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Assessment of Infection Prevention and Control Programs in Some Health Facilities in Cameroon using the World Health Organization Assessment Framework

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Abstract

Healthcare associated infections (HCAI) remain a global` problem, affecting millions of people worldwide and accounting for prolonged hospitalization and increased financial burden. Establishing infection prevention and control (IPC) programs is effective in reducing the incidence of HCAI, but the status of IPC programs is not well documented in Cameroon. We assessed the core components of IPC programs with a focus on HCAI surveillance in some health facilities using the WHO assessment framework (IPCAF). We carried out a cross-sectional study from October 2019 to January 2021. Health facilities were chosen purposefully. Trained data collectors traveled to health facilities and administered the IPCAF questionnaire to authorities of health facilities. All eight components of an IPC program were assessed. Data collected was analyzed using Statistic Package for Social Sciences (SPSS 27.0) software. Altogether 65 health facilities were assessed, 81.5% of which were public facilities. The median IPCAF score from the health facilities was 275 (Range: 112.5- 595) on a scale of 800, with most (86%) of them having either an inadequate (29%) or a basic (57%) IPC status. None of the health facilities attained the advanced IPC status. HCAI surveillance was the weakest of the eight IPC core components. Most (89.2%) of the health facilities did not include HCAI surveillance in their IPC programs. There is therefore need to strengthen IPC programs in health facilities in Cameroon, with a focus on the surveillance of HCAIs, which was the weakest core component.

Keywords: *Control, Healthcare Associated Infections, Prevention.*

Introduction

Healthcare associated infection (HCAI) is a global challenge, affecting millions of people worldwide and increasing by 0.06% annually, with developing countries disproportionately affected and Africa having the highest rates compared to the other continents [1,2]. The World health organization (WHO) reports that averagely 7% of patients in developed countries and up to 15% of patients in low- and middle-income countries (LMIC) develop at least one HCAI at a given time with an estimated 10% attributable mortality [2,3]. In developing countries, the burden of HCAI is underestimated largely due to the complexity of diagnosis and the paucity of surveillance data which requires expertise and resources, which are often limited in developing countries [4]. In 2016, one study in Cameroon

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revealed that HCAI contributed to high hospital morbidity in one of the teaching hospitals [5]. Some studies however show that in high-risk populations such as patients admitted in the intensive care and neonatal units, the prevalence is two to 20 times higher in LMIC compared to high income countries, notably for device associated infections [3,6]. These infections, which are neither incubating nor present in a patient at the time of admission, are one of the most frequent adverse events occurring during the delivery of care to a patient in a health facility or during ambulatory care and threaten the safety of patients [7]. HCAI often account for prolonged hospitalization, increase resistance of microorganisms to antimicrobials, long term disabilities, excess financial expenses and even death [2]. The annual hospital costs of HCAIs in the U.S. have been estimated to be up to 33 billion dollars per year [8]. The most frequent HCAI are central line-associated bloodstream infection (CLABSI), ventilator-associated pneumonia (VAP), catheter-associated urinary tract infection (CAUTI), and surgical site infection (SSI) [9]. The most common route of transmission of HCAI from patient to patient and within the healthcare environment are healthcare workers' hands [10]. However, a large percentage of HCAI are preventable through effective infection prevention and control (IPC) measures [6]. Therefore, establishing effective IPC programs at the national and health facility level is primordial in reducing the incidence of HCAI. Although there has been significant progress made to reduce the incidence of HCAI in many parts of the world, a number of emerging events such as the Covid 19 pandemic have underlined the need to support countries in developing and strengthening IPC with the objective to achieve resilient health systems, both at the national and facility levels [6,11]. It is worth noting that several initiatives have been developed to reduce the incidence of HCAI especially in developing countries with programs such as continuous quality improvement efforts [12], antimicrobial stewardship [13], the use of checklists [14], and the development of infection prevention guidelines for facilities [15,16]. A number of IPC assessment tools including the infection control assessment tool (ICAT) developed by the US agency for international development (USAID) were developed to help countries in their continuous quality improvement (CQI) process to improve IPC. In 2009, the WHO published an interim document on the core components of an IPC program at the national and acute health facility level. Building on this momentum and on best available scientific evidence and expert consensus, aiming to ensure a high quality of health service delivery for every person accessing health care, as well as to protect the health workforce delivering those services the tool was revised and finally published in 2016 [6]. The guideline provides evidence-based recommendations on the core components of IPC programs that are required to be in place at the national and acute facility level to prevent HCAI. At the national level, the Infection prevention and control assessment tool 2 (IPCAT2) tool is recommended while the infection prevention and control assessment framework (IPCAF) tool is recommended. The IPCAT2 tool is meant to assess the six core components of an IPC program at the national level while the IPCAF tool evaluates the eight core components of an IPC program at the health facility level. Many countries are currently setting up IPC programs both at the national and health facility levels. However, most of these programs are still to provide the desired effect especially in LMIC partly due to the lack of adequate infrastructure in health facilities, but also due to the poor compliance of healthcare workers to these IPC standard protocols [7,17]. We sought to assess the core components of IPC programs with a focus on HCAI surveillance in some health facilities in Cameroon using the IPCAF tool, prior to

establishing a national HCAI surveillance system and developing a CQI approach to strengthen IPC practices in Cameroon.

Materials and Methods

Study Design and Setting

This was a cross-sectional descriptive study carried out in health facilities selected from all administrative regions of Cameroon. Cameroon is a LMIC found in Central Africa and situated at the Gulf of Guinea, with a population of about 27 million inhabitants following the 2022 World Bank estimate [4] and divided into ten administrative regions. The Cameroon health sector is structured into a pyramidal form made up of three functional levels as follows – the central level responsible for policy development, the intermediate level made up of 10 regional delegations of public health having a technical supervisory role and the peripheral level made up of 189 health districts responsible for the implementation of policies and strategies. Following the Cameroon Ministry of Public Health (MOPH) organigram, health facilities are classified into seven categories as follows:

Category 1: General Hospitals (GH)
Category 2: Central Hospitals (CH)
Category 3: Regional Hospitals (RH) and similar hospitals
Category 4: District Hospitals
Category 5: District Medical Center (DMC)
Category 6: Integrated Health Center (IHC)
Category 7: Outpatient Care Center (OCC)

We sampled both public and private health facilities from the first to the sixth categories from all the ten regions of the country.

Data Collection Tool

We used the WHO-IPCAF questionnaire to assess the core components of an IPC program in the selected health facilities. The IPCAF is a systematic tool that can provide a baseline assessment of IPC program and activities within a health care facility, as well as ongoing evaluations through repeated administration to document progress over time and facilitate improvement. The IPCAF is a structured, closed-formatted questionnaire with an associated scoring system. It is primary intended to be self-administered but can also be used for joint assessments, through careful discussions between external assessors and facility staff. This framework is intended to assess the current IPC situation at the health facility, that is, the existing IPC activities/resources, and identify strengths and gaps that can inform the development of future plans. It is a diagnostic tool for health facilities to detect relevant problems or shortcomings that require improvements and identify areas where they can meet international standards and requirements. This tool is structured following the recommendations in the WHO Guidelines on core components of IPC programs at the acute health care facility level and thus, it is divided into eight sections reflecting the eight WHO IPC core components, which are then addressed by a total of 81 indicators. These indicators are based on evidence and expert consensus and have been framed as questions with defined answers to provide an orientation for assessment. The first component evaluates IPC program; the second, IPC guidelines; the third IPC education and training; the fourth, HCAI surveillance; the fifth, Multimodal Strategy (MMS); the sixth, monitoring and evaluation; the seventh, workload, staffing and bed occupancy; and the eighth, built environment, materials, and equipment for IPC [6]. For each section, questions are formatted as “Yes/No”, single or multiple choices, with a numerical score assigned to each response depending on how crucial the question is for IPC standards. Based on the overall score achieved in the eight sections (on a total of 800), the facility is assigned to one of four progress levels of IPC implementation thus:

Inadequate (0-200): IPC core components implementation is deficient. Significant improvement is required.

Basic (201-400): Some aspects of the IPC core components are in place, but not sufficiently implemented. Further improvement is required. Intermediate (401-600): Most aspects of the IPC core components are appropriately implemented. The facility should continue to improve the scope and quality of implementation and focus on the development of long-term plans to sustain and further promote the existing IPC program activities.

Advanced (601-800): The IPC core components are fully implemented according to the WHO recommendations and appropriate to the needs of the facility [18].

Data Collection Procedure

Prior to data collection, 4 data collectors, who were mainly medical doctors were trained on the IPCAF questionnaire and how to administer it by a team of supervisors. Following this briefing, the data collectors practiced how to administer the questionnaire under the supervision of the supervisors. This was to standardize the approach and the scoring of the responses. The data collectors then traveled to the selected health facilities to collect data. To ensure quality of the data collected, the data collectors were supervised throughout the process of data collection. While at the health facilities, the data collectors interviewed the general supervisor, the hygiene and sanitation/ IPC focal persons or committees as well as the head/ representative of the health facilities.

Study Period

The study was carried out from October 2019 to January 2021. Data collectors started data collection in four (Center, South, Littoral, and West) of the ten regions in 2019. However, the data collection was slowed down in 2020 because of the restriction of movement due to the Covid-19 pandemic with Cameroon confirming the first case in March 2020. Data collection continued in 2021.

Sampling Methodology and Data Analysis

Health facilities were chosen purposefully. All first second and third public health facilities in all ten regions were selected while health facilities from the fourth to the sixth categories were selected randomly. All private health facilities were also selected at random. However, to ensure representativeness, the health facilities were chosen from all levels of the health system pyramid from category one through six. The health facilities were both from the public and private sectors. In the towns of Douala and Yaounde, the economic and political capital of Cameroon respectively and the two most populated towns with most of the reference health facilities, we sampled all the reference hospitals. The data collected was entered into a Microsoft Excel sheet, cleaned, and exported to Statistic Package for Social Sciences (SPSS version 27.0) statistical software for analysis. Descriptive statistics were done to determine the IPC status of the various health facilities.

Ethical Consideration

Prior to data collection, an administrative authorization was obtained from the Ministry of Public Health. The objectives of the study were explained to the respondents, who were also reassured of the fact that it was not an audit but a first step of a continuous quality improvement of IPC programs in their health facilities.

Results

Altogether 65 health facilities were assessed from all ten regions of the country. Table one shows demographic variables assessed. More than three quarter (81.5%) of the health facilities assessed were from the public sector with majority (70.8%) from the third and fourth categories. Most of the health facilities

were from the Center, West, Littoral and Northern regions and more than two-thirds (69.2%) of the health facilities had no dedicated IPC committees as recommended by WHO, while of the health facilities with an IPC program, only 7.7% of them had clear terms of references specifying their roles and responsibilities of the IPC committee.

Figure 1 shows that 86.1% of the of the health facilities either had an inadequate IPC status (29.2%), that is, deficient implementation of IPC core components requiring a significant improvement, or a basic IPC status (56.9%), that is, having some aspects of the IPC core components in place but not sufficiently implemented and requiring further improvement. Few (13.8%) of the health facilities had an intermediate IPC status while none attained the advanced IPC status. None of the sampled health facilities reported having used the IPCAF framework prior to this study, even though WHO published it in 2017 and encouraged member states to use it to improve IPC programs in acute health facilities.

Figure 2 shows an asymmetric distribution, skewed to the right, with no health facility obtaining a score above 600 on a scale of 800, corresponding to an advanced IPC status.

The distribution of IPC status in both public and private health facilities is similar with most of the health facilities with a basic IPC status as shown in Figure 3. Category 1 (reference hospitals) health facilities had either a basic or an intermediate IPC status with none having an advance IPC status while all category five and six health facilities sampled had an inadequate IPC status irrespective of whether they were from the private or public sector.

Most category three and four health facilities had a basic IPC status as shown in Figure 4 below. The median IPCAF score of the health facilities was 275 (Range: 112.5 – 595) on a scale of 800. HCAI was the weakest IPC core component with a median score of 12.5 (Range: 0 – 60) while built environment, materials, and IPC equipment was one of the strongest components with a median score of 65 (Range: 15 – 100), both on a scale of 100. Table 2 below summarizes the median scores for IPC core components. This study reported that 89.2% of the health facilities did not include HCAI surveillance as a component of their IPC program. About 67.7% of the health facilities however had designated staff responsible for general surveillance activities in their health facilities, though only few (18.5%) were trained in basic field epidemiologic surveillance, a complementary course for a surveillance staff. Some of the health facilities however do monitor some priority infections such as surgical site infections (16.9%), some local priority epidemic-prone infections (26.2%) such as severe acute raspatory syndrome (SARS) and infections in vulnerable populations (13.8%) such as neonates. However, almost none (1.5%) of the health facilities carry out routine surveillance evaluations in line with the needs of the health facility to prioritize which HCAI to target for surveillance according to the local context.

Even though some of the health facilities visited report carrying out a form of HCAI surveillance, only one health facility (1.5%) uses standardized case definitions according to international guidelines such as that of Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN) or the European Center for Disease Prevention and Control (ECDC).

Information analysis and dissemination/ data use, linkage and governance were also one of the weakest thematic areas of HCAI surveillance core component, with few (6.2%) health facilities analyzing and disseminating antimicrobial drug resistance on a regular basis. Table 3 below summarizes the findings of the thematic areas of HCAI surveillance of the health facilities sampled.

Discussion

We carried out a baseline assessment of IPC practices in a sample of health facilities from all the ten regions of Cameroon with a representation from six of the seven categories of health facilities in Cameroon. Even though few studies have assessed IPC practices in developing countries, to the best of our knowledge, this is the first study conducted in Cameroon using the WHO IPCAF tool to assess the core components of IPC programs in health facilities. Compared to other assessment tools developed, the IPCAF tool assesses IPC status in a more holistic way and is relatively easy to interpret, though it requires professional experience to administer [18,19]. Prior to our study, none of the health facilities sampled had used the IPCAF tool before, even though WHO published the tool in 2016 and urged member states to use it to strengthen IPC programs in health facilities. The Covid-19 pandemic has also underscored the inadequacy of IPC in most countries and the importance of its sound establishment in healthcare facilities [20]. Therefore, the results of our study will provide valuable insights to the Ministry of Public Health (MOPH) to develop evidence- based strategies to strengthen IPC in health facilities as it strives to improve the quality of care of patients in Cameroon.

The current findings revealed that most health facilities had a basic IPC status, a result which is consistent with a study carried out in a similar LMIC setting like Bangladesh [21] and in a recently published global study on IPC [22]. The inadequacy or basic IPC status in most of the health facilities could be explained by the lack of IPC programs with designated IPC focal persons or IPC committees and clear terms of references as well as a lack of a national IPC guidelines. Poor IPC governance at national and facility levels is a common problem for health facilities, thus a lack of policy often results in a dearth of national IPC policies, inadequate funding for IPC activities and dedicated employees, and a lack of resources [23]. Most of the health facilities had hygiene and sanitation committees which focused on improving waste management in the health facilities but not addressing most of the other aspects of an IPC program in the health facility. Most of the hygiene committees neither had a facility IPC action plan including a monitoring and evaluation frameworks nor were members of the committee trained in IPC. Monitoring and audit of IPC practices was also one of the weakest IPC core components in most of the health facilities. A trained workforce together with the adequate infrastructure and the constant provision of IPC consumables is vital to improving IPC in health facilities [24,25]. Built environment, materials, and equipment for IPC was however one of the IPC core components where most of the health facilities had a relatively good score. The health facilities were constructed respecting standard norms. However, most of these health facilities lacked a microbiology laboratory, which is very vital for the surveillance of HCAI.

Most health facilities lacked a HCAI surveillance, hence this was the weakest IPC core component. HCAI surveillance including AMR patterns, are an essential component of both national and facility IPC programs. A facility based HCAI surveillance guides IPC interventions and detect outbreaks, including AMR surveillance, with timely feedback of results to health personnel and stakeholders and through national networks. The establishment of a national HCAI surveillance program and networks that include mechanisms for timely data feedback and with the potential to be used for benchmarking purposes is vital to reduce HCAI and antimicrobial resistance [6].

Although the establishment of a HCAI surveillance system is effective in reducing HCAI, building a national HCAI surveillance

system is however a challenge in many countries not only because of limited resources, but also because of the complex and specialized characteristic of HCAI surveillance systems [26]. This requires the prioritization of goals and infections to be monitored, standardized surveillance methodology, standardized case definitions compatible with diagnostic methods available, define calculation of rates, evaluation of data quality, report frequency, and reporting system including feedback mechanisms. In LMIC the challenge is more prominent because a lack of dedicated human resources and expertise in epidemiology and IPC. In LMICs, it may also be difficult to apply standard case definitions due to limited expertise and/or skills for data interpretation and use, lack of reliable microbiological and other diagnostic tools and poor-quality information from patient records [2]. Therefore, given the limited resources, there is need for health facilities to go through a prioritization exercise to determine the type of HCAI to target for surveillance according to the local context. Most health facilities did not only lack a HCAI surveillance but even the few hospitals implementing HCAI surveillance, they do not use standardized case definitions. Cameroon does not have an established HCAI surveillance system, nor does it have a national HCAI surveillance guideline nor a national protocol with data collection tools for HCAI surveillance. There is also no legal framework to guide HCAI surveillance in Cameroon. These are prerequisites to establishing a HCAI surveillance system. WHO recommends the country and health facility to clearly describe the organization of HCAI surveillance, determine the priority HCAIs to monitor defined according to the local context, define the surveillance methodology and data analysis and dissemination [2]. The IPCAF tool assesses these four areas as prerequisite to setting up a HCAI surveillance system. Our study shows that most of the health facilities were deficient in these four areas. These findings are consistent with the challenges or gaps in setting up a HCAI surveillance system in LMIC and particularly Africa, described in some studies [2,3].

Conclusion

The status of IPC programs in most health facilities in Cameroon are sub-optimal, with majority of the health facilities either having an inadequate or a basic IPC status, and none having attained the advance status as describes by WHO. HCAI surveillance is one of the weakest IPC core components, with very few health facilities implementing HCAI surveillance. There is need to develop evidence-based approaches to strengthen IPC including the establishment of a national HCAI surveillance program and networks that include mechanisms for timely data feedback to be used for benchmarking purposes to reduce HCAI and antimicrobial resistance.

Table 1. Demographic Characteristics of Health Facilities Assessed

Variable	Frequency	Percentage (%)
Type of health facility		
Public	53	81.5
Private	12	18.5
Category of health facility		
First	5	7.7
Second	6	9.2
Third	15	23.1

Fourth	31	47.7
Fifth	4	6.2
Sixth	4	6.2
Year of assessment		
2019	39	60
2020	5	7.7
2021	21	32.3
Region		
Far North	2	3.1
North	12	18.5
Adamawa	2	3.1
North-West	2	3.1
West	12	18.5
Center	15	23.1
East	2	3.1
Littoral	12	18.5
South-West	3	4.6
South	3	4.6
IPC committee		
No	45	69.2
Yes, without terms of reference	15	23.1
Yes, with terms of reference	5	7.7

Table 2. Median Scores of IPC Core Components in Selected Health Facilities

IPC core component	Min	Q1	Median	Q3	Max
IPC program	0	5	22.5	47.7	95
IPC guidelines	0	7.5	40	65	92.5
IPC education and training	10	10	30	57.5	85
HCAI surveillance	0	5	12.5	26.3	60
Multimodal strategy for implementing IPC	0	0	20	52.5	85
Monitoring/ audit of IPC practices	0	8.7	25	35	72.5
Workload, staffing and	10	35	50	60	85

bed occupancy					
Built environment, materials, and equipment for IPC	15	51	65	78	100
Total for all components	112.5	182.5	275	372	595

Abbreviations: *Min*: Minimum, *Max:* Maximum, *Q1:* First quartile, *Q3:* Third quartile

Table 3. Assessment of Key Elements of HCAI Surveillance in 65 Health Facilities

Key elements	**Variable**	**Options**	**Number (%)**
Organization of HCAI surveillance	Surveillance as a component of IPC program	Yes	7 (10.8)
	Designated staff responsible for surveillance	Yes	44 (67.7)
	Surveillance staff trained in frontline epidemiologic surveillance	Yes	12 (18.5)
	Availability of informatics to support surveillance	Yes	23 (35.4)
Priorities for HCAI surveillance	Prioritization exercise to determine targeted HCAI	Yes	3 (4.6)
	Surgical site infection surveillance	Yes	11 (16.9)
	Device-associated infection surveillance	Yes	4 (6.2)
	Clinically defined infections surveillance	Yes	17 (26.2)
	Colonization/ multi-resistant pathogens surveillance	Yes	6 (9.2)
	Local priority epidemic-prone infections	Yes	17 (26.2)
	Infections in vulnerable	Yes	9 (13.8)

	populations		
	Infections that may affect health care workers	Yes	4 (6.2)
	Regular evaluation of surveillance system	Yes	1 (1.5)
Methods of surveillance	Use of reliable surveillance definitions	Yes	1 (1.5)
	Use of standardized data collection methods	Yes	2 (3.1)
	Processes in place for regular data quality review	Yes	1 (1.5)
	Possess adequate microbiology and laboratory capacity to support surveillance	Yes,	35 (53.8)
Information analysis and dissemination	Surveillance data use for tailored actions	Yes	2 (3.1)
	Regular antimicrobial resistance analysis	Yes	4 (6.2)
	Regular feedback to frontline health workers	Yes	3 (4.6)
	Regular feedback to department heads	Yes	11 (16.9)
	Regular feedback to IPC committees	Yes	4 (6.2)
	Regular feedback to non-clinical management /administration	Yes	10 (15.4)
	How feedback is done	Yes	16 (24.6)

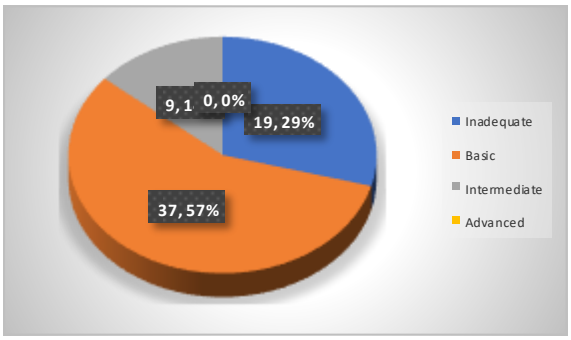

Figure 1. IPC Status of Health Facilities

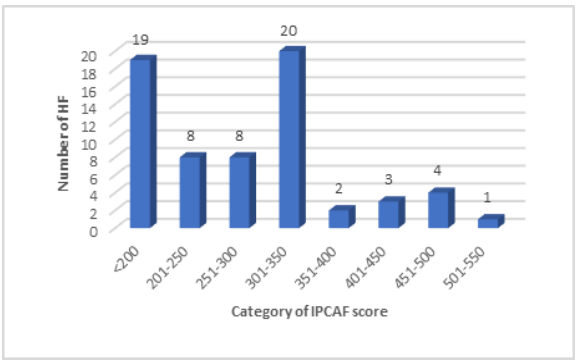

Figure 2. Distribution of Facility IPCAF Scores

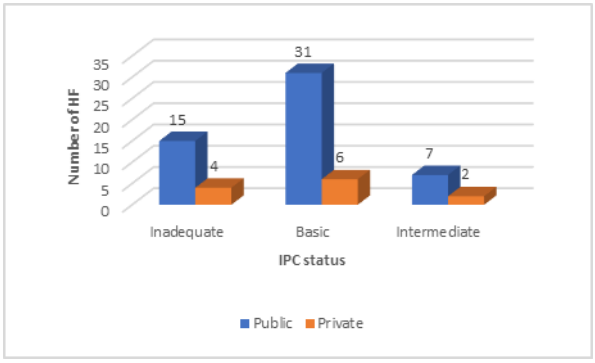

Figure 3. Distribution of Facilities by IPC Status

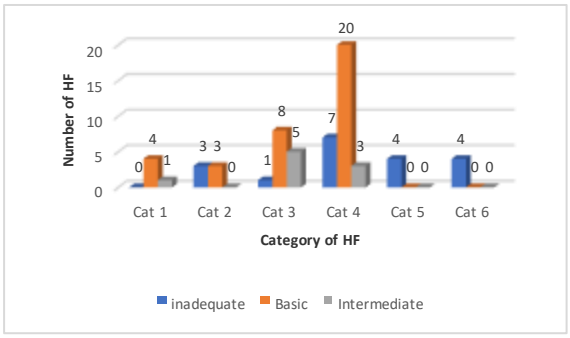

Figure 4. Distribution IPC Status by Category of Facility

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prevention and control at the global level by developing useful tools to guide IPC programs at the national and health facility levels.

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