to the significant damage that has been done to the health system in Iraqi Kurdistan Region as a result of persistent conflicts with the Iraq federal government, issues in the region and the current demographic, and political situation in the region [12], this study was conducted in order to evaluate the implementation of IPC in the Ranya administration healthcare facilities.

The present study shows that the IPC in healthcare institutions in Ranya were not in a good place, based on evaluation by using IPCAF. Moreover, the study also found that only three among 8 health care facilities have IPC guidelines with one person responsible for implementing, observing, and reporting the IPC issues in their hospitals. In addition, these three staff are responsible for the other 5 IPC health facilities in the Ranya administration.

Among 8 healthcare facilities, only 6 HCFs (75%) had a basic level of IPC ranging between 207.5 to 347 points and 2 HCFs (25%) had an inadequate level of IPC ranging between 200 and 180 points based on IPC core component. These results show that according to WHO IPCAF Tool Scores and Description, Ranya HCF facilities have few functional IPC aspects, but it is not properly implemented, and nearly every component needs major improvement [11]. Despite Iraq's identification as a developing nation with a middle-income level, the city of Ranya in the Iraqi Kurdistan Region has basic and/or inadequate public healthcare facilities, which is comparable to other lower-middle-income countries that have average levels of IPC. According to 81 countries' responses to the WHO global survey on infection prevention and control in health care settings, high-income nations often had higher IPC levels (median IPCAF score of 605 points), whereas low-income and lower-middle-income countries had significantly lower scores: 385 points and 500 points, respectively, as well as public facilities: 515 points [13]. Furthermore, this study is inconsistent with other studies done in Turkish health care facilities which indicated a total of 68 HCFs from seven regions in Turkey and the Turkish Republic of Northern Cyprus. 50 (73.5%) HCFs had advanced IPC levels, while 16 (23.5%) of hospitals had intermediate IPC levels [14].

Regarding the HCFs 8 core components, the study which was observed the highest scoring component was C8 (Building environment, materials equipment for IPC practice and feedback; scored minimum point 75) (Fig 4). The lowest-scoring components were C3 (IPC education and training; the maximum score was 15 points) and C4 (C4=HAI Surveillance; got 30 points) (Fig 2). While the other components, such as the IPC Program, Guidelines, Multimodal Strategies, Monitoring/audits of IPC practice and report, have got low scores, the maximum score they got was 50 points and it was for C7 (Workload, Staffing and bed occupancy).

According to the results, there is an appropriate environment, materials and equipment for IPC at healthcare facilities. Hand hygiene stations and Personal protective equipment (PPE) were available for all healthcare workers. The sharp, infectious, and non-infectious waste collection containers are conveniently located near all waste-producing locations. Unfortunately, the HCFs in Ranya have limited resources for the other WHO core component, and it is not at the WHO standards. There is a lack of (IPC) programs. Only three hospitals have a person in charge of the IPC program. They all are healthcare workers as mentioned previously. Although the hospitals and HCFs follow the KRG Minister of Health's guidelines regarding infection control, which is based on the Iraqi national guide to the infection control program, it not implemented well in every hospital. There are no IPC team at HCFs, and IPC guidelines are not available to every HCF in the Ranyah administration.

According to the results of the current study, most healthcare professionals, cleaners, and other staff members who have direct patient contact do not undergo IPC training. While some employees have limited access to IPC training, most employees do not receive regular, consistent training. In order to carry out and sustain the IPC activities, regular staff education and capacity-building programs are crucial, in addition to other advancement of medical skills programs [15]. Moreover, the HCFs lacked surveillance activities and regular evaluation of current needs and priorities in facilities. The HCFs have a general surveillance system in place for a few essential diseases. Furthermore, the multimodal strategies scored a median 15 points, which means multimodal strategies are not good for implementing IPC interventions, such as addressing ergonomics and ensuring that the essential infrastructure and supply availability are in place.

The finding of the study also illustrated monitoring/audits of IPC practice and feedback. Implementing the IPC requires periodic evaluations with uniform audits and monitoring [16]. Further, the workload, staffing and bed occupancy got a median of 40 points for both of them and the maximum point was 50 points for three hospitals which are Pediatric & Maternal Hospital, Ranyah General Hospital, and Qaladze General Hospital. Although a cross-sectional survey was carried out in 12 tertiary-level healthcare facilities in Pakistan, the scores of all facilities ranged from inadequate to advanced. One facility fell into the "inadequate" category with a score of 5 facilities achieved the "basic" category, another 5 beings "intermediate", and only one (8.3%) hospital achieved "advanced" status. As this study observed., the aspects of education and training, surveillance and multimodal strategies achieved the lowest average scores [17].

Finally, the Kurdistan Region of Iraq published Vision 2020 for the Kurdistan Region in 2013 as a roadmap for developing policies aimed at several important areas, including health. It identified four

primary initiatives for health policy: building a strong system for financing health care, boosting preventive health services, expanding access to high-quality healthcare, and fortifying policy and regulatory capabilities [18]. Unfortunately, ongoing crises and conflicts in the region with the central government and the rapid expansion of the Islamic State hindered the implementation of this vision.

5. Conclusions

The Ranya HCF facilities have certain working IPC aspects without appropriate implementation; further, practically all components need significant improvement. For operations and ongoing initiatives, such as enough materials, instruction, multimodal approaches, hand hygiene services, cleanliness, and policies for infection prevention and control, adequate funding is required. The study recommended at the healthcare facilities level, IPC education and training should be provided to all staff members. Multimodal techniques and facility-based HAI surveillance should guide interventions. To prevent and control HAIs and AMR, regular monitoring and feedback on healthcare practices based on IPC standards are advised. At the national level, the IPC program should prioritize training and education for health professionals, create national HAI surveillance systems, organize IPC events, and set up a mechanism for monitoring and evaluation to assess performance and standards. In addition, healthcare worker staffing levels should be adequately assigned according to patient workload. In addition, providing hospitals with materials and equipment to perform appropriate IPC should be readily available at the point of care.

Data availability: Data will be made available on request.

Conflicts of interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Reference

- [1] B. Joseph and M. Joseph, "The health of the healthcare workers.," *Indian journal of occupational and environmental medicine*, vol. 20, no. 2, India, pp. 71–72, 2016. doi: 10.4103/0019-5278.197518.
- [2] H. A. Khan, F. K. Baig, and R. Mehboob, "Nosocomial infections: Epidemiology, prevention, control and surveillance," *Asian Pac. J. Trop. Biomed.*, vol. 7, no. 5, pp. 478–482, 2017, doi: 10.1016/j.apjtb.2017.01.019.
- [3] WHO, "Health care-associated infections FACT SHEET," World Health Organization. doi: 10.1016/B978-0-323-82823-9.00037-4.
- [4] World Health Organization, Global report on infection prevention and control. World Health Organization, 2022. [Online]. Available: https://books.google.iq/books?hl=en&lr=&id=auWfEAAAQBAJ&oi=fnd&pg=PR5&dq=Global+report+on+infection+prevention+and+control.+Geneva:+World+Health+Organization%3B+2022.+Licence:+CC+BY-NC-SA+3.0+IGO&ots=Eujm0CXHqV&sig=tbyO5gv9FGSfeOBpH7gKEO_HziM&redir_esc=y#
- [5] M. Haque, M. Sartelli, J. McKimm, and M. A. Bakar, "Health care-associated infections—an overview," *Infect. Drug Resist.*, pp. 2321–2333, 2018.
- [6] C. Suetens et al., "Prevalence of healthcare-associated infections, estimated incidence and composite antimicrobial resistance index in acute care hospitals and long-term care facilities: Results from two european point prevalence surveys, 2016 to 2017," *Eurosurveillance*, vol. 23, no. 46, pp. 1–18, 2018, doi: 10.2807/1560-7917.ES.2018.23.46.1800516.
- [7] X. Liu, A. Spencer, Y. Long, C. Greenhalgh, S. Steeg, and A. Verma, "A systematic review and meta-analysis of disease burden of healthcare-associated infections in China: an economic burden perspective from general hospitals.," *J. Hosp. Infect.*, vol. 123, pp. 1–11, May 2022, doi: 10.1016/j.jhin.2022.02.005.
- [8] A. Cassini et al., "Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis," *Lancet Infect. Dis.*, vol. 19, no. 1, pp. 56–66, 2019, doi: 10.1016/S1473-3099(18)30605-4.
- [9] World Health Organization, "Infection prevention and control GLOBAL." 2022. doi: 10.4324/9781003069072-12.
- [10] World Health Organization, "Coronavirus disease (COVID- 19) technical guidance : Infection prevention and control," *Infect. Prev. Control*, pp. 1–6, 2023, [Online]. Available: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control/>.
- [11] WHO, "Infection Prevention and Control Assessment Framework at the Facility Level," *World Heal. Organ.*, vol. 2016, no. May, pp. 1–16, 2018, [Online]. Available: <https://www.who.int/publications/i/item/WHO-HIS-SDS-2018.9>.
- [12] N. P. Shabila, N. G. Al-Tawil, R. Tahir, F. H. Shwani, A. M. Saleh, and T. S. Al-Hadithi, "Iraqi health system in kurdistan region: Medical professionals' perspectives on challenges and priorities for improvement," *Confl. Health*, vol. 4, no. 1, pp. 2–7, 2010, doi: 10.1186/1752-1505-4-1921118537.
- [13] S. Tomczyk et al., "The first WHO global survey on infection prevention and control in health-care facilities," *Lancet Infect. Dis.*, vol. 22, no. 6, pp. 845–856, 2022, doi: 10.1016/S1473-3099(21)00809-4.

-
- [14] E. Azak et al., "Evaluation of the implementation of WHO infection prevention and control core components in Turkish health care facilities: results from a WHO infection prevention and control assessment framework (IPCAF)—based survey," *Antimicrob. Resist. Infect. Control*, vol. 12, no. 1, 2023, doi: 10.1186/s13756-023-01208-0.
 - [15] J. Storr et al., "Core components for effective infection prevention and control programmes: New WHO evidence-based recommendations," *Antimicrob. Resist. Infect. Control*, vol. 6, no. 1, 2017, doi: 10.1186/s13756-016-0149-9.
 - [16] J. Wilson, "Rethinking the use of audit to drive improvement," *J. Infect. Prev.*, vol. 19, no. 1, pp. 3–4, 2018, doi: 10.1177/1757177417746732.
 - [17] M. A. Tahir et al., "Assessment of Infection Prevention and Control (IPC) Implementation and Strategies Used for IPC Preparedness at Facility Level in Underdeveloped Areas of Pakistan," *Infect. Drug Resist.*, vol. 16, no. April, pp. 1997–2006, 2023, doi: 10.2147/IDR.S399830.
 - [18] Ministry of Planning KRG, "Kurdistan Region of Iraq 2020".