Infection Prevention in Practice 6 (2024) 100408

Available online at www.sciencedirect.com

Infection Prevention in Practice

journal homepage: www.elsevier.com/locate/ipip

Assessing the state of infection prevention and control in cameroon: a cross-sectional workshop evaluation using socioecological models

Boris Arnaud Kouomogne Nteungue [a,b,*], Erick Tandi [c,d,e], Jeffrey Campbell [f], Chanceline Bilounga Ndongo [g,h], Bissouma-Ledjou Tania [i], Alphonse Acho [a,j], Dieudonnée Reine Ndougou [k], Reverien Habimana [l], Ambomo Sylvie Myriam [k], Bertolt Brecht Kouam Nteungue [m], Oyono Yannick [m], Louis Joss Bitang [n], Georges Alain Etoundi Mballa [g,o], Yap Boum [o,p]

[a] *Department of Public Health, Central University of Nicaragua, Managua, Republic of Nicaragua*
[b] *School of Public Health, Texila American University, Georgetown, Republic of Guyana*
[c] *Department of Preventive Medicine, College of Medicine, Graduate School of Public Health, Korea University, Republic of Korea*
[d] *Department for Health Promotion, Ministry of Health, Yaounde, Republic of Cameroon*
[e] *Institute for Occupational and Environmental Health, Korea University, Seoul, Republic of Korea*
[f] *Section of Pediatric Infectious Diseases, Boston Medical Center, Boston, USA*
[g] *Faculty of Medicine and Pharmaceutical Sciences, University of Douala, Douala, Republic of Cameroon*
[h] *Department for the Control of Diseases, Epidemics and Pandemics, Yaounde, Republic of Cameroon*
[i] *World Health Organization, Cameroon Country Office, Republic of Cameroon*
[j] *GHSA, Management Sciences for Health, Republic of Cameroon*
[k] *School of Health Sciences, Catholic University of Central Africa (ESS-UCAC), Yaounde, Republic of Cameroon*
[l] *Chonnam National University Medical School, Gwangju, Republic of Korea*
[m] *Faculty of Health Sciences, University of Buea, Republic of Cameroon*
[n] *Emergency Center of Yaounde (CURY), Yaounde, Republic of Cameroon*
[o] *Public Health Emergency Operation Coordination Center, Ministry of Health, Yaounde, Republic of Cameroon*
[p] *Institute Pasteur, Bangui, Central African Republic*

ARTICLE INFO

Article history:
Received 2 May 2024
Accepted 23 July 2024
Available online 24 October 2024

Keywords:
Infection prevention control
IPC programme
Socioecological model
Minimum requirements

SUMMARY

Objectives: Infection prevention and control (IPC) contributes to the reduction of healthcare associated infections. Notwithstanding the global attention with available guidelines and tools, low- and middle-income countries (LMICs) still struggle to put into place effective IPC programmes. Here, we use a socioecological approach to summarize the findings of a recent workshop on the implementation of IPC activities in Cameroon.
Study design: We conducted a cross-sectional study on the assessment of the IPC in Cameroon.
Methods: Experts and key stakeholders involved in IPC in Cameroon evaluated the implementation of infection prevention and control during a 4-day workshop. Detailed summaries of workshop discussions and recommendations were created. Data were clustered into themes guided by the WHO core component of IPC. Results were analyzed using

* Corresponding author.
E-mail address: bokorisbokoris@gmail.com (B. A. K. Nteungue).

https://doi.org/10.1016/j.infpip.2024.100408

Healthcare associated infection
IPC core components

the socioecological model of Bronfenbrenner, McLeroy and the theory of Grol and Wensing on successful implementation of practices in healthcare settings.
Results: Cameroon does not have an effective IPC programme in place but has developed some areas of the World Health Organization (WHO) IPC core components across the guideline level, the individual level, the organizational level, and the political level.
Conclusion: Cameroon is still far from the norms and standards laid out by the WHO. The evidence generated from the current analysis should contribute to improve policies and strategies towards an effective IPC programme in Cameroon and other LMICs.

Introduction

Healthcare associated infections (HAI) are a global challenge that result in lengthy hospital stays, increased morbidity and mortality, increased disabilities and higher health care costs. Low- and middle income countries (LMICs) are disproportionately affected by HAIs [1—3]. Infection prevention and control (IPC) measures are an effective and scientifically proven strategy to reduce HAIs [4]. The effective implementation of IPC measures often relies on the existence of enablers that are not always present in LMICs, such as water, sanitation and hygiene (WASH) which are sustainable development targets 6.1 and 6.2 [5,6]. According to the World Health Organization (WHO), IPC is an integral component of the health system, and WHO has developed guidelines to enable IPC in healthcare facilities [7,8]. The availability of IPC trained staffs contributes to reinforce a culture of safety within hospital settings [9]. The successful implementation of IPC activities in healthcare facilities and communities relies on behavior change of multiple actors (health workers, visitors, patients) with interactions at different levels (professional and organizational) [10,11]. LMICs struggle to put in place effective IPC programmes due to constraints in resources and infrastructure, and few LMICs countries have conducted national assessments of barriers or enablers of IPC activities [3,12]. In 2017, the joint external evaluation conducted in Cameroon reported a null capacity for IPC and as the coronavirus disease of 2019 (COVID-19) pandemic magnitude significantly decreased it was necessary to appreciate the improvements made by the country during the epidemic regarding IPC programme [13—15]; the MoH activated the Public Health Emergency Operation Coordination Center (PHEOCC) to appropriately respond to the new pandemic in March 2020 [14]. This is the first appraisal of IPC activities conducted in Cameroon at the national level using the WHO Infection Prevention control and Assessment tool for Minimum Requirements (IPCAT 2 MR) from the perspective of the socio-ecological model of Urie Bronfenbrenner, McLeroy and the theory of Grol and Wensing [16—18].

Methods

Study design

This was a cross-sectional study on the evaluation of the strategic implementation of IPC activities in Cameroon based on the WHO IPCAT2MR Tool. The questionnaire was administered during the course of the national IPC activities' evaluation as an opportunity we had to have the national and international experts attending the workshop.

Workshop

In December 2023, the MoH organized a national evaluation of the implementation of IPC from the period of January 2017 to December 2023. The MoH then invited representatives from all the different administrations involved in IPC to objectively evaluate what was done in the field and to identify gaps to be addressed; with the approval of the MoH, we took this opportunity to have all the experts at one place, to administer the WHO IPC MR tool using a consensus approach. Over 4 days in the city of Douala, 15 IPC experts from the MoH, including the National IPC Focal Person, and 8 IPC experts from Non-Governmental Organizations, participated in the workshop.

IPC assessment process

We used the Nonimal Group Technique (NGT) approach of Delbecq and Van de Ven through a face-to-face group interaction using the WHO IPCAT2MR tool, which is recommended for prioritization of information [19,20]; this approach used 4 stages in which were involved the 15 participants identified by the MoH — (a) the questionnaire was projected in front of all the participants, who individually brainstormed during 20 minutes and attributed a corresponding score on each question based on the available scale which was the silent generating stage, (b) participants then shared their answers (score per questions) to each other in a round robin fashion to allow others to reflect on the answer they initially choose, (c) under the leadership of the coordination team (main investigator and the national IPC focal person), participants engaged in a discussion of individual scores attributed to each WHO IPCAT2MR components and it was ensured a common understanding of the question with the support of the WHO experts presents who shed lights on some misunderstandings and these two stages took 65 minutes; (d) all the scores per questions of the questionnaire as projected lively were rated through consensus with all participants agreeing to the final score based on previous discussions, this last stage took 30 minutes due to the high number of participants.

The WHO IPC minimum requirement tool —a 25 question survey on 6 IPC components at the national level-to all the participants. It is important to emphasize that all the respondents answered the questionnaire through a consensus approach and not an individual one. The 6 IPC components of

Core component 1 : IPC programme	
1.1	Active prevention and control (IPC) programme exist at the national level?
1.2	An appointed IPC focal point in charge of the programme can be identified
1.3	The appointed IPC focal points have undergone training in IPC in the prevention of healthcare associated infection (HAI)
1.4	There is an identified, protected and dedicated budget allocated to the IPC programme, according to the planned activity
1.5	The appointed IPC focal point(s) have dedicated time for the task (at least one full-time equivalent)
Core component 2 : IPC guidelines	
2.1	The IPC focal point has a mandate to produce guidelines for preventing and controlling HAI
2.2	The development of guidelines involved the use of evidence-based scientific knowledge and international/national standards
2.3	The guidelines are for national coverage, including all the acute healthcare facilities (both public and private)
2.4	The guidelines are reviewed at least once every five years and updated to reflect the current evidence base
2.5	The IPC programme actively addresses guidelines adaptation and standardization of effective preventive practices (SOP) and their implementation to reflect local conditions
Core component 3: IPC education and training	
3.1	The national IPC programme provides guidance and recommendation for in-service IPC training at the facility level (for example, frequency, expertise required, requirements for new employee orientation, monitoring and evaluation approaches
3.2	The national IPC programme provides content and support to IPC training of health workers at the facility level
3.3	A national IPC for curriculum for in-service training of health care workers has been developed in alignment with the national IPC guidelines, approved and endorsed by an appropriate national body
3.4	A national system and schedule of monitoring and evaluation is in place to check on the effectiveness of training and education, at least annually
Core component 4 : HAI surveillance	
4.1	A multidisciplinary technical group for HAI is established at the national level by the national IPC focal point
4.2	A national strategic plan for HAI surveillance (with a focus on priority infections based on the local context) is developed by the multidisciplinary technical group
4.3	The national IPC focal point/team is trained on HAI surveillance concepts and methods
Core component 5: Multimodal strategies for the implementation of IPC activities	
5.1	There is a trained IPC focal point with knowledge of implementation science and multimodal improvement strategies and their application to IPC
5.2	The national IPC focal point coordinates/support local implementation of IPC improvement interventions
5.3	Multimodal strategies are included as the best approach for implementation IPC guidelines, and IPC education and training programmes
Core component 6: Monitoring/audit of IPC practices and feedback	
6.1	A multidisciplinary technical group for IPC monitoring is established at the national level
6.2	A strategic plan for IPC monitoring is in place, including an integrated system for collection, analysis and feedback
6.3	A minimal set for core indicators for healthcare facility in the country is defined
6.4	A mechanism to train national and local auditors is in place
6.5	Hand hygiene is compliance, monitoring and feedback is identified as a key national indicator, at the very least for reference hospitals

Figure 1. The WHO questionnaire on Minimum Requirements [21].

the WHO assessment tool were used as themes to group main response ideas: (a) IPC programme, (b) IPC guidelines, (c) IPC education and training, (d) HAI, (e) multimodal strategy and (f) monitoring and audit on IPC practices (Figure 1 below).

Analysis

We conducted a descriptive and narrative analysis of responses obtained, relating to the six IPC components. Each question of the WHO tool was first of all explained considering answers provided by the experts and the consensus that justify the score given, the overall score translating the national performance of the Cameroon' IPC strategy is displayed later to corroborate the narrative analysis. We used the Socio-ecological model of Bronfenbrenner and the theory of Grol and Wensing [20,22] to analyze qualitative data collected to identify the barriers and enablers of IPC activities, referring to questions with score that this not fully performed during the discussion stage of the nominal group technique approach. We used this framework to deduce key IPC interventions for future improvement. We then designed a theoretical framework for IPC activities in Cameroon [20,22].

Ethical approval

This study did not rely on patients' data and no ethics approval or patient consent was then required. The MoH provided administrative authorization for the national assessment of IPC activities by the IPC experts.

Findings from the workshop

National appraisal of IPC with the WHO assessment tool

The synthesis of the NGT approached reported an overall IPC strategic score of 28% (7 out of 25 points), with IPC core components having scored between 0 to 3 points (Table I below).

Table I
Evaluation score of Cameroon IPC activities using the WHO IPCAT2MR tool

IPC components by WHO	Observed	Expected
IPC programme	3	5
IPC guidelines	1	5
IPC training and education	1	4
Hai surveillance	1	3
Multimodal strategies	1	3
Monitoring/Audit of IPC practices	0	5
Total	7	25
Score	**28%**	

IPC within the national healthcare system

An IPC National Focal Person (IPCNFP) was appointed in July 2021 to coordinate all IPC activities nationwide. The IPCNFP worked with the regional delegations of public health (RDPH) and partners to train IPC committees and focal persons at the regional, district and healthcare facility level. Due to a recognized lack of a national IPC benchmark, in February 2022 the MoH developed an IPC action plan with the main objective of ensuring protection and safety of all healthcare workers through the reduction and control of HAI and AMR. This action plan defined priority areas for the end of the year 2025 which were: (i) the effectiveness of a functional IPC programme at national and healthcare facility levels with the development of an operational IPC action plan and advocacy for funds mobilization, (ii) the development of IPC guidelines with a focus on Water Sanitation and Hygiene (WASH), waste management, HAI, monitoring and evaluation of IPC and community IPC, (iii) the increase in IPC capacity building of IPC actors and the integration of IPC in academic curricula of health students and the capacity building of healthcare workers, (iv) the development of a functional surveillance system for HAI, (v) the integration of multimodal strategies in all IPC activities for enhancing an IPC culture change within health settings, (vi) the implementation of a functional monitoring and evaluation framework for the follow up of IPC activities in HCFs and in communities, (vii) the regulation of the distribution of human resources dedicated to IPC in HCFs, (viii) the improvement of a healthy environment with available material and equipment for IPC and (iX) to improve IPC in the community [23].

The IPC action plan included a costing of all activities from 2022 to 2025. This costing analysis showed that IPC remained inadequately funded. This finding was shared with partners during the workshop as an advocacy tool, taking into consideration that there is no budget solely dedicated for IPC. Cameroon does not have a national IPC committee or technical working group but an IPC focal point person is available at national, regional, district and healthcare facility level. Despite the inexistence of an IPC legal framework in Cameroon, there are numerous laws, regulatory instruments and decrees at national and regional levels that support IPC activities in general, but that do not adhere to a structural organization as recommended by the African Union (AU). With the guidance of experts from the WHO Regional Office for Africa, the MoH elaborated and validated its IPC operational action plan and a monitoring and evaluation plan.

The lack of a National IPC programme or a multisectoral IPC coordination team is a barrier for a successful implementation of IPC in LMICs, as was recently found in the Democratic Republic of Congo (DRC) and Nepal. Additionally, the lack of appropriate infrastructure and administrative support for IPC within the MoH impedes the full roll out and monitoring of IPC activities.

IPC guidelines

In January 2021, the MoH issued the first National Guidelines on IPC in HCFs, with the aim of improving IPC and the quality of care in HCFs through increased awareness on IPC, the improvement of healthcare workers (HCWs) capacities, and the standardization of IPC practices in facilities [24]. This manual laid out contextual minimum requirements for IPC in healthcare settings: standards precautions, complementary precautions, Hand Hygiene, waste management, WASH, triage, pathways and protocols, corpse management, HAI surveillance, quality of IPC services, and IPC training and coordination. The guide was produced in French and English languages and was disseminated to all 197 health districts in the 10 administrative regions in 2022. These guiding tools were also reported in other countries including Kenya (2015), Egypt (1999), South Africa (2000), and Cambodia (2009) [12]. The MoH has 4 disease-specific priority programs on HIV, hepatitis, tuberculosis and malaria. Along with an enlarged immunization program, these priority programs have integrated some aspects of IPC specific to their scope of application.

With regards to the intensification of vaccination against COVID-19 and its integration in the national immunization programme, the MoH issued an IPC guide for vaccination in April 2022 to reinforce IPC during vaccination procedures and to ensure the safety and security of HCWs (vaccinators), beneficiaries, and communities. Vaccination usually produces a large amount of waste (needles, syringes, etc.) that could expose HCWs to infection. Waste management and waste disposal were particularly addressed in this guide [25].

As the IPC guidelines were implemented, it was noticed that some IPC committees and focal persons had a different understanding of their roles; it was therefore needed to review and update their job description, which was effectively realized with the validation in June 2022 of the first document on the Terms of References (ToR) of IPC focal persons and IPC committees at national, regional, district and HCFs [26].

Surveillance of healthcare associated infections (HAI)

In Cameroon, a national guide for the Integrated Disease Surveillance and Response (IDSR) is available and was revised in December 2020. This guide is a compass describing every step to promptly detect and respond to epidemics and public health events at the human, animal and environment interface. Its main limitation is the lack of surveillance for HAI [27].

The lack of national guidelines for HAI surveillance and the few laboratories involved in AMR monitoring site prevent a full picture of AMR in Cameroon. The MoH has recommended all HCFs to have a hygiene committee but surveillance of HAI is still conducted by tertiary and secondary hospitals without a national observer. Laboratories also regularly report resistant organisms to hospitals for the prescription of an appropriate

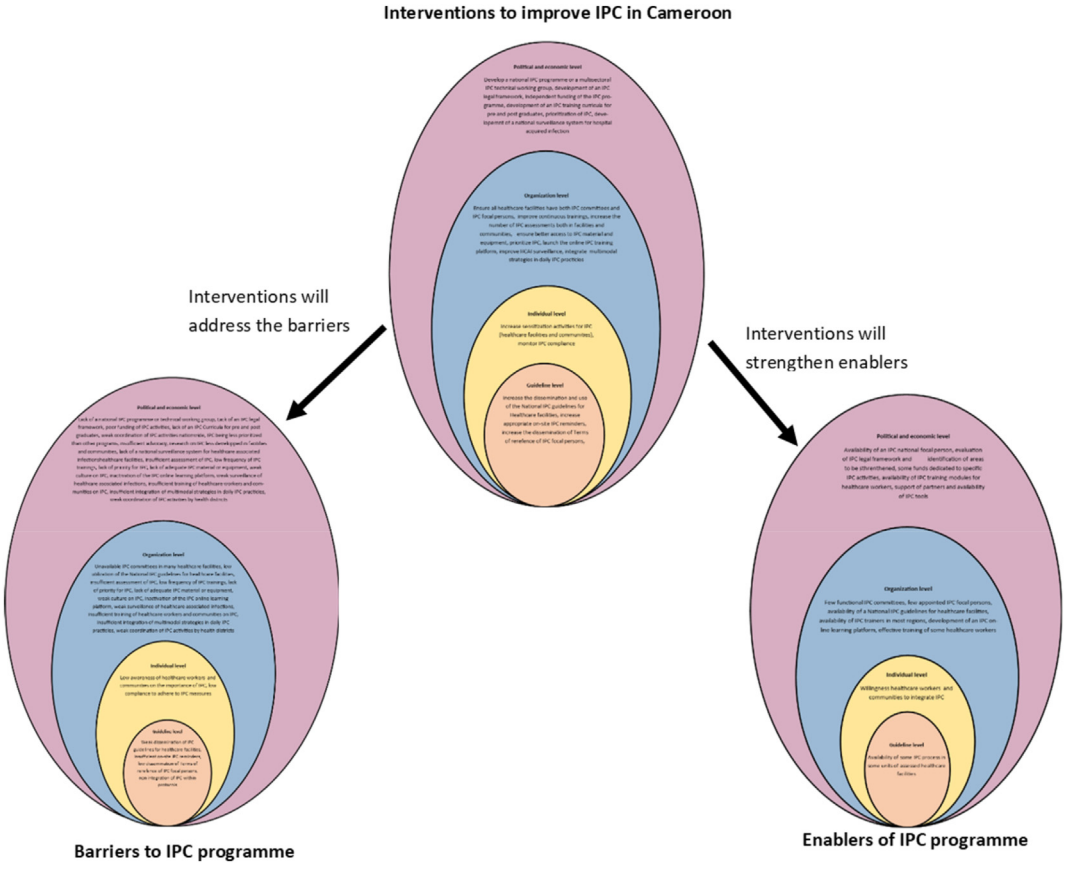

Figure 2. The conceptual framework of barriers, enablers and interventions aiming at improving IPC in Cameroon, informed by selected theories and adapted to the results of our analysis. This framework includes the guideline level (light orange), the individual level (yellow), the organizational level (light blue) and the political and economic level (light pink). The division was adaptation of the socioecological model of Bronfenbrenner and McLeroy and theories of Groll and Wensing [16—18].

treatment [28,29]. Despites these limitations, 7 sentinel site laboratories distributed in 4 regions of Cameroon are part of the Global Antimicrobial Resistance Surveillance System (GLASS). GLASS was launched in 2014 to help in the identification, notification and monitoring of multi-drug resistant organisms, though data quality remains an issue [30].

HAI is one of the components less prioritized in IPC and similarly to Cameroon. In contrast, Kenya, South-Africa and Cambodia on the other hand have developed HAI surveillance and antibiotic stewardship which provides some data and contribute to evidence-based IPC strategies. In less than 3 years after operation research in IPC began in Sierra Leone, the country developed HAI coordination and surveillance at the national level although IPC in Sierra Leone remains at the basic level [12,31].

Education and training

In 2019, the MoH developed IPC training modules for HCWs that were updated in 2020 due to the pandemic. This professional IPC training curriculum aimed at strengthening capacities of staff already working in the field to be better prepared to respond to COVID-19 cases. It has two formats: (i) the Just In Time IPC training (JIT) and (ii) the Full IPC training.

JIT is a 3-day training for in-service health workers. The first part includes a 2-day theoretical IPC courses based on thirteen modules (introduction to IPC and AMR, standard and complementary precautions, prevention and surveillance of HAI, waste management, environmental hygiene, management of infectious dead bodies, donning and doffing of personal protective equipment, cleaning and disinfection, Injection safety, water supply, triage, isolation and notification in the context of COVID-19 and the use of IPC assessment tools). The second part includes 1 day dedicated for field training, including the evaluation of a HCF and the elaboration of an operational plan with the IPC committee.

The full IPC training format is a 5-day course with additional modules on leadership and the management of an IPC programme in a HCF; the last day of this training is dedicated to field practices. As of March 2024, within the MoH database, only 900 out of 44,554 HCWs (2%) are effectively trained on IPC. To address the issues of IPC training both in schools and on the field, the MoH has initiated a process to build a Massive Open Online Course (MOOC) on IPC to ensure that the maximum number of people can attend the training and gain knowledge about IPC assessment tools, reporting and follow-up. The modules that are already validated by the MoH are already uploaded into this website, which will soon be functional [32].

The proportion of trained HCWs in Cameroon is very low compared to other countries like South-Africa (89%) or Nepal (30%). An IPC-professional curricula should be scaled-up to at least all HCF, and the government should advocate for

development of an undergraduate IPC curricula to ensure that all students in health-related field are knowledgeable on IPC before obtaining their diploma. Sierra Leone has developed an IPC national training curricula that is integrated to clinical practice and training of other specialties [12,31]. A similar model could be used by Cameroon. Once finalized and launched, Cameroon's IPC MOOC could ensure the integration of IPC as a culture at both healthcare settings and national levels.

Multimodal strategies

Multimodal strategies (MMS), the fifth core component of an effective IPC programme according to WHO, is a set of 5 elements that when combined trigger better IPC compliance through specific interventions to resolve identified problems. MMS's five areas of action are the system change that is required for enabling IPC, the training and education of staff, monitoring and feedback, reminders and communications, and the culture of safety [33]. This IPC approach to initiate behavior change has been implemented in some pilot HCF in Cameroon.

Monitoring and evaluation of IPC

With the absence of an IPC programme or a technical working group on IPC, there is neither strategic and operational plan for monitoring and evaluation of IPC activities, nor indicators for minimum requirements of IPC at HCF level. This workshop was an opportunity to generate a draft monitoring and evaluation plan that is now coupled with the existing IPC action plan. However, the MoH conducted IPC supervision only in some HCFs; hand hygiene has been evaluated and monitored in HCF who benefited from the pilot activities initiated.

Conceptual framework for the development of an IPC programme in Cameroon

We assessed existing resources and needs for IPC activities in Cameroon using the socioecological model (Bronfenbrener and McLeRoy) and the theory of Groll and Wensing [16,17,34]. This framework allowed us to propose the examination of barriers, enablers and potential interventions to improve IPC through an integrated framework at four different levels: the guideline, the individual, the organizational and the political (Figure 2).

The socioecological model and the theory of Groll and Wensing highlights the need to create IPC strategies at all levels from the guideline level, the individual level, the organizational level and the political and economic level. Multi-level interventions would ensure that gains in IPC are sustained and that IPC is integrated as a culture to boost improvements in all the interconnected levels of the IPC framework. It is urgent to define IPC indicators and to adopt IPC processes and indicators similar to what has been accomplished in Kenya, South Africa, Zimbabwe, Namibia, Egypt, and Sierra Leone [12,31].

Conclusion

Here, we distill key findings from a recent national-level workshop on IPC in Cameroon. We assessed the enablers and barriers for an effective IPC programme in Cameroon through a socioecological model and provide insights and recommendations for evidence-based policies to enhance IPC in Cameroon. Significant achievements such as the development of a multisectoral IPC technical working group, the IPC legal framework, the IPC curricula for in-service and pre-service workers and the clinical surveillance of HAI could be reached by focusing actions at the guideline level, the individual level, organizational level and the political and economic level. In Cameroon, IPC programme within the healthcare system is far from what is recommended, but strong political commitment and IPC stewardship are keys for a successful IPC programme.

Credit author statement

Conceptualization: BAKN, ET, YB.
Methodology: BAKN, ET, YB, CB, DRN.
Software: BAKN, ET.
Validation: BAKN, ET, YB, CB.
Formal Analysis: BAKN, ET, YB.
Investigation: BAKN, ET, YB, CB.
Resources: BAKN, ET, YB, CB.
Data curation: BAKN, ET, YB.
Writing Original Draft: BAKN, ET, YB.
Writing — Review and Editing: BAKN, ET, CB, BLT, AA, JC, DRN, RH, ASM, BBKN, OY, BLJ, GAEM, YB.
Visualization: BAKN, ET, YB.
Supervision: ET, YB, CB, JC.
Project administration: BAKN, ET, YP.
Funding Acquisition: BAKN, ET, CB, YP.

Acknowledgements

We would like to acknowledge the significant contribution of staffs from the MoH, the Ministry of Finances, the Ministry of Social Affairs, the Ministry of Livestock Fisheries and Animal Industries, the Ministry of Decentralization and Local Development, the WHO, USAID-MTaPS, Africa CDC and Jhpiego.

Funding

None.

Conflict of interest

None declared.

References

[1] Fraser JL, Mwatondo A, Alimi YH, Varma JK, Vilas VJDR. Healthcare-associated outbreaks of bacterial infections in Africa, 2009—2018: A review. Int J Infect Dis 2021 Feb 1;103:469—77.
[2] Allegranzi B, Nejad SB, Combescure C, Graafmans W, Attar H, Donaldson L, et al. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. Lancet 2011 Jan 15;377(9761):228—41.
[3] Organization WH. Global report on infection prevention and control [Internet]. World Health Organization; 2022 [cited 2024 Jun 20]. Available from: https://books.google.com/books?hl=en&lr=&id=auWfEAAAQBAJ&oi=fnd&pg=PR5&dq=GLOBAL+REPORT+ON+INFECTION+PREVENTION+AND+CONTROL&ots=Eukq0HXHqT&sig=zS7uY5a-vsNp4b2UVdmU8jxa5-s.
[4] Adams F, Zimmerman P anne, Sparke V, Mason M. Towards a framework for a collaborative support model to assist infection prevention and control programmes in low- and middle-income

countries: a scoping review. Inter J Infec Contr [Internet] [cited 2024 Jan 15];19 2023. https://doi.org/10.3396/ijic.v19.21851.
[5] Chaitkin M, McCormick S, Torreano JAS, Amongin I, Gaya S, Hanssen ON, et al. Estimating the cost of achieving basic water, sanitation, hygiene, and waste management services in public health-care facilities in the 46 UN designated least-developed countries: a modelling study. Lancet Global Health 2022 Jun 1;10(6):e840—9.
[6] Organization WH. 2017 annual report WHO/UNICEF joint monitoring programme for water supply, sanitation and hygiene. In: 2017 annual report WHO/UNICEF joint monitoring programme for water supply, sanitation and hygiene [Internet]; 2017. p. 20. 20 [cited 2024 Jun 20]. Available from: https://pesquisa.bvsalud.org/portal/resource/pt/biblio.
[7] Storr J, Twyman A, Zingg W, Damani N, Kilpatrick C, Reilly J, et al. Core components for effective infection prevention and control programmes: new WHO evidence-based recommendations. Antimicrob Resist Infect Control 2017 Jan 10;6(1):6.
[8] Tartari E, Tomczyk S, Pires D, Zayed B, Coutinho Rehse AP, Kariyo P, et al. Implementation of the infection prevention and control core components at the national level: a global situational analysis. J Hosp Infect 2021 Feb 1;108:94—103.
[9] Perera N, Haldane V, Ratnapalan S, Samaraweera S, Karunathilake M, Gunarathna C, et al. Implementation of a coronavirus disease 2019 infection prevention and control training program in a low-middle income country. Int J Evid Based Healthc 2022 Feb 15;20(3):228—35.
[10] Houben F, Hensbergen M van, Heijer CDJD, Dukers-Muijrers NHTM, Hoebe CJPA. Barriers and facilitators to infection prevention and control in Dutch residential care facilities for people with intellectual and developmental disabilities: A theory-informed qualitative study. PLoS One 2021 Oct 29;16(10):e0258701.
[11] Rajkumar E, Rajan AM, Daniel M, Lakshmi R, John R, George AJ, et al. The psychological impact of quarantine due to COVID-19: A systematic review of risk, protective factors and interventions using socio-ecological model framework. Heliyon [Internet] 2022:e09765 [cited 2023 Dec 24]; Available from: https://www.cell.com/heliyon/pdf/S2405-8440(22)01053-2.pdf.
[12] Sastry S, Masroor N, Bearman G, Hajjeh R, Holmes A, Memish Z, et al. The 17th International Congress on Infectious Diseases workshop on developing infection prevention and control resources for low- and middle-income countries. Int J Infect Dis 2017 Apr 1;57:138—43.
[13] Joint External Evaluation of IHR Core Capacities of the Republic of Cameroon [Internet]. [cited 2024 May 22]. Available from: https://www.who.int/publications-detail-redirect/WHO-WHE-CPI-REP-2017.60.
[14] Esso L, Epée E, Bilounga C, Abah A, Hamadou A, Dibongue E, et al. Cameroon's bold response to the COVID-19 pandemic during the first and second waves. Lancet Infect Dis 2021;21(8):1064—5.
[15] Epée E, Mandeng N, Libwea JN, Mouangué C, Belinga S, Fokam J, et al. Two years of Cameroon's resilient response to the COVID-19 pandemic. J Cameroon Acad Sci 2022 Dec 6;18:493—500.
[16] Bronfenbrenner U. Ecological systems theory. In: Encyclopedia of psychology, 3. Washington, DC, US: American Psychological Association; 2000. p. 129—33.
[17] Grol R, Wensing M. What drives change? Barriers to and incentives for achieving evidence-based practice. Med J Aust 2004;180:S57—60.
[18] McLeroy KR, Bibeau D, Steckler A, Glanz K. An Ecological Perspective on Health Promotion Programs. Health Educ Q 1988 Dec 1;15(4):351—77.
[19] Bourrée F, Michel P, Salmi LR. Consensus methods: review of original methods and their main alternatives used in public health. Revue d'epidemiologie et de sante publique 2008;56(6):e13—21.
[20] McMillan SS, King M, Tully MP. How to use the nominal group and Delphi techniques. Int J Clin Pharm 2016 Jun 1;38(3):655—62.
[21] Assessment tool of the minimum requirements for infection prevention and control programmes at the national level [Internet]. [cited 2024 May 20]. Available from: https://www.who.int/publications/m/item/assessment-tool-of-the-minimum-requirements-for-infection-prevention-and-control-programmes-at-the-national-level.
[22] Grol R, Wensing M. What drives change? Barriers to and incentives for achieving evidence-based practice. Med J Aust [Internet] 2004 Mar;180(S6) [cited 2024 May 22] Available from: https://onlinelibrary.wiley.com/doi/abs/10.5694/j.1326-5377.2004.tb05948.x.
[23] Ministry of Health, Cameroon. Infection prevention and control action plan for human health. Ministry of Health; Ministry of Health, Cameroon. Report No.: 1.
[24] National guidelines on infection prevention and control in health facilities in Cameroon [Internet]. CCOUSP. [cited 2022 Sep 13]. Available from: https://www.ccousp.cm/download/national-guidelines-on-infection-prevention-and-control-in-health-facilities-in-cameroon/.
[25] Ministry of Health Cameroon, Enlarged Immunization Program. Vaccinator pocket's guide for infection prevention and control during COVID-19 vaccination. 2022 Apr.
[26] Ministry of Health. Terms of reference of infection prevention and control focal person at all levels of the health pyramid in Cameroon. 2022 Jun.
[27] Guide technique pour la Surveillance Intégrée de la Maladie et la Riposte au Cameroun fr [Internet]. CCOUSP. [cited 2024 Feb 19]. Available from: https://www.ccousp.cm/download/guide-technique-pour-la-surveillance-integree-de-la-maladie-et-la-riposte-au-cameroun-fr/.
[28] Sih C, Mbatchou-Ngahane BH, Mboue-Djieka Y, Ngueng-Eke MC, Mbarga NT, Verla VS, et al. Incidence and impact of hospital-acquired complications in an internal medicine unit of a reference hospital in Cameroon: a prospective cohort study. Transactions of The Royal Society of Tropical Medicine and Hygiene 2021 Jul 1;115(7):772—8.
[29] Nouetchognou JS, Ateudjieu J, Jemea B, Mesumbe EN, Mbanya D. Surveillance of nosocomial infections in the Yaounde University Teaching Hospital, Cameroon. BMC Res Notes 2016 Dec 8;9(1):505.
[30] Yopa DS, Anya P, Mendjime P, Elouga T, Nnanga-Nga E, Nguefack-Tsague G. Evaluation of the Antimicrobial Resistance Surveillance System in Sentinel Sites in Cameroon. Cureus [Internet] 2023;15(6) [cited 2024 Mar 2] Available from: https://www.cureus.com/articles/157468-evaluation-of-the-antimicrobial-resistance-surveillance-system-in-sentinel-sites-in-cameroon.pdf.
[31] TropicalMed | Free Full-Text | Improvement in Infection Prevention and Control Performance Following Operational Research in Sierra Leone: A Before (2021) and After. Study [Internet] 2023 [cited 2024 Mar 2]. Available from: https://www.mdpi.com/2414-6366/8/7/376.
[32] Prevention et Contrôle des Infections (PCI) [Internet]. CCOUSP. [cited 2024 Feb 20]. Available from: https://www.ccousp.cm/cours/prevention-et-controle-des-infections-pci/.
[33] World Health Organization. Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level [Internet]. Geneva: World Health Organization; 2016 [cited 2023 Nov 15]. 90 p. Available from: https://iris.who.int/handle/10665/251730.
[34] McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. Health Educ Q 1988;15(4):351—77.