



# Assessment of Infection Control Measures at Primary Health Care Facilities in Egypt

Hoda Ibrahim Ibrahim Rizk, Hanan Abd-Elghani EL-Raghi, Marwa M. Zein \*

Department of Public Health and Community Medicine, Faculty of Medicine, Cairo University, Cairo, Egypt

## Abstract

**BACKGROUND:** Primary care facilities (primary health cares [PHCs]) in Egypt are public sector facilities and the issue of infection control (IC) in public sector facilities is important because public sector facilities are the only option available to most low-income groups, who constitute most of Egypt's population.

**AIM:** The aim of the study is to the assessment of IC measures in PHC by national and international assessment tools.

**STUDY DESIGN:** Health system operation research, observational study.

**METHODOLOGY:** Sample: 3 Egyptian PHCs, all health care providers (HCPs) in each facility were interviewed with a total number (55 doctors and 34 nurses). using a national assessment tool, interview questionnaire derived from the international assessment tool, and hand hygiene observation checklist.

**RESULTS:** Although the availability of supplies, presence of administrative activities, and good infrastructure, items related to manpower practice (cleaning activities and procedures) had the lowest percent score (57.9% and 68.5%, respectively). Almost all doctors and nurses did not have a pre-employment tuberculin skin test. Hand hygiene compliance was very low among HCPs during the observation time (1.6% for doctors and 10% for nurses).

**CONCLUSION:** The national IC assessment tool of PHC facilities in Egypt is well structured, but defective in the assessment of employee health activities related to IC. Tuberculin skin test as screening of tuberculosis for the HCPs is neither done pre-employment nor periodically. Despite the availability of supplies for hand hygiene practice and good IC knowledge, the compliance was very low during the observation time.

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**\*Corresponding author:** Marwa M. Zein, Department of Public Health and Community Medicine, Faculty of Medicine, Cairo University.  
E-mail: [marwa.zein.2312@gmail.com](mailto:marwa.zein.2312@gmail.com)  
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## Introduction

Healthcare-associated infection (HCAI) is a major global safety concern for both patients and health care providers (HCPs). HCAI is an infection occurring to a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission. HCAI can affect patients at any type of setting where they receive care and can also appear after discharge. HCAI includes also occupational infections among health facility staff [1].

Although the care provided in most primary health care (PHC) facilities is predominantly ambulatory with few or no inpatient beds, infection control (IC) is still important to minimize or eliminate the risks of facility-acquired infections and assure quality patient care [2].

The core set of health services delivered by the reformed health system in Egypt is called "the Basic Benefit Package" which is the masterpiece of the Family Health Model. Health facility accreditation is mandatory before contracting with a family health fund through four

steps. The final accreditation is based on measuring eight categories, IC program is one of them [3].

The strategic plan for the IC program included setting up an organizational structure, IC guidelines, training health care workers, promoting occupational safety, and establishing a system for monitoring and evaluation [4].

Primary care facilities (PHCs) are public sector facilities and public sector facilities are the only option available to most low-income groups, who constitute most of Egypt's population. Improving the IC situation in PHCs leads to improving the quality of services provided and the entire health status of the population. Despite the availability of the national IC assessment tool, it is not covering certain items such as the part related to the HCPs so it is crucial to assess its comprehensiveness with the international tool to help in the provision of a simple and comprehensive method.

## Aim of the study

### Goal

Improve IC situation in PHC facilities.

### *Specific objectives*

The study was conducted in three Egyptian PHC facilities with the following objectives:

1. Compare items of assessment of IC measures between national and international assessment tool of IC in PHC
2. Assessment of IC measures in PHC by national assessment tool
3. Explore hand hygiene (HH) compliance among HCPs
4. Explore the fulfillment of HH supplies.

## **Methods**

### **Study design**

Health system operations research, exploratory study.

### **Study setting**

The study was conducted at three Egyptian PHC facilities at Cairo and Giza governorate.

### **Sample type and subjects of the study**

Convenient sample (easy access) including three PHC facilities in urban (Masr El-Quadema), semi-urban (El-Zahraa), and rural (Shabramant) areas. All HCPs in each facility were interviewed with a total number (55 doctors and 34 nurses).

### **Data collection tools and technique**

The IC was assessed by the following tools.

1. The national assessment tool for PHC facilities [5] was first developed by the team of IC of the Egyptian ministry of health in 2006. The latest version which was developed in 2015 was the one used in this study. It includes five major items for assessment (administrative activity, cleaning activities, infrastructure, supplies, and procedures) with a total of 484 points which were divided into (34 points for administrative activity, 46 points for cleaning activities, 36 points for infrastructure, 40 points for supplies, and 328 points for procedures) then the total points were converted into a percentage to facilitate its interpretation
2. Structured interview questionnaire derived from the international IC assessment tool for PHC facilities [2], used to collect data from doctors, nurses, and workers.

- Observation checklists derived from the international tool of assessment
  - a. Hand hygiene station checklist: It assessed the availability of hand hygiene stations; the availability of the hand hygiene supplies and their quality
  - b. Hand hygiene practice checklist: It assessed the adherence of the HCPs to hand hygiene practice in each facility. This checklist was used by observing the HCP either doctor or nurse who contacted a patient, the type of patient contact either invasive or not, the type of hand hygiene before and after patient contact either handwashing with soap and water or alcohol hand rub or none.

If the HCP do hand hygiene either hand wash or alcohol hand rub another checklist was used to assess if this hand hygiene was correct or not based on criteria of correct hand hygiene; hands-free of jewelry and other accessories, sleeves above the elbow, avoiding contamination of hands when switching off the taps and taking at least 30 seconds doing hand wash.

### **Data analysis technique**

All the collected data were revised for completeness and logical consistency. Pre-coded data was entered on the computer using Microsoft Office Excel Software Program 2017. Pre-coded data was then transferred and entered into the Statistical Package of Social Science Software program, version 26 (SPSS) to be analyzed statistically.

For qualitative variables, they were described as frequency and percentage and compared using the Chi-square test, where the  $p < 0.05$

Ethical considerations: All the interviewed staff was treated according to the Helsinki Declaration of biomedical ethics. Verbal consent was obtained from each interviewed staff after proper orientation regarding the objectives of the study. The protocol was approved by the faculty of medicine at Cairo university's ethical committee, public health department council staff, and the ministry of health.

## **Results**

1. Comparison between items of national and international IC assessment tools in PHC facilities  
Table 1 represents a content analysis of national and international IC assessment tools in PHC facilities. Most items of assessment were found in both tools except for the assessment of HCP safety (presence of employee health program, employee

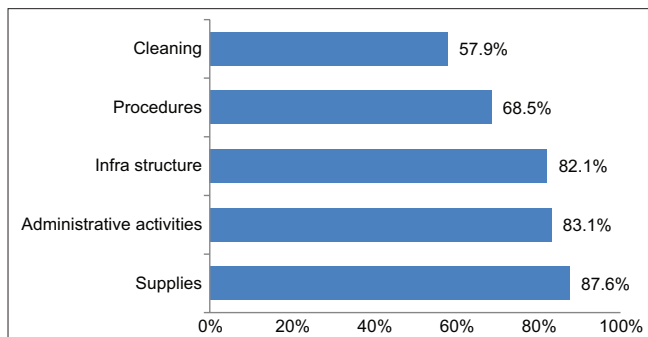
health education program, monitoring of sharp injuries, the presence of strategies to prevent sharp injuries, and pre-employment TB screening). Some items were not present in both tools such as facility demographics (number of staff, types of procedures, average number of clients).

**Table 1: Comparison between items of national and international IC assessment tools in PHC facilities**

Items	National assessment tool	International assessment tool
Facility demographics (number of staff, types of procedures, average number of clients)	Not present	Not present
IC program		
IC program and infrastructure	Present	Present
Training and competence	Present	Present
HCP safety	Not present	Present
Standard precautions	Present	Present
assessment		
Total items and sub items of assessment	5 items and 102 sub items	9 modules and 156 questions
Number of pages	5 pages	45 pages

## 2. IC assessment according to the national assessment tool

Figure 1 remarks that although the availability of supplies, presence of administrative activities, and good infrastructure, items related to manpower practice (procedures and cleaning activities) had the lowest percent score.



**Figure 1: Average total percent score of the studied PHC facilities in items of the national IC assessment tool**

## 3. IC assessment according to the international assessment tool

Regarding the observation of hand hygiene stations:

Table 2 illustrates the total percent score of the hand hygiene stations regarding the fulfillment of the required criteria (availability of supplies and sink condition). The total percent score was 73.3%. The least score was for the presence of hand hygiene posters (47.1%) followed by sink cleanness and the presence of alcohol-based hand antiseptics (both 58.8%).

Regarding the assessment of IC committee activities towards the protection of HCPs against acquired infections in the facility:

Table 3 showed that the nurses' positive response (73.5%) towards the presence of formal employee health program was significantly more than the doctors' positive response (46.2%) ( $p = 0.02$ ), 85.2% of the nurses said that there is employee health

education program in their facilities. While half of the doctors said that there is an employee health education program and the other half denies that ( $p = 0.002$ ).

**Table 2: Percent score of observation checklist for assessment of hand washing supplies and sinks condition**

Items of assessment	Total score (%)
Presence of hand washing station	15/17* (88.2)
Supplies	
Running water available	15/17 (88.2)
Liquid soap present	15/17 (88.2)
Type of dispensers**	11/17 (64.7)
Liquid dispensers in a clean condition	13/17 (76.5)
Method of drying***	11/17 (64.7)
Presence of alcohol-based hand antiseptic	10/17 (58.8)
Presence of poster on hand wash	8/17 (47.1)
Sink condition	
Sink is clean	10/17 (58.8)
Taps are not leaking	15/17 (88.2)
Drainage pipes are not leaking	14/17 (82.4)
Total score (%)	137/187 (73.3)

\*Number of clinics in each facility\* number of facilities (3), \*\*Hand operated pump and not hand-held pour bottle, \*\*\*Paper towel or single use cloth towel

The hepatitis B vaccination status among doctors and nurses; 80% of the doctors and 91.1% of the nurses were fully vaccinated against HBV (three doses) ( $p < 0.001$ ), as shown in Table 3.

**Table 3: Assessment of IC committee activities towards protection of HCPs against acquired infections in the facility**

Item	Doctors		Nurses		p-value
	n (/55)	%	n (/34)	%	
Presence formal employee health program					
Present	25	45.50	25	73.50	0.02
Not present	30	54.50	9	26.50	
Presence employee health education program					
Yes	28	50.90	29	85.30	0.002
No	27	49.10	5	14.70	
Hepatitis B vaccine					
No vaccine	4	7.3	1	3.0	<0.001
One dose	1	1.8	0	0.0	
Two doses	6	10.9	2	5.9	
Three doses	44	80.0	31	91.1	
Presence of assigned person to call in an event of sharp injury					
Present	20	37%	29	84.10	<0.001
Not present/don't know	35	63%	5	15.90	
Monitoring employee punctures and sharp injuries					
Yes	11	19.4%	15	43.4	0.03
No/Do not know	44	80.3%	19	56.6	
Pre-employment tuberculin test assessment					
Had the baseline tuberculin test	1	1.8%	3	8.8	0.3
Did not had baseline tuberculin test	54	98.2%	31	91.2	

Regarding the assessment of Hand hygiene practice (observation of HH practice), Table 4 shows the hand hygiene practice of doctors and nurses in the studied PHC facilities. For doctors, only one hand hygiene practice (1.6%) was done from 62 hand hygiene chances and 2 hand hygiene (10%) practices were done from 20 chances for nurses.

## Discussion

Little is known about the risks involved with the most common care procedures in PHC. Procedures that are relatively invasive and may result in adverse effects commonly performed in PHC include insertion of intrauterine devices, injections, and dental procedures. There is a recognized risk associated with the acquisition of viruses such as hepatitis B and HIV [6].

**Table 4: Observation of hand hygiene practice of doctors and nurses**

HH Observation	Total patient contact	Type of patient contact		Type of HH before patient contact		Type of HH after patient contact		Total HH practice n (%)		
		Invasive	Non-invasive	Yes		No				
				Hand wash	Alcohol rub	Hand wash	Alcohol rub			
Doctors	31	2	29	0	0	31	1	0	30	1/62 (1.6)
Nurses	10	9	1	0	0	10	2	0	8	2/20 (10)

### Advantages and limitations of national assessment tool

The advantages were that it was short and well structured (five items and 102 sub-items in five pages), takes short time (the average time to complete it is 2 h). While the limitations were that the score of some items (cleaning and infrastructure) is subjective, interpretation of the total score was not available with the tool and the researcher got it from personal communication with the supervisors of IC in the ministry of health, items of clinics assessment are the same despite the difference in the procedures done in each clinic, deficient in the assessment of staff IC knowledge, deficient in detailed observation checklist for the assessment of IC measures e.g. hand hygiene and deficient in items related to assessment of employee health e.g. needle -stick injury notification and documentation.

Regarding employee health program, healthful work environment for the staff and eliminate or minimize occupational exposure to blood-borne pathogens through following exposure control plan [7]. In the current study, by comparing Egyptian national and international IC assessment tools in PHC facilities, it was found that the national tool doesn't include items for assessment of employee health (e.g. control of sharp injuries, monitoring of sharp injuries, and TB screening).

Regarding monitoring and reporting sharp injuries, CDC recommended, in outpatient settings, that the facility should track the blood exposure events, evaluates event data, and develops/implements corrective action plans to reduce the incidence of such events [8]. An estimated 600,000 to one million needle-stick injuries are occurring each year in the world. About half of which went unreported. Therefore, it should be stressed that staff should be encouraged and be supported to report injuries [9]. As depicted from the current study, 63% of the doctors said that they do not know or there are not assigned person to call in an event of sharp injury compared to the nurse's response (15.9%) ( $p < 0.001$ ). More than three-quarters of the doctors (80.3%) and more than half of nurses (56.6%) said that they don't know or there isn't monitoring to employee puncture and sharp injuries ( $p = 0.03$ ) as shown in Table 3. The IC committee leaders said that the facility offers the vaccine for all HCPs free of charge.

Regarding the protection of HCPs against TB, the CDC recommended in outpatient settings to ensure

that all HCPs had baseline tuberculosis screening (using tuberculin skin test) before placement. Those with the potential for ongoing exposure to TB receive periodic screening (if negative) at least annually [8]. In the current study, pre-employment baseline tuberculin test assessment as shown in Table 3 almost all the doctors and nurses responded that they did not have a pre-employment tuberculin skin test done ( $p = 0.3$ ).

Malangu and Mngomezulu (2015) conducted a survey in South Africa to describe and compare the tuberculosis IC measures implemented by PHC facilities. They found that around 80% of facilities complying with a screening of staff members for tuberculosis and the screening of staff members for tuberculosis found that 18 facilities reported 35 cases of tuberculosis among staff members. In the current study, most of the HCPs did not have a pre-employment baseline assessment of TB status using a tuberculin skin test [10].

Hand hygiene is one of the most important elements of IC activities as hand hygiene alone can significantly reduce the risk of cross-transmission of infection in healthcare facilities [11].

Insufficient or very low HH compliance rates have been reported from both developed and developing countries with mean baseline rates ranging from 5% to 89% and an overall average of 38.7%. In addition, the duration of hand cleansing episodes ranged on average from as short as 6.6 s to 30 s [12]. In the current study, it was found that the national assessment tool is defective in the detailed observation checklist of hand hygiene practice. The application of the observation checklist of the international tool demarcates that the total hand hygiene practice compliance was 1.6% of the hand hygiene chances for the doctors and 10% of the hand hygiene chances for the nurses as displayed in Table 4. In addition to that, all hand hygiene practices that were done did not meet the criteria of correct hand hygiene practice.

## Conclusion

1. The national IC assessment tool of PHC facilities in Egypt is well structured but defective in the assessment of employee health activities related to IC e.g. blood-borne pathogens and TB transmission and how to avoid this transmission
2. Tuberculin skin test as screening of TB for the HCPs is neither done pre-employment nor periodically
3. Despite the availability of supplies for hand hygiene practice and good IC knowledge, compliance was very low during the observation time.

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