Global report on infection prevention and control

World Health Organization

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Contents

Foreword

The importance of preventing infection and antimicrobial resistance (AMR) in health care is being recognized increasingly in many national and global health efforts. Over the years, the central role infection prevention and control (IPC) has been reflected in the emerging priorities of the World Health Organization's Member States, and their partners. IPC action is acknowledged as playing a prominent role in curbing emerging and ongoing threats in health-related activities ranging from water, sanitation and hygiene and health worker and patient safety to preventing specific conditions, such as AMR and sepsis. It is critical to the provision of high-quality and safe health care, and lies at the core of health emergency preparedness and response. As such, IPC has played a decisive role during the COVID-19 pandemic, and its correct application continues to save lives everywhere around the globe.

This global report on IPC is the first of its kind. It provides a global situation analysis of how IPC programmes are being implemented in countries around the world and highlights the harm to patients and health workers caused by health care-associated infections (HAIs) and AMR. The report also addresses the impact and cost-effectiveness of IPC and it indicates approaches, resources and strategic directions to support countries in their efforts to improve IPC programmes and practices, as a high priority for the health agenda and in connection with other areas of work.

Inadequate IPC places a significant burden on those affected and is a determinant of poor quality care delivery and health services disruption, particularly in lower income settings. The report reveals that high-income countries are more likely to be progressing their IPC work, and are eight times more likely to have a more advanced status of IPC programmes and practices implementation than low-income countries. This demonstrates, once again, that IPC is also a problem of equity and access to quality health care.

Patients afflicted with other conditions and seeking care, or accessing preventive services such as vaccination in good health, find themselves with the risk of being infected with a HAI. Facilities can be the entry point for outbreaks or become amplifiers of pathogen transmission, with subsequent spread of outbreaks to the community. Out of 100 patients hospitalised, seven will be infected with an HAI, the risk doubling and being up to 20 times higher in low- and middle-income countries. The more ill and fragile patients get, the higher becomes the risk of HAIs and their deadly consequences. Deaths are increased two to threefold when infections are resistant to antimicrobials. Moreover, the experience accumulated in the past two years during the COVID-19 pandemic unequivocally shows that both patients and health workers can be at high risk of being infected with SARS-CoV-2 during health care delivery and need to be protected.

IPC is a proven solution that has the ability to avoid most of this harm and incalculable suffering and costs to people and the health system. Compelling evidence shows that up to 70% of HAIs can be prevented by scaling up an array of effective IPC interventions. Investing in IPC is one of the most effective and cost-saving interventions available. In particular, hand hygiene and environmental hygiene in health care facilities were found to be able to more than halve the risk of dying as a result of infections with AMR pathogens, as well as to decrease the associated long-term complications and health burden by at least 40%. Improving hand hygiene in health care settings could save about US$ 16.50 in reduced health care expenditure for every dollar invested. It is also shocking to understand that, during the first six months of the COVID-19 pandemic, access to appropriate personal protective equipment combined with rapid IPC training would have had the potential to avert SARS-CoV-2 infections and related deaths among health care workers globally, while generating substantial net savings across countries worldwide, independently from their income.

However, the striking reality outlined by this report is the limited and inconsistent implementation of IPC programmes globally. Comparing data from WHO 2017–2018 and 2021–2022 surveys, the percentage of countries having a national IPC programme did not improve; furthermore in

2021–2022 only four out of 106 assessed countries (3.8%) had all minimum requirements for IPC in place at the national level. This is reflected in inadequate implementation of IPC practices at the point of care, with only 15.2% of health care facilities meeting all of the IPC minimum requirements, according to a WHO survey in 2019.

Nevertheless, encouraging progress has also been made in some areas, with a significant increase being seen in some key indicators such as the percentage of countries having an appointed IPC focal point, and/or a dedicated budget for IPC and a curriculum for front-line health care workers' training; and/or establishing hand hygiene compliance as a key national indicator.

Given this global picture, the report also outlines priorities for addressing IPC in the national and international health agendas. It is crucial that political commitment be decisive and visible through the engagement of the national and local leadership at its highest levels, the allocation of resources and the establishment of the appropriate regulations and legal frameworks for IPC. This would ensure that at least the WHO IPC minimum requirements are in place in all countries, as a first step towards the full implementation of all IPC core components. Most importantly, IPC should make a difference for health worker and patient safety at the point of care, with optimal practices embedded within the patient pathway and clinical care. This can only happen if adequate standard operating procedures, training, infrastructure, supplies and human resources are available and monitored.

It is time to turn the page on the paradox of hospitals spreading disease, rather than being the curative centres they were designed to be. Investments in IPC improvements are urgently needed. This is the moment for making decisive action on IPC and raising public awareness. This report aims to provide the scientific basis and the motivation for powerful action on IPC.

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The development of the report was coordinated by Benedetta Allegranzi of the Department of Integrated Health Services, Universal Health Coverage and Life Course Division, who also led the writing, together with Alessandro Cassini of the Department of Surveillance, Prevention and Control, Antimicrobial Resistance (AMR) Division.

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Abbreviations

AMR	Antimicrobial resistance
BSI	Bloodstream infections
CI	Confidence interval
CRO	Carbapenem-resistant Enterobacterales and/or *Acinetobacter baumannii* and/or *Pseudomonas aeruginosa*
CRE	Carbapenem-resistant Enterobacterales
DALYs	Disability adjusted life-years
DHIS-2	District Health Information System-2
ECDC	European Centre for Disease Control and Prevention
EU/EEA	European Union and European Economic Area
FAO	Food and Agriculture Organization of the United Nations
GAP	Global Action Plan
HAI	Health care-associated infection/hospital acquired infection
HHSAF	Hand hygiene self-assessment framework
HIC	High-income country
ICU	Intensive care unit
IHR	International Health Regulations
IPC	Infection prevention and control
IPCAF	IPC Assessment Framework
IQR	Interquartile range
JEE	Joint external evaluation
JMP	WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene
LIC	Low-income country
LMIC	Low- and middle-income country (includes low-income, lower-middle-income and upper-middle-income countries)
MDR	Multidrug-resistant
MDRO	Multidrug-resistant organisms
MMIS	Multimodal improvement strategies
MRSA	Meticillin-resistant *Staphylococcus aureus*
OECD	Organisation for Economic Co-operation and Development
OIE	World Organisation for Animal Health
PPE	Personal protective equipment
SDGs	Sustainable Development Goals
SPAR	State party self-assessment annual reporting (tool)
TrACSS	FAO, OIE and WHO Tripartite AMR country self-assessment survey
UI	Uncertainty interval
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USA	United States of America
USCDC	United States Centers for Disease Control and Prevention
WASH	Water, sanitation and hygiene
WASH FIT	Water and sanitation for health facility improvement tool
WHO	World Health Organization

Executive summary

The WHO global report on infection prevention and control

Over the last decade, major outbreaks such as those due to the Ebola virus disease and the Middle East respiratory syndrome coronavirus (MERS-CoV), and the coronavirus disease 2019 (COVID-19) pandemic, have demonstrated how epidemic-prone pathogens can spread rapidly through health care settings. These events have exposed the gaps in infection prevention and control (IPC) programmes that exist irrespective of the resources available or the national level of income. Furthermore, other less-visible health emergencies are also a compelling reason to address gaps in IPC, such as the silent endemic burden of health care-associated infections (HAIs) and antimicrobial resistance (AMR), which harm patients every day across all health care systems.

This Executive summary provides a synthesis of the first World Health Organization's (WHO) *Global report on infection prevention and control*. Therefore, it highlights the burden of infection and AMR and the related harm to both patients and health workers in health care settings. It presents a global situation analysis of the implementation of IPC programmes as well as an overview of the strategies and resources that are available to improve the situation in countries.

While identifying key gaps and achievements at country and global level, the report sets priorities and offers guidance on the implementation of IPC interventions. It demonstrates the impact and cost–effectiveness of IPC interventions. Moreover, it highlights the importance of integration and alignment of IPC interventions with water, sanitation and hygiene (WASH) strategies in the context of broader efforts to address AMR, health emergencies, and the quality and safety of health care.

IPC provides effective solutions to prevent the risk of infection and AMR in health care.

It is a clinical and public health specialty based on a practical, evidence-based approach that protects patients, health workers and visitors to health care facilities by preventing avoidable infections, including those caused by antimicrobial-resistant pathogens, acquired during the provision of health care services *(1)*. IPC occupies a unique position in the field of patient and health workers' safety and quality of care, as it is universally relevant to every health worker and patient, at every health care interaction.

Guidance and recommendations are available to countries to identify the core components of effective IPC programmes at the national and facility level *(2)* and ensure that they have adequate IPC capacity. These were developed by WHO according to the available evidence and the consensus by experts and professionals from countries and key stakeholders in the field of IPC. Derived from the core components through a consensus-building process, WHO also established international IPC minimum standards, the so-called "minimum requirements" for IPC *(3)*, that all countries and health care facilities should have in place to ensure minimum protection to patients, health workers and visitors.

The report and its executive summary are primarily aimed at those in charge of making decisions and formulating policies in the field of IPC at the national, subnational and facility levels. This includes policy-makers, senior managers, administrators who are managing health budgets, and IPC focal points at national level (Ministry of Health, public health institutes, etc.), and subnational and health care facility levels.

The report is the result of a cross-cutting and multidisciplinary effort, involving staff at WHO headquarters, and in regional and country offices, as well as key partners in the field of IPC. It includes information and data from many sources, including the scientific literature, WHO global databases, WHO surveys using standardized tools, WHO publications and reports published by other institutions. The report also includes a compilation of data and information providing overviews of IPC at the regional level, and diverse examples of IPC programmes at country level.

The problem of unsafe care resulting from HAIs and AMR

No country or health system, however sophisticated, can claim to be free of HAIs.

HAIs are among the most frequent adverse events occurring in the context of health service delivery. These infections, many of which are caused by multidrug-resistant organisms, harm patients, visitors and health workers, and place a significant burden on health systems, including the associated increased costs.

Out of every 100 patients in acute-care hospitals, seven patients in high-income countries (HICs) and 15 patients in low- and middle-income countries (LMICs) will acquire at least one health care-associated infection during their hospital stay *(4, 5)*. Up to 30% of patients in intensive care can be affected by health care-associated infections, with an incidence that is two to 20 times higher in LMICs than in HICs, in particular among neonates *(5, 6)*.

Approximately one in four (23.6%) of all hospital-treated sepsis cases are health care associated. Almost half (48.7%) of all cases of sepsis with organ dysfunction treated in adult intensive care units are acquired in hospital *(7, 8)*.

On the basis of data from 2016–2017, the European Centre for Disease Prevention and Control (ECDC) calculated that 4.5 million episodes of HAIs occurred every year in patients admitted to acute care hospitals in the European Union and European Economic Area (EU and EEA) countries *(9)*. The United States Centers for Disease Control and Prevention (USCDC) estimates that, on any given day, one in 31 hospital patients and one in 43 nursing home residents has a health care-associated infection *(10)*. The problem of infection and spread of AMR does not spare long-term care facilities where ECDC estimated that 4.4 million episodes of health care-associated infections occur every year in EU and EEA countries *(9)*. Similarly, the CDC estimated that, on any given day, one in every 43 nursing home residents has a HAIs *(10)*.

Transmission of SARS-CoV-2, the virus that causes COVID-19, in health care settings has been a major issue throughout the COVID-19 pandemic, especially during the first waves in 2020. Among hospitalized patients with confirmed COVID-19, up to 41% were infected in health care settings, according to different studies *(11)*. The prevalence of infection among health workers varied from 0.3% to 43.3% *(12)*.

The impact of HAIs and AMR on people's lives is incalculable.

In EU and EEA countries, the burden of the six most frequent HAIs in terms of disability and premature mortality was twice the burden of 32 other infectious diseases combined *(13)*.

Mortality among patients affected by health care-associated sepsis was 24.4%, increasing to 52.3% among patients treated in an intensive care unit *(7, 8)*.

Mortality among patients infected with resistant microorganisms is at least two to three times higher than among those infected with sensitive microorganisms *(5, 14–19)*.

In EU and EEA countries, the three most impactful antibiotic-resistant microorganisms, which account for 70% of the burden of AMR (in terms of disability and premature mortality), are typically acquired in health care settings *(20, 21)*.

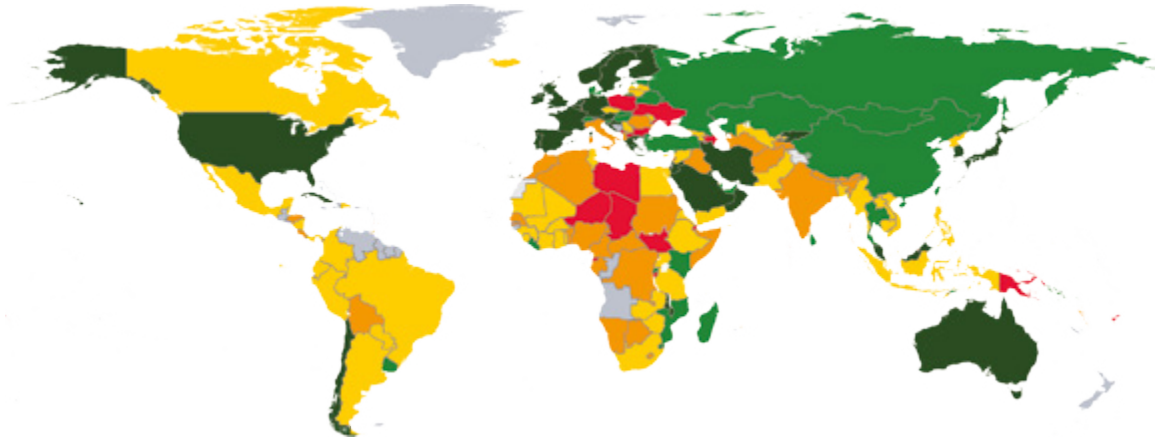
WHO estimates that between 80 000 and 180 000 health care workers lost their lives to COVID-19 globally between the beginning of the pandemic and May 2021 *(22)*.

Situation analysis of the implementation of IPC around the world

IPC implementation at the national level

In 2020–2021, according to the system established to monitor the status of country progress towards the implementation of the AMR global action plan (the Tripartite Antimicrobial Resistance Country Self-assessment Survey or TrACSS), among 162 countries submitting data, 11% of countries reported that they did not have an IPC programme or an operational plan (Fig. 1, A) and 54% that they had national IPC programmes or operational plans that had not been implemented, or that were being implemented only in selected health facilities (Fig. 1, B and C). Only 34% of countries reported having an IPC programme implemented nationwide (Fig. 1, D and E), and only 19% of these had a system to monitor its effectiveness and compliance (Fig. 1, E) *(23)*.

Fig. 1. Country map according to 2020–2021 TrACSS results (indicator 8.1)



- A. No national infection prevention and control (IPC) programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Source: *(24)*.

In 2021–2022, a detailed global survey on the minimum requirements for national IPC programmes carried out by WHO *(3, 24)* showed that an active IPC programme (a functioning programme with annual workplans and budget) existed in 54.7% (58/106) of countries.

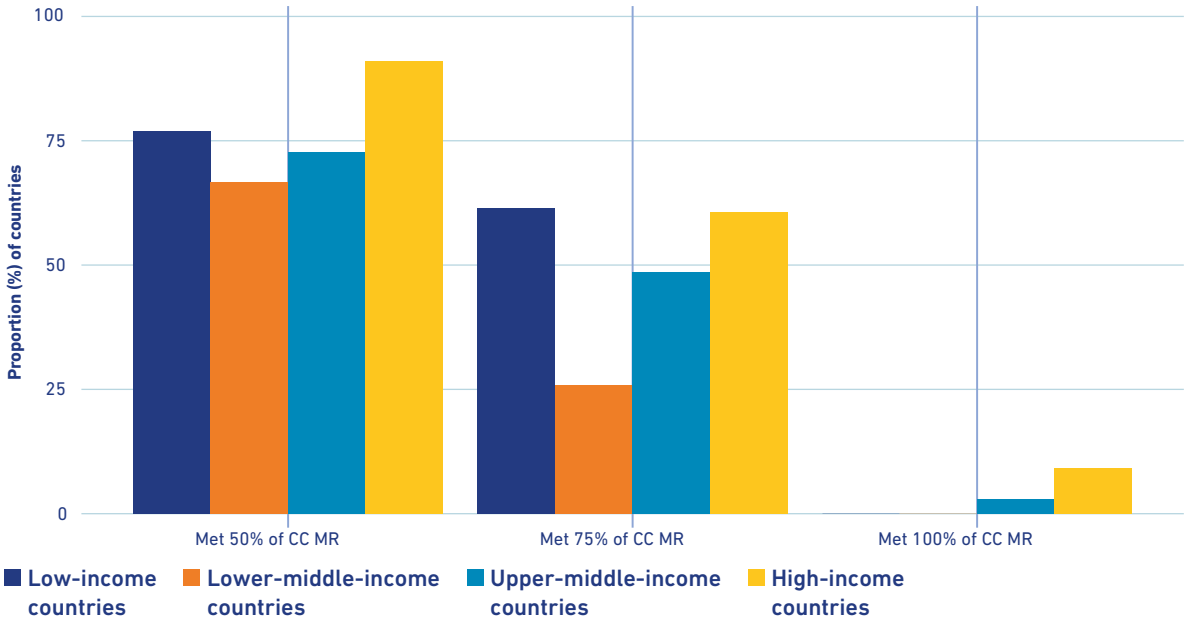
However, only four of the participating countries (3.8%) met all minimum requirements for IPC. According to this survey, relevant gaps were limited availability of a budget specifically dedicated to IPC, limited support at the national level for IPC training roll-out and monitoring of its effectiveness, and lack of expertise to conduct IPC monitoring (WHO, unpublished data).

Conversely, a high percentage of countries (75%) reported that multimodal improvement strategies (that comprise several components or elements implemented in an integrated way with the aim of improving an outcome and changing behaviour), which are considered the gold standard, were included in national IPC guidelines and IPC education and training as the best implementation approach. A similar percentage of countries stated that their national IPC focal point was

responsible for coordinating support for interventions aimed at improving IPC at the facility level (WHO, unpublished data).

Across all surveys and data sets mentioned in the global report, there is a significant positive association between the World Bank income level of a country and the implementation of IPC at the national level. This can be seen in Fig. 2 related to the findings of the 2021–2022 WHO global survey on national IPC programmes (WHO, unpublished data).

Fig. 2. Proportion of countries meeting IPC minimum requirements, by World Bank level of income



CC MR: core components minimum requirements.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Comparing data on IPC implementation at the national level across years

Reviewing data from TrACSS *(23)* over the past years, there has been little improvement in the implementation of IPC national programmes in LMICs. Indeed, from 2018 to 2021, the only significant statistical association indicating IPC improvement was observed for HICs progressing from levels D to E of the TrACSS classification (WHO, unpublished data) (Fig. 3).

Compared with low-income countries (LICs), HICs were more than eight times as likely to have a more advanced IPC implementation status; compared with upper-middle-income countries, they were five times as likely to have a more advanced IPC implementation status (WHO, unpublished data).

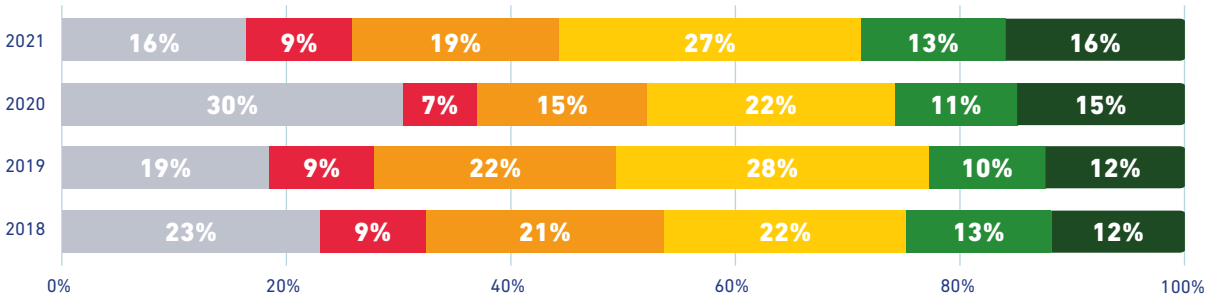
When data from the WHO national IPC global surveys on national IPC programmes conducted in 62 countries in 2017–2018 *(25)* and in 2021–2022[2], are compared, the following key findings emerge (WHO, unpublished data).

- The percentage of countries having a national IPC programme remained relatively stable between 2017–2018 (64.5%) and 2021–2022 (61.3%). However, there was a significant increase in the percentage of countries that have appointed at least a trained IPC focal point (21% vs 72.6%, P<0.001).

[2] Afghanistan, Argentina, Bahrain, Benin, Bolivia (Plurinational State of), Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Chad, Chile, China, Côte d'Ivoire, Denmark, Ecuador, Ethiopia, Finland, Georgia, Germany, Ghana, Guinea, Guyana, Iran (Islamic Republic of), Iraq, Italy, Jamaica, Jordan, Kenya, Kuwait, Kyrgyzstan, Liberia, Malawi, Malaysia, Malta, Mauritania, Mexico, Netherlands, Nicaragua, Nigeria, Norway, Oman, Panama, Paraguay, Peru, Philippines, Qatar, Republic of Moldova, Saudi Arabia, Serbia, Singapore, Spain, Sudan, Suriname, Sweden, Thailand, Trinidad and Tobago, Tunisia, Uganda, United Arab Emirates, United States of America, and Zimbabwe.

- There was a significant increase in the proportion of countries having a dedicated budget for IPC between 2017–2018 (25.8%) and 2021–2022 (48.4%, *P*=0.02); however there is still considerable potential for improvement.
- The percentage of countries having an in-service IPC curriculum significantly increased, from 58.1% to 85.5% (*P*=0.003). However, in 2021–2022, only 41.5% of the countries reported that the national IPC programme was able to provide support for these training activities.

Fig. 3. IPC programmes levels according to TrACSS results from 2018 to 2021



A. No national IPC programme or operational plan is available.

B. A national IPC programme or operational plan is available. National IPC and WASH and environmental health standards exist but are not fully implemented.

C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.

D. A national IPC programme available is according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.

E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.

No response.

Numbers are percentages of countries (*N*=194) answering A to E for that year of survey.
Source: *(24)*.

IPC implementation at the health care facility level

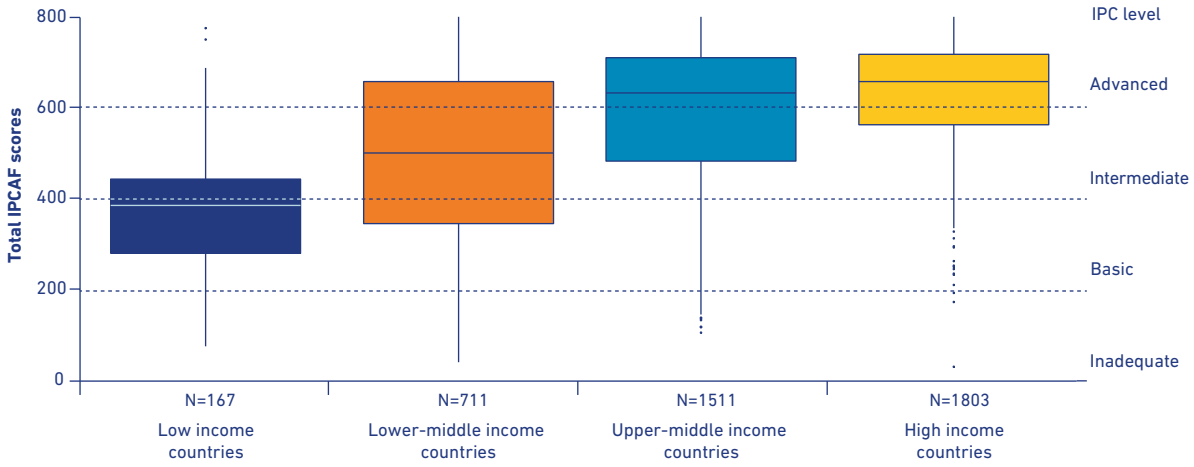
In 2019, according to a WHO global survey involving 4440 health care facilities in 81 countries across all six WHO regions and at all income levels, the level of implementation of IPC core components ranged from "inadequate" to "advanced" (Fig. 4) *(26)*.

Significant differences in the level of implementation of IPC programmes were observed according to the country level of income. There were significantly lower scores in LMICs compared with HICs.

LICs scored at a "basic" level of IPC implementation on average. HICs had more developed IPC in place for all core components, while lower income countries had notably limited implementation of IPC guidelines, training and education, monitoring, audit, feedback and HAIs surveillance (Fig. 5) *(26)*.

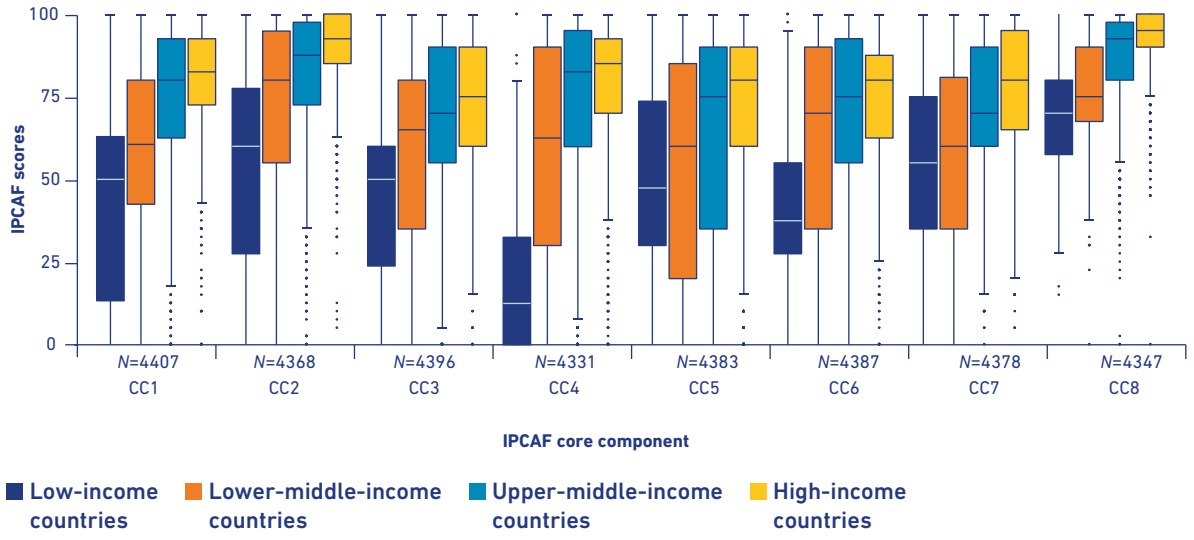
At the facility level, IPC minimum requirements must be in place to provide at least the minimum protection and safety to patients, health workers and visitors *(3)*. The 2019 survey showed that only 15.2% of participating facilities met all indicators designated as IPC minimum requirements, whereas 92.9% met at least half of these indicators.

Fig. 4. Overall IPC scores, by World Bank income levels of countries participating in the 2019 WHO global survey on IPC programmes at the facility level



IPCAF: infection prevention and control assessment framework; IPC: infection prevention and control.
Source: *(26)*.

Fig. 5. IPC scores, by core component and World Bank income level of countries participating in the 2019 WHO global survey on IPC programmes at the facility level



IPCAF: infection prevention and control assessment framework; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: multimodal improvement strategy for implementing IPC activities; CC6: IPC monitoring, audit and feedback; CC7: Workload, staffing and bed occupancy at the facility level; CC8: Built environment, materials and equipment for IPC.
Source: *(26)*.

No facility in any LIC had all the IPC minimum requirements in place, and only 18.9% of tertiary specialized health care facilities in HICs had implemented all of them *(26)*.

Even where IPC programmes are in place, they are often not able to function appropriately and sustainably in an enabling environment. In 2019, IPC programmes existed in almost all secondary and tertiary health care facilities. However, particularly in LMICs, the facilities lacked full-time IPC professionals, an allocated IPC budget, routine microbiological laboratory support, and appropriate workload, staffing and bed occupancy *(26)*.

A facility without access to water should not be called a "health care" facility, yet many are in this condition worldwide.

The 2020 global WASH report provided a striking picture: 1.8 billion people were using health care facilities that lacked basic water services and 800 million people were using facilities with no toilets. And yet implementing WASH services in health care facilities across the 46 least-developed countries would require relatively modest investments (US$ 6.5 to US$ 9.6 billion until 2030) *(27, 28)*.

Despite the surge in response to the COVID-19 pandemic, not all essential IPC human resources, supplies and products are available two years into the pandemic. The lack or limited availability of personal protective equipment (PPE) was reported in three WHO pulse surveys carried out in 2020 and 2021 on the continuity of essential health services during the COVID-19 pandemic. Moreover, the lack of IPC supplies and poor application of best practices were shown to be major reasons for the disruption of essential health services in 44% of countries in 2020 and 26% of countries in 2021 *(29, 30)*. In the least developed countries, the situation with such shortages and gaps is particularly acute. An estimated 50% of health care facilities lacked basic water supplies, 63% lacked basic sanitation services, 26% lacked hand hygiene facilities at points of care, and 60% of health care facilities did not have systems to safely manage health care waste *(29)*.

Among COVID-19 facilities assessed by WHO in 10 countries of the African Region[3] in June–July 2021, three quarters of the hospitals (74%) reported that they had available all the essential IPC guidelines for COVID-19, whereas only about one quarter of the primary care facilities (26%) had them. Training on IPC practices and use of PPE was provided in 60% of hospitals while supportive supervision activities were present in only 47% of hospitals. In primary care facilities, there was insufficient training (provided in only 46% of facilities) and supportive supervision (34%) *(30)*.

The same study reported that there continues to be a shortage of PPE required to provide care to COVID-19 patients (surgical masks, respirators, gloves, face shields, goggles and gowns), with only 20% of primary facilities and 27% of hospitals having all items available for staff. In addition, implementation of a COVID-19-safe environment (that is, a dedicated entrance for screening, a separate room for a patient with suspected COVID-19, etc.) was in place in only about one quarter of primary care facilities and about one third of hospitals *(30)*.

These recent data highlight again that limited progress has been achieved in some countries despite the momentum created by the pandemic, and that there are major gaps in IPC in primary care. These gaps hamper the quality and safety of care provided at this critical level of the health system and can have detrimental consequences as regards the trust of the community in health care.

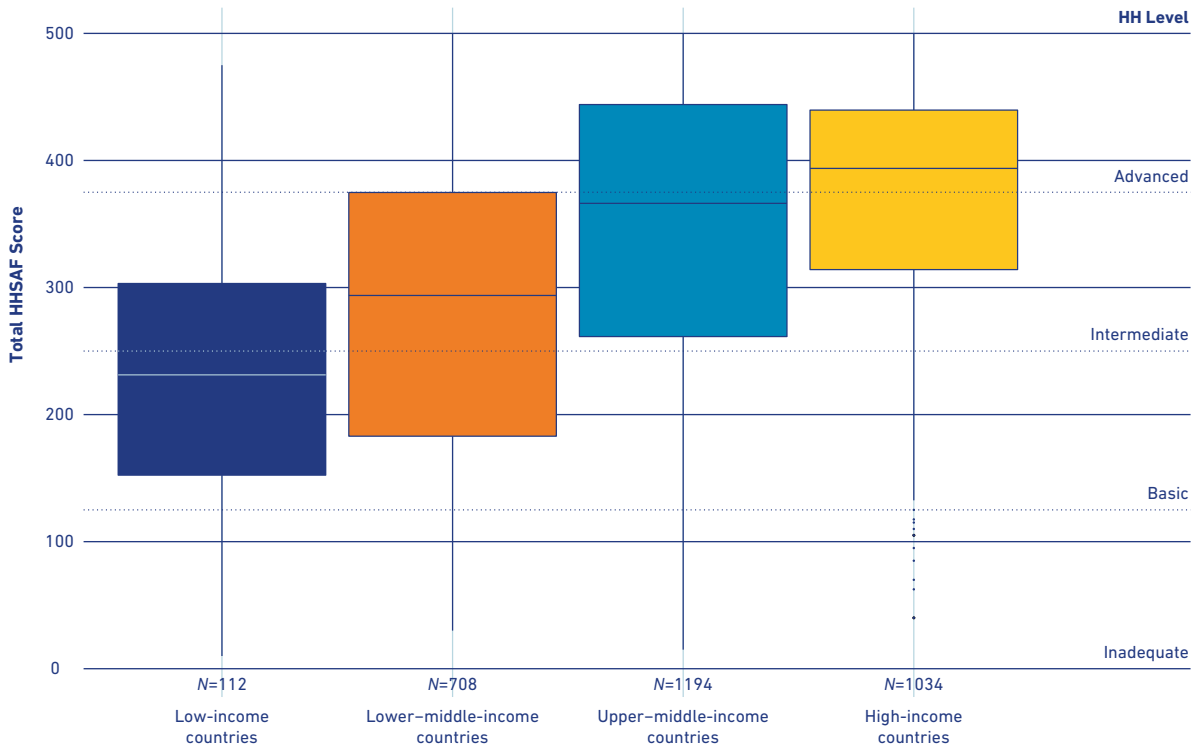
Implementation of hand hygiene programmes at the health care facility level

Appropriate hand hygiene can save lives. Such hand hygiene practices prevent infections, generate economic savings and are therefore a minimum requirement for IPC in all health care facilities. However, available evidence shows that compliance with hand hygiene recommendations during health care delivery remains suboptimal around the world, with an average of 59.6% compliance levels in intensive care units up to 2018, and extreme differences between HICs and LICs (64.5% vs 9.1%) *(31)*. In studies systematically reviewing different periods, the average hand hygiene compliance level – in the absence of specific interventions aimed at improving compliance – was found to be 40% up to 2009, and 41% between 2014 and 2020. In the absence of such interventions, the level of compliance with appropriate hand hygiene guidelines averaged 40% to 50%, but was seen to be as low as 20%, even in HICs *(32, 33)*.

In 2019, the WHO global survey on hand hygiene programmes in 3206 health care facilities in 90 countries showed an intermediate implementation level (350/500 points) overall, with significant differences according to the income level of participating countries ("advanced" in HICs and "basic" in LICs) (Fig. 6), showing a disparity between hand hygiene practice implementation in resource-rich and resource-poor settings *(34)*.

[3] Burundi, Cameroon, Democratic Republic of the Congo, Ghana, Kenya, Mali, Namibia, Senegal, Seychelles, and Zambia.

Fig. 6. Overall weighted HHSAF scores, by country and World Bank income levels



N=3048; HH: hand hygiene; HHSAF: hand hygiene self-assessment framework.
Source: *(34)*.

Alcohol-based handrub products, the most efficient means to achieve appropriate hand hygiene, were reported to be available in only 17% of facilities in LICs (vs 75% of facilities in HICs) and the recommended consumption of at least 20 litres of handrub per 1000 patient-days was achieved in only 9% of LIC facilities compared with 36% of facilities in HICs *(34)*.

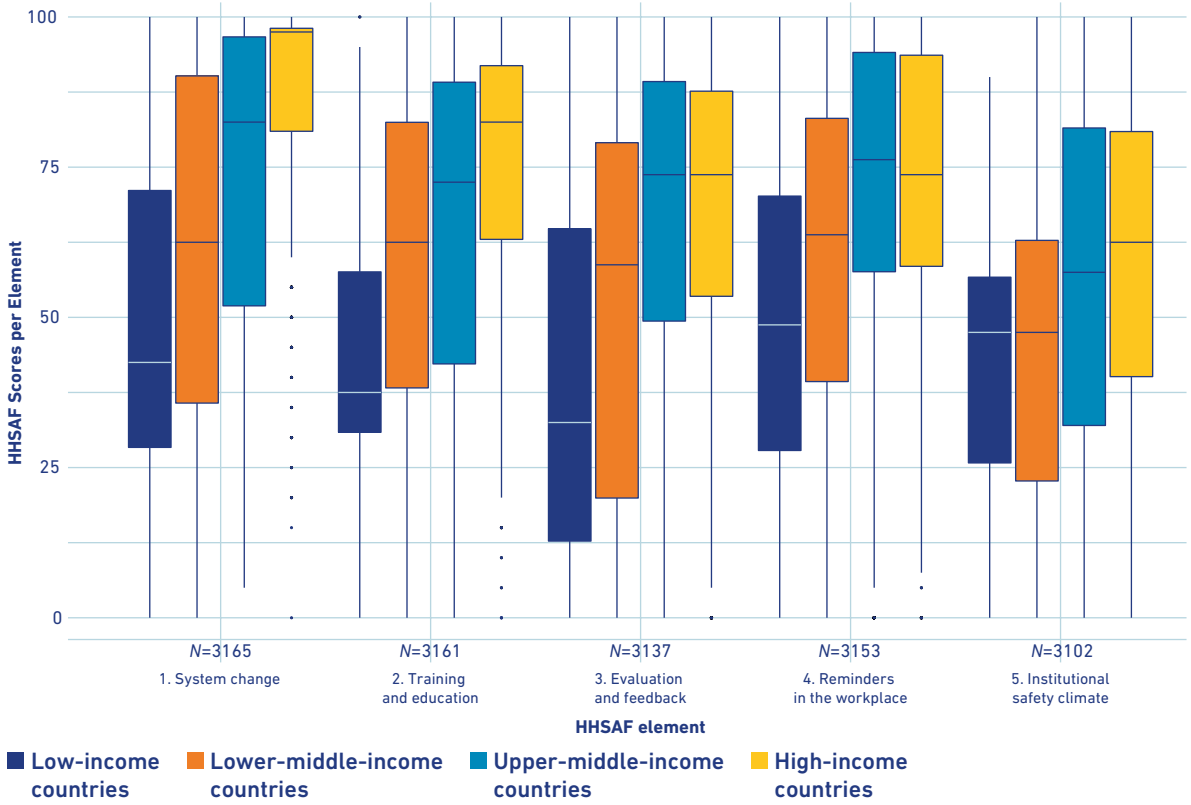
The 2020 WHO global progress report on WASH in health care facilities revealed that one in three facilities lacked hand hygiene supplies (either soap and water or alcohol-based handrubs) at the point of care *(27)*.

The availability of resources seems to be an important driver in the implementation of appropriate hand hygiene. However, a sustained improvement of hand hygiene practices is possible only in an enabling organizational environment and institutional culture (the so-called "institutional safety climate") – and yet, within multimodal hand hygiene improvement strategies, the element scoring lowest was having an institutional safety climate for hand hygiene (Fig. 7) *(34)*.

The scores for all five elements of the WHO multimodal hand hygiene improvement strategy were consistently directly proportional to country income level: the higher the income level, the higher the scores.

These differences were significant for elements related to "System change" and "Training and education". "Evaluation and feedback" in LICs was the lowest-scoring element across the survey (Fig. 7). This suggests (confirming findings from other studies) that LICs do not monitor IPC-related indicators adequately, despite these being IPC core components and minimum requirements *(34)*.

Fig. 7. Weighted element-specific scores for the five elements of the HHSAF survey, 2019, by World Bank income level



HHSAF: hand hygiene self-assessment framework.
Source: *(34)*.

Situation and challenges in implementing the minimum requirements for IPC programmes in WHO regions

The COVID-19 pandemic has exposed many challenges and gaps in IPC in all regions and countries, including those that had the most advanced IPC programmes. However, it has also provided an unprecedented opportunity to make a situation analysis and rapidly scale up outbreak readiness and response through IPC practices, and to strengthen IPC programmes across the health system.

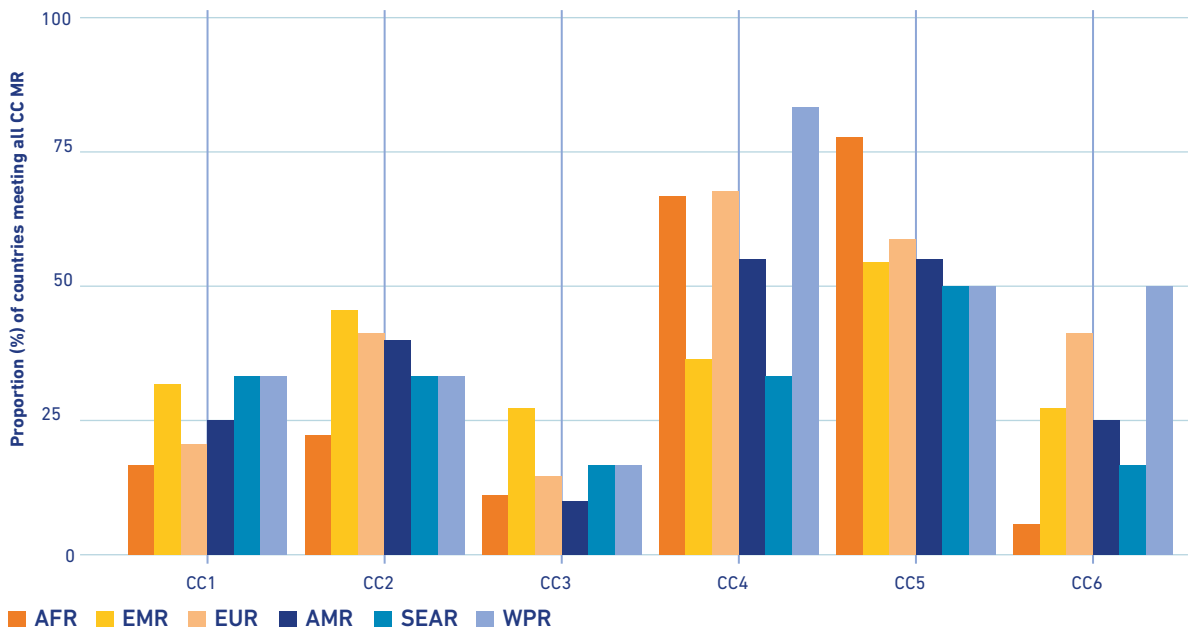
The 2021–2022 WHO global survey on national IPC programmes revealed remarkable differences in the implementation of the minimum requirements for IPC programmes across WHO regions (Fig. 8) (WHO, unpublished data).

Table 1 illustrates the main common challenges and gaps in implementing the WHO core components for IPC encountered in all regions, at national and/or facility level.

The 2021–2022 WHO global survey on national IPC programmes revealed remarkable differences, some significant gaps and limited progress over time, across WHO regions in the implementation of the IPC core components, in particular regarding the minimum requirements for each core component (WHO, unpublished data).

However, compared with previous surveys improvements were also reported by countries in the following areas: having an appointed IPC-trained national focal point, a budget dedicated to IPC and in-service IPC curriculum; developing national IPC guidelines and a national programme or plan for HAI surveillance; using multimodal strategies for IPC interventions; and establishing hand hygiene compliance as a key national indicator (WHO, unpublished data).

Fig. 8. Proportion of countries meeting all reported IPC minimum requirements, by core component, across WHO regions



CC MR: core components minimum requirements; AFR: WHO African Region; AMR: WHO Region for the Americas; SEAR: WHO South-East Asia Region; EMR: WHO Eastern Mediterranean Region; EUR: WHO European Region; WPR: WHO Western Pacific Region.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Table 1. Common challenges and gaps in IPC in all regions, by WHO Core Component

Core Component	Challenges and current gaps
CC1. IPC programmes	• Competing interests/programmes and services • Lack of financial investments in IPC • Lack of institutionalization, leadership and weak legal frameworks • Limited integration of IPC into other programmes
CC2. National and facility level IPC guidelines	• Lack of guidelines and technical documents according to international standards • Developing IPC guidelines is a demanding process requiring specific expertise • Lack of templates to develop national and facility-level guidelines
CC3. IPC education and training	• Lack of IPC experts and mentors • Lack of standardized IPC curricula, including within pre-graduate courses (e.g. medicine, nursing, midwifery) and in-service training, and for post-graduate specialization • Lack of career pathways and development for IPC professionals
CC4. HAI surveillance	• Lack of expertise among auditors • Need for high financial investment
CC5. Multimodal strategies for implementing IPC activities	• Work practices, behaviours and organization that do not conform to international standards
CC6. IPC monitoring, evaluation and feedback	• Limited translation of monitoring plans into real activities • Limited use of data for action
CC7. Workload, staffing and bed occupancy at the facility level	• Chronic general problem of poor staff/patient ratio (insufficient nurses, and doctors and other professionals) • Lack of human resources dedicated to IPC activities • Health care-associated infections not included within occupational health policies
CC8. Built environment, materials and equipment for IPC	• Weak capacity of microbiology laboratories • Inadequate supplies and infrastructure, including WASH • Procurement and distribution difficulties up to the point of care • Cost and market limitations in LMICs

CC: Core component; HAI: health care-associated infections; IPC: infection prevention and control; LMICs: low- and middle-income countries; WASH: water, sanitation and hygiene.

Based on the momentum created by the COVID-19 pandemic, there has been country engagement and progress in scaling up actions to improve IPC implementation, but sustainability in the longer term should be ensured.

At this point, based on the momentum created by the COVID-19 pandemic, there is clear country engagement and progress in scaling up actions to put in place minimum requirements and core components of IPC programmes, which is being strongly supported by WHO and other key players. Sustaining and further expanding this progress in the longer term is a critical need that requires urgent attention and investments.

The impact and economic side of IPC

A range of IPC interventions have been shown to be highly effective in preventing the occurrence of HAIs.

Analyses pooling together the results of studies from systematic reviews, calculated that IPC interventions can achieve a significant reduction in the rates of HAIs (in particular of catheter-associated bloodstream infections, catheter-associated urinary tract infections, surgical site infections and ventilator-associated pneumonia) in the range of 35–70%, irrespective of the level of income of a country *(35-37)*.

Whether implemented as a stand-alone intervention or integrated into multifaceted interventions, hand hygiene has been highlighted as the most effective single measure to reduce the transmission of microorganisms/pathogens and infection in health care settings *(38, 39)*.

IPC is highly cost–effective and a "best buy" for public health as an approach to reducing infections and AMR in health care, improving health, and protecting health care workers *(19, 40)*.

Available evidence shows that enabling and ensuring appropriate hand hygiene was cost-saving in all populations tested, from health workers to visitors. Screening at patient admission followed by decolonization from potentially harmful microorganisms was consistently found to be cost-saving or cost-effective, especially when carrying out the selective screening of at-risk patients (WHO, unpublished data).

Landmark institutional reports, such as those of the World Bank and the Organisation for Economic Co-operation and Development (OECD), confirmed the positive return on investment from implementation and enforcement of appropriate IPC measures, particularly hand hygiene *(40)*.

According to OECD, the implementation of a package including improved hand hygiene, antibiotic stewardship programmes and enhanced environmental hygiene in health care settings would reduce the health burden of AMR by 85%, while producing savings of 0.7 euros per capita per year *(39)*.

Hand hygiene and environmental hygiene in health care facilities in particular, were found to be the most cost-saving interventions: implementing these would more than halve the risk of dying as a result of infections with AMR pathogens, as well as decreasing the associated long-term complications and health burden by at least 40% *(40)*.

These IPC interventions were affordable in all settings, including low-resourced ones. In particular, improving hand hygiene in health care settings could save about US$ 16.5 in health care expenditure for every US dollar invested *(40)*.

Rapid availability of appropriate PPE, combined with an immediate scale-up of IPC training, could have had the potential to save lives and costs at the start of the COVID-19 pandemic.

A recent modelling study by OECD and WHO indicated that, during the first six months of the COVID-19 pandemic, the availability and rational use of appropriate PPE combined with rapid IPC training could have averted SARS-CoV-2 infections and related deaths among health care workers globally, while generating substantial net savings in all countries tested. Enhancing hand hygiene was also shown to be cost–effective in most regions (WHO and OECD, unpublished data).

More research is needed to increase the evidence on the cost–effectiveness of IPC interventions, especially in LMICs. Indeed, only a limited number of studies exist on the cost–effectiveness of IPC interventions, and most of them have been carried out in HICs.

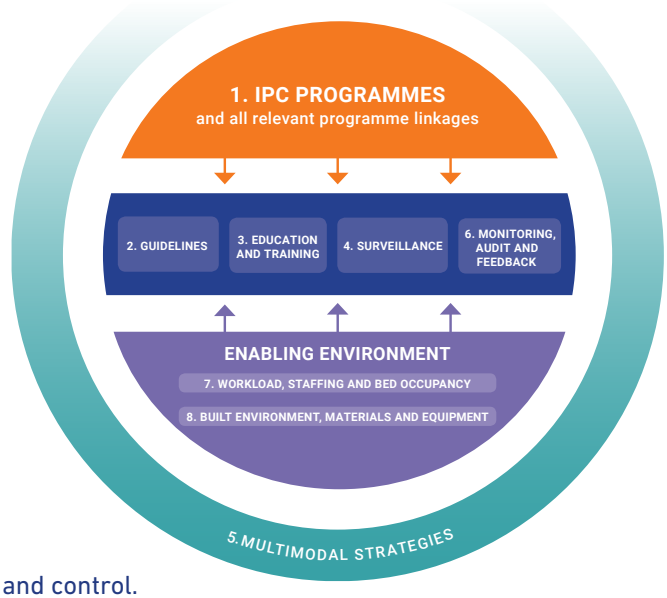
Solutions to improve IPC

Given the evidence reported above, IPC is a tried-and-true solution that is effective and cost-saving, and it ensures patient and health workers' protection and high-quality care. This is why, over the past 20 years, WHO has invested in developing policies, recommendations and implementation strategies and tools to support IPC improvement worldwide.

In the aftermath of the devastating outbreak of Ebola virus disease in West Africa, 2016 represented a turning point in the history of IPC with the publication of comprehensive, evidence-based and consensus-based WHO guidelines on the core components of effective IPC programmes *(2)*, which benefited from the input of many IPC stakeholders and field implementers from around the world.

Eight core components were identified, six of which are relevant for both the national and health care facility levels, and two (core components 7 and 8) should be implemented at the facility level (Fig. 9).

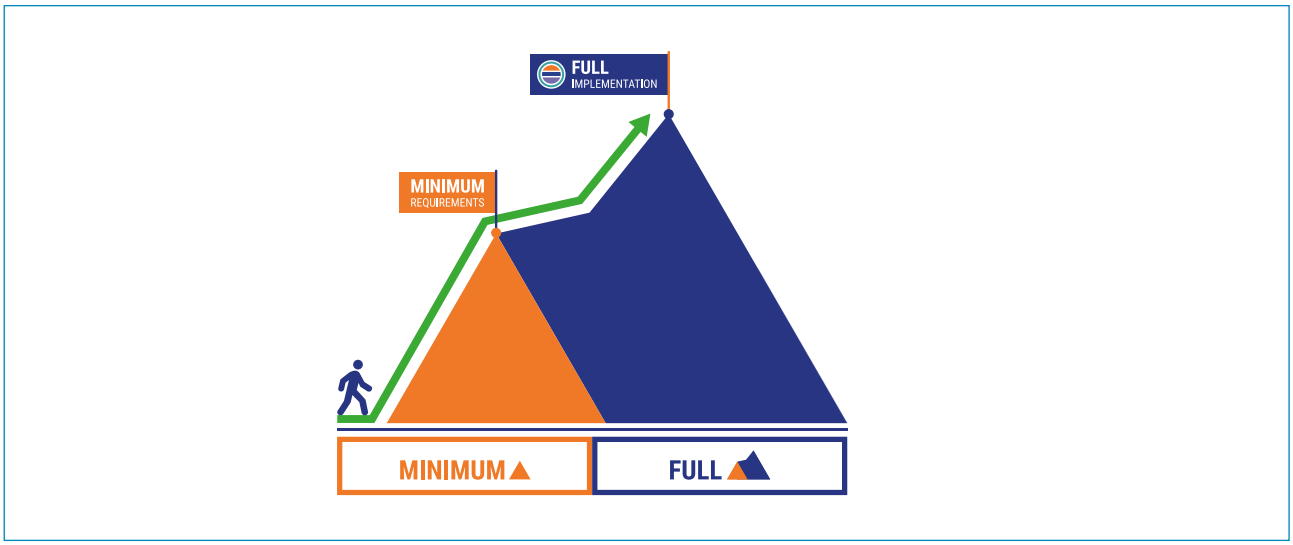
Fig. 9. The eight core components of IPC programmes



IPC: infection prevention and control.
Source: *(2)*.

Recognizing that the fulfilment of all IPC core components takes time and that countries may be at different stages of progress, with different capacities, available opportunities and resources, in 2019 WHO identified the IPC "minimum requirements" which represent the starting point for undertaking the journey to build strong and effective IPC programmes at the national and facility level (Fig. 10) *(3)*. These were directly derived from the IPC core components through a consensus-building process involving IPC stakeholders, experts and field implementers from around the world. The IPC minimum requirements should be in place in all countries and health care facilities to support further progress towards full and sustained implementation of all IPC core components.

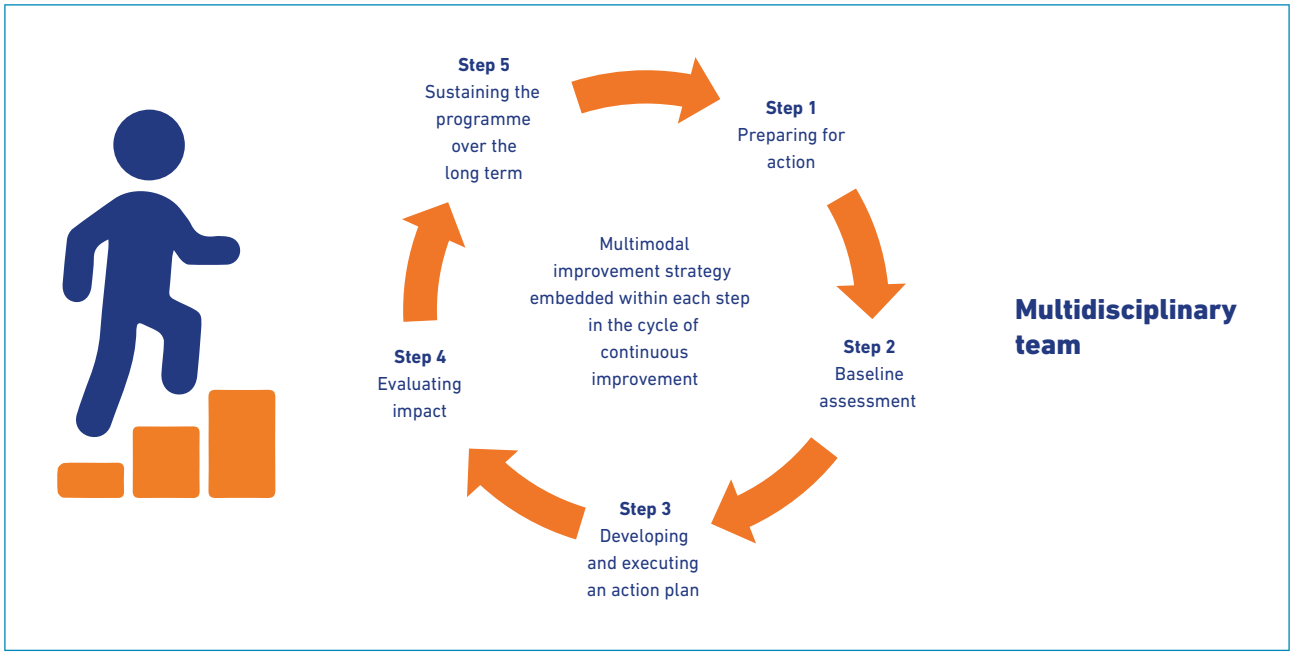
Fig. 10. Minimum versus full requirements to achieve effective IPC programmes



Source: *(3)*.

Whether applying the minimum requirements or full requirements, the implementation of the IPC core components should always be tackled using a stepwise approach, based on a careful assessment of the status of the IPC programme and local activities and developing, implementing and sustaining a plan for improvement. To undertake this process, WHO proposes a five-step cycle of implementation (Fig. 11) to support any IPC improvement intervention or programme, based on implementation and quality improvement science *(41, 42)*.

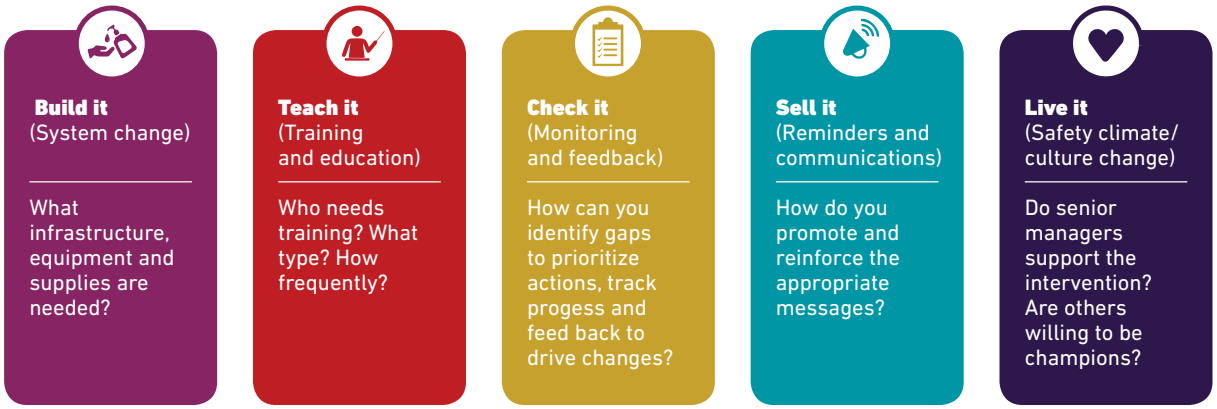
Fig. 11. The five-step implementation cycle to IPC improvement



Based on compelling evidence and its own research especially in the field of hand hygiene, WHO recognized that multimodal improvement strategies are the gold standard approach to implementing IPC interventions in the field *(38, 40, 43, 44)*.

Scientific evidence and lessons from implementation science suggest that targeting only one element (that is, using a unimodal strategy) is more likely to result in improvements that are short-lived and not sustainable *(2, 38, 40)*. The WHO multimodal improvement strategy for IPC comprises the following five elements: system change; training and education; monitoring and feedback; reminders and communications; and a safety climate/culture change. In other words, the strategy involves building the right system, teaching the right things, checking the right things, selling the right messages, and ultimately "living" IPC throughout the entire health system *(41–44)* (Fig. 12).

Fig. 12. Multimodal thinking



The five-step cycle and the multimodal improvement strategy can be applied to any IPC intervention. WHO has adapted them to interventions for injection safety, the prevention of surgical site infections *(45, 46)*, and the prevention and control of carbapenem-resistant organisms *(47, 48)*.

IPC and WASH interventions in health care facilities are complementary and IPC Core Component 8 inherently includes WASH standards and strategies which WHO and UNICEF have developed *(49, 50)*. These strategies represent another excellent example of multimodal strategy and a step-wise approach perfectly aligned with those of WHO for IPC (Fig. 13) *(51)*.

Fig. 13. Eight practical steps for WASH improvement

Source: *(51)*.

To ensure IPC implementation and optimize operations in the context of outbreaks, WHO developed a practical framework of actions for strengthening IPC within outbreak preparedness, readiness and response (Fig. 14) *(52)*. This framework provides a stepwise approach to IPC outbreak management, and is accompanied by a toolkit providing helpful resources.

Fig. 14. IPC at the core of outbreak preparedness, readiness and response

IPC: infection prevention and control.
Source: *(52)*.

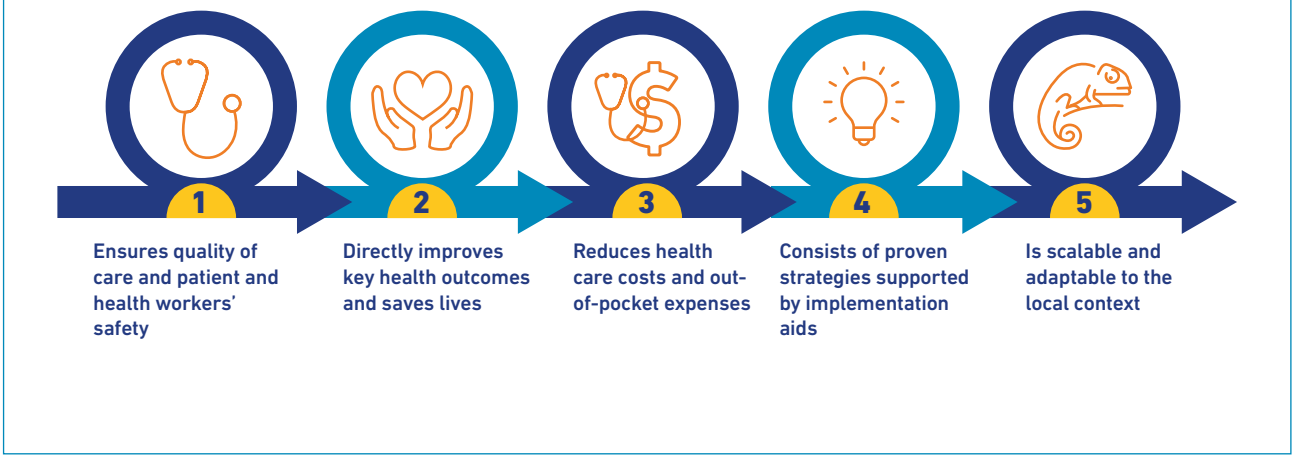
Directions and priorities for countries

The report provides a situation analysis of the status of IPC programmes worldwide and highlights that, although some progress has been made (especially in the past two years), the implementation of IPC programmes is still lagging.

The report makes it clear that there are at least five main reasons for investing in IPC *(53)* (Fig 15).

IPC is indeed at the core of a number of other major global health priorities, including health emergencies and the International Health Regulations, patient and health worker safety, AMR action plans, sepsis prevention, WASH, andintegrated people-centred, high-quality care.

Fig. 15. Five main reasons for investing in IPC



Further, the overarching focus on quality essential health services as part of a primary health care-driven approach to universal health coverage is well-served by strong IPC at all levels of the health system.

IPC is included in a number of existing resolutions and action plans adopted by the World Health Assembly. Furthermore, the implementation and monitoring of IPC programmes contribute to achieving the Sustainable Development Goals (especially goals 3.1–3.3, 3.8, 3.d.2, and 6) *(54)*.

Within the global report, WHO provides some key directions and priorities to accelerate efforts and progress at the local, national and global levels (Fig. 16). These priorities can be summarized in the following main three areas.

1. **Political commitment and policies** to scale up and enforce the core components of IPC programmes and the related minimum requirements, including through sustained financing, legal frameworks and accreditation systems.
2. **IPC capacity-building and creation of IPC expertise** as a clinical and public health specialty, including through IPC training and continuous education across different levels and health disciplines, and career pathways for IPC professionals. Embedding IPC within all clinical pathways is critical to influence the quality of health care delivery.
3. **Development of systems to monitor, report, and act** on key indicator data. This should include surveillance of HAI and emerging sentinel pathogens, monitoring of a range of IPC and WASH indicators, and efficient management of the supply chain.

Across these three areas, integration and alignment with other programmes, coordination among government sectors and collaboration with the most critical stakeholders are paramount.

No country or health system, even the most developed or sophisticated, can claim to be free of HAIs and AMR. Equally, there is no need for anyone to be unnecessarily exposed to infection during health care delivery as a result of suboptimal IPC practices, or because of a lack of equipment or standard operating procedures.

It has never been more urgent to prevent HAIs and AMR now and in the future.

Fig. 16. Critical priorities for IPC in national and international health agendas

1 Functional IPC programmes	• Dedicated budget • Trained IPC professionals
2 IPC minimum requirements	• At national and facility levels in all countries • Demonstrated by M&E of key IPC and WASH indicators
3 Decisive and visible political commitment and leadership engagement	• At the highest levels • Allocation of national and local health budgets • Establishing targets for IPC investment
4 Regulations and legal framework	• To enforce IPC requirements and policies through accreditation and accountability systems • Reporting of key IPC performance indicators and targets
5 Integration and alignment with other programmes	• Specific IPC programme that horizontally integrates/aligns with existing ones
6 Embedding IPC within the patient pathway and clinical care	• Tools and SOPs to support IPC understood and practiced at the point of care in all clinical areas • Workflow, human factors, ergonomics to be considered
7 IPC training and education at all levels	• Implementation of accredited IPC curricula (pre- & postgraduate, in-service) • Based on the WHO IPC core competencies
8 Human resources and career pathway for IPC	• IPC professionals: - with a recognized career pathway - empowered with a clear mandate and authority - accountable for implementation and reporting impact
9 Surveillance of HAIs and AMR in health care	• Functioning and quality-controlled systems for HAI and AMR surveillance • Connected with existing platforms (e.g. GLASS) • Existing standardized surveillance protocols (e.g. ECDC PPS)
10 Quality diagnostics	• Access to quality laboratory diagnostics and services
11 Monitoring IPC programmes	• Using standard M&E approaches • Regular assessments and feedback to health workers • WHO Global IPC Portal as a protected and confidential solution
12 Using data for action and communications	• Use of data for action and development of local, tailored IPC improvement plans • Tailored and consistent communications from authoritative source, based on science

ECDC: European Centre for Disease Prevention and Control; GLASS: Global Antimicrobial Resistance and Use Surveillance System; IPC: infection prevention and control; M&E: monitoring and evaluation; PPS: point prevalence study; WASH: water, sanitation and hygiene.

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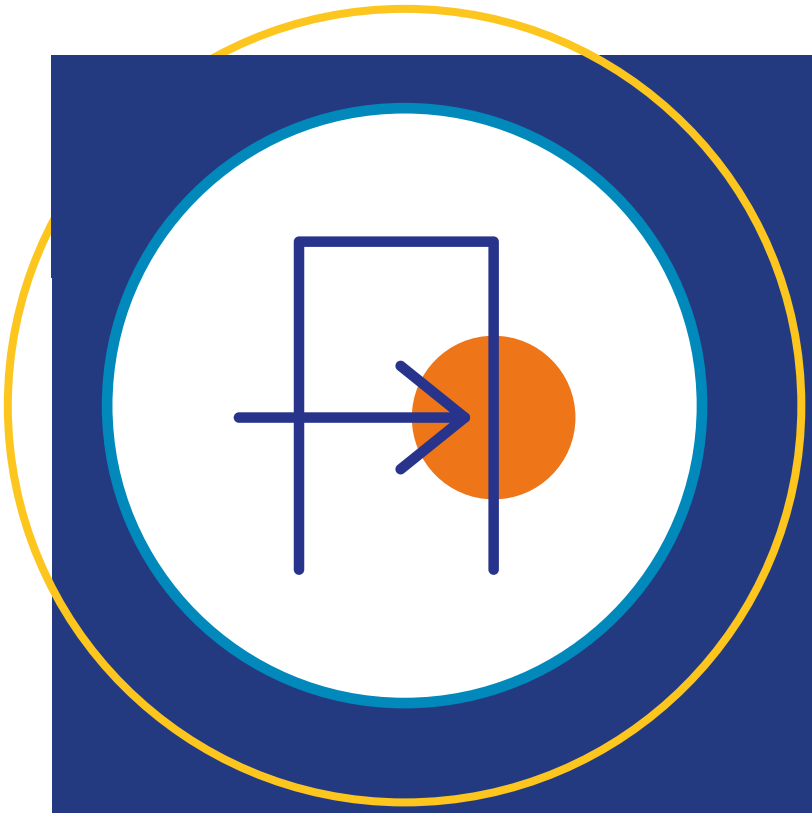

CHAPTER 1.

Introduction

Chapter 1. Introduction

What is infection prevention and control?

Infection prevention and control (IPC) is a clinical and public health specialty based on a practical, evidence-based approach which prevents patients, health workers, and visitors to health care facilities from being harmed by avoidable infections, including those caused by antimicrobial-resistant pathogens, acquired during the provision of health care services *(1)*.

IPC occupies a unique position in the field of patient and health workers' safety and quality of care, as it is universally relevant to every health worker and patient, at every health carae interaction.

IPC is a proven approach to prevent the transmission of infectious hazards, but applying it requires programmatic, institutional, financial and knowledge support. Effective IPC requires constant action at all levels of the health system, from policy-makers to facility managers, health workers, and other relevant stakeholders, as well as all those who access health services, and their family members.

IPC is also a cornerstone of health system resiliency and preparedness. The COVID-19 pandemic demonstrated not only the importance of protecting health workers and patients through IPC, but also the central role of health care facilities in the control of emerging infectious diseases. WHO and the international community of IPC experts and organizations have identified core components of effective IPC programmes, basic IPC standards (known as "minimum requirements"), as well as impactful application strategies *(2-5)*. IPC is also based on a scientific approach grounded in infectious diseases, epidemiology, social and implementation science, engineering, and health system strengthening. Therefore, all persons involved in the IPC programme at the national, subnational (regional) and facility level must be competent, with the required knowledge, skills and attitudes to be able to practise safely and ethically as IPC professionals *(1)*.

Purpose and target audience of this report

This report aims to provide a global situation analysis of the implementation of IPC and an overview of available strategies and resources to improve the situation. Considering the gaps identified, the report highlights priorities and directions for implementing IPC at country and global level.

Specifically, the report

- describes the level of implementation of IPC programmes at the global, regional, national, and health facility levels;
- provides an overview of WHO's approaches and recommendations for IPC improvement;
- identifies gaps and priorities for country improvement and outlines future strategic directions and priorities for countries; and
- outlines the importance of integration and alignment of IPC within wider efforts on antimicrobial resistance (AMR), health emergencies, and quality and safety in order to harness the combined policy, implementation and financing efforts of key stakeholders.

Examples are given of real-life country experiences, illustrating the approaches undertaken to institute and carry out IPC programmes, as well as the related achievements, despite the challenges encountered (see Annex 3).

This report does not specifically address antimicrobial stewardship which nevertheless, has an essential role, complementary to IPC, in the context of critical strategies to reduce AMR and requires specific interventions and approaches *(6)*.

Primarily, this document targets those in charge of making decisions and formulating policies in the field of IPC at the national, subnational and facility levels. These include policy makers, senior managers, administrators who are managing health budgets, and IPC focal points at national level (Ministry of Health, public health institutes, etc.), and subnational and health care facility levels.

It is also aimed at professionals with the mandate to develop and implement national action plans for combating AMR, preventing health care-associated infections (HAIs), setting the national strategic direction for quality health services, promoting patient safety, and those responsible for preparing and responding to public health emergencies in the context of the International Health Regulations (IHR 2005) *(7)*.

This report should also be helpful to other stakeholders, including those responsible for: improving the quality of health care at facility level; health facility accreditation/regulations; occupational health; public health; infectious disease control and surveillance; water, sanitation and hygiene (WASH); antimicrobial stewardship programmes; clinical microbiology and environmental health interventions; as well as additional categories of health workers involved in care delivery.
It also targets health leaders and technical staff in international organizations, nongovernmental organizations, donor organizations and foundations in global health, and other civil society actors.

The combined efforts of this group of implementers will lead to increased and focused attention, investments, and progress for IPC. It will also contribute to improving the quality and access to health for people throughout the world, while being anchored in the principles of equity and safety in health care delivery.

Data sources and methodologies

This report is the result of a cross-cutting and multidisciplinary effort, involving WHO headquarters and regional and country offices.

It collates information and data from many sources, including the scientific literature, WHO national and global surveys and studies, and reports by other institutions. It reports assessments of IPC indicators made using WHO standardized data-collection tools that are completed regularly either at the national or at the facility level. These tools monitor national action plans for AMR, IPC programmes, essential health services, preparedness for health emergencies or response to outbreaks. The report also includes data from comprehensive and detailed WHO global surveys of national or facility IPC and hand hygiene programmes made using standardized tools. Evaluations were performed through either self- or joint assessments, led by the countries with the support of WHO and/or other stakeholders. Results were derived from published documents or articles, and from ad-hoc analyses of relevant unpublished data. Specific checklists were developed for unpublished data, according to the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) best practices in reporting health estimates (*8*).

The report also includes a compilation of data and information providing overviews of IPC at the regional level, and diverse country examples of IPC programmes (Annex 3). In these cases, data were extracted from the available data sources, or were provided by WHO regional and country offices and/or ministries of health.

CHAPTER 2.

The problem of unsafe care resulting from HAIs and AMR

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Chapter 2. The problem of unsafe care resulting from HAIs and AMR

Key messages

- HAIs, many of which are caused by multidrug-resistant organisms, harm patients, visitors and health workers, and are a significant burden to health systems, including the associated increased costs. They represent one of the most frequent adverse events during health care delivery.
- In the last decade, large-scale outbreaks of Ebola virus disease, the Middle East respiratory syndrome epidemic, and the coronavirus disease 2019 (COVID-19) pandemic, have demonstrated some of the dramatic consequences of epidemic-prone pathogens often spreading through health care settings. No country or health system, however sophisticated, can claim to be free of HAIs. Out of every 100 patients in acute-care hospitals, seven patients in high-income countries (HICs) and 15 patients in low- and middle-income countries (LMICs) will acquire at least one HAI during their hospital stay. Up to 30% of patients in intensive care can be affected by HAIs, with an incidence that is two to 20 times higher in LMICs than in HICs. This is particularly true among neonates.
- Approximately one in four (23.6%) of all hospital-treated sepsis cases are health care-associated. Almost half (48.7%) of all cases of sepsis with organ dysfunction treated in adult intensive-care units are hospital-acquired.
- In a pooled analysis, mortality among patients affected by health care-associated sepsis was 24.4%, increasing to 52.3% among patients treated in an intensive care unit.
- Among hospitalized confirmed COVID-19 patients, up to 41% were infected in health care settings, according to different studies. The COVID-19 pandemic had a huge impact on the health work force worldwide. The incidence of infection among health workers varied from 0.4% to 49.6%, and estimated deaths were between 80 000 and 180 000 globally up to May 2021.
- In counties in the European Union and European Economic Area (EU/EEA), the three most impactful antibiotic-resistant microorganisms – determining 70% of the burden of AMR (in terms of disability and premature mortality, i.e. disability adjusted life-years) – are typically acquired in health care: extended-spectrum beta-lactamase which produces *Escherichia coli*; meticillin-resistant *Staphylococcus aureus*; and carbapenem-resistant *Pseudomonas aeruginosa*.
- Mortality among patients infected with resistant microorganisms is at least two to three times higher than among those infected with sensitive microorganisms.
- It was estimated that in 2019 the deaths associated with bacterial AMR were 4.95 million (95% uncertainty interval (UI) 3.62–6.57), including 1.27 million (95% UI 0.911–1.71) death attributable to bacterial AMR, worldwide, with the highest burden in western sub-Saharan Africa. Among the leading AMR pathogens responsible for this burden, five out of six were mainly health care-associated.

How frequent are infections acquired in health care?

HAIs are a consequence of poor-quality care or even of increasingly advanced care without proper safety programmes. They can be a deadly cause of harm, and a severe threat to patient and health worker safety.

In 2017, it was estimated that in HICs an average of one in 10 patients was subject to an adverse event while receiving hospital care *(9)*. The frequency was significantly higher in LMICs. Infections acquired during health care delivery were the most frequent adverse events – in particular, pneumonia and surgical site infections *(9)*. For example, the Ibero-American Study of Adverse Events, published in 2011, estimated that the incidence of adverse events in Argentina, Colombia, Costa Rica, Mexico and Peru was 20% *(10)*. Another study of adverse events in LMICs found that the adverse event rate varied by country, ranging from 2.5% to 18.4%. Some 30% of adverse events were associated with the death of the patient in 2012 *(11)*. According to a review published in

2018, HAIs were the third most frequent adverse event globally *(12)*; surgical errors were the most frequent, accounting for 40% of all adverse events *(12)*. In the African Surgical Outcomes Study, infection was found to be the most frequent complication of surgery *(13)*. Regarding adverse events, up to 83% (with an average of 51%) were highly preventable *(12)*.

Global estimates of HAI frequency are hampered by the lack of HAI surveillance systems in many countries, especially in LMICs. These estimates also suffer from underreporting, poor data quality, and a lack of standardization of methods and protocols.

In 2009, Jha and colleagues estimated that there were, in HICs and LMICs respectively, 117.8 and 203.1 million hospitalizations, and an overall incidence rate of adverse events of 14.2% and 12.7%, for a total of 42.7 million adverse events worldwide *(14)*.

In 2010, WHO estimated that, in acute-care hospitals in HICs, an average of seven patients acquires at least one HAI, while in LMICs, 15 patients acquire at least one HAI *(15, 16)*.

Combining these estimates, it appears that globally an average of almost 43 million hospitalizations are complicated by HAI every year.

As highlighted by WHO, more-recent studies also showed that the frequency of HAIs varies between countries and according to economic conditions. The pooled prevalence of HAIs was estimated to be 9.0% in the WHO South-East Asia Region, according to a systematic review published in 2015 *(17)*. Multicountry prevalence surveys of HAIs in the WHO Eastern Mediterranean Region and in the EU/EEA showed a HAI prevalence of 11.2% and 6.5% in 2017 and 2018, respectively *(18, 19)*. HAI prevalence was found to be 3.2% among 12 299 patients in 199 hospitals in the United States of America (USA) in 2015, while the proportion of patients with HAIs was significantly lower than in 2011 (4.0%, *P*=0.003) *(20)* (Fig. 2.1).

Patients may acquire an infection during health care delivery in any setting across the health system.

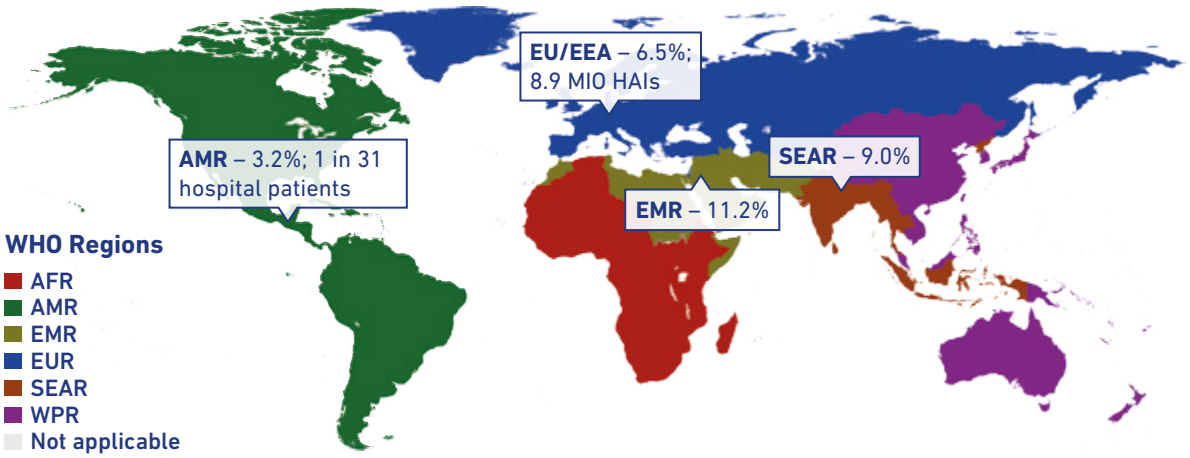
In 2017, the European Centre for Disease Prevention and Control (ECDC) calculated that 8.9 million episodes of HAIs occurred in patients admitted to acute-care hospitals and long-term care facilities in EU/EEA countries *(19)* (Fig. 2.1); in 2011, 91 310 attributable deaths were estimated to have occurred in acute-care hospitals *(21)*.

The United States Centers for Disease Control and Prevention (USCDC) estimated that, on any given day, one in 31 hospital patients and one in 43 nursing home residents has an HAI *(22)*.

The 2011 *WHO report on the burden of endemic health care-associated infection worldwide*, indicated that surgical site infections was the most frequent type of HAI reported hospital-wide in LMICs, where the level of risk was significantly higher than in HICs *(16)*. Surgical site infections were also the second most frequent type of HAI in Europe and the USA *(23)*.

According to a systematic literature review on surgical site infections in LMICs between 1995 and 2015, the pooled surgical site infection incidence rate was 5.9% (95% confidence interval (CI) 4.8–7.1) per 100 surgical operations and 11.2 per 100 surgical patients (95% CI 9.7–12.8), with significant variations according to the type of surgical procedures (WHO, unpublished data). The incidence of surgical site infections following caesarean section in LMICs was 11.7% (95% CI: 9.1–14.8), a much higher average rate than that reported in Europe (2.9%) *(23)*. Similarly, surgical site infection incidence in prosthetic orthopaedic surgery was 9.7% (95 CI 5.3–15.3) in LMICs and 0.7% (knee prosthesis) to 1.0% (hip prosthesis) in Europe (WHO, unpublished data).
Caesarean section is considered the single most important risk factor for maternal infection after

Fig. 2.1. Frequency of HAIs in different WHO regions and countries



EU/EEA: European Union/European Economic Area; HAIs: health care-associated infections; MIO: million; WHO regions: AFR: African Region; AMR: Region for the Americas; EMR: Eastern Mediterranean Region; EUR: European Region; SEAR: South-East Asia Region; WPR: Western Pacific Region.
Source: *(17–20)*.

childbirth globally *(24)*. In Africa, up to 20% of women who deliver through caesarean section get a wound infection, which affects their health and their ability to provide quality care for their newborn child *(13)*.

In EU/EEA countries and in countries of the WHO Eastern Mediterranean Region, the most frequent HAIs were respiratory tract infections, followed by surgical site infections, urinary tract infections (equally represented) and bloodstream infections (BSI) *(18, 19)*.

The toll is heavier among high-risk patients, such as those admitted to intensive care units (ICUs), who often acquire infections from indwelling devices such as urinary or vascular catheters or invasive mechanical ventilation. Infections associated with these devices can affect as many as 30% of patients in ICUs and their incidence in LMICs is at least triple that in HICs *(15, 16)*. In a multicentre study in 45 countries in the WHO Region for the Americas, and the European, Eastern Mediterranean, South-East Asia, and Western Pacific regions, the incidence of device-associated infections in ICU patients was from five to 14 times that in the USA *(25)*. Particularly in these patients, but not only in them, infection can rapidly and frequently evolve to sepsis, a life-threatening organ dysfunction. Sepsis represents a final common pathway to death from many infectious diseases worldwide.

Reviewing published studies, WHO recently calculated that among hospital-treated sepsis cases around the world, approximately one in four cases (23.6%) are health care-associated *(26)*. In adult ICUs, almost half of all cases (48.7%) of sepsis with organ dysfunction treated in ICUs were hospital-acquired *(26, 27)*.

According to the pooled analyses in the above-mentioned WHO review, the incidence of health care-associated sepsis globally was 15.4 (95% CI 9.2–25.7) cases per 1000 adult patients *(27)* and more than seven times higher among neonates (112.9 (95% CI 64.2–191.1) cases per 1000 neonates) *(26)*. It was also found in previous pivotal publications that newborns were at a higher risk of acquiring HAI, with infection rates in LMICs three to 20 times than those in HICs *(28)*.

AMR in health care

The spread of microorganisms that are resistant to antimicrobials is a critical issue in health care settings and IPC interventions can play a substantial role to significantly reduce the spread, along with optimal diagnostic and antimicrobial stewardship. In EU/EEA countries, the five most frequent pathogens causing HAIs, are *Escherichia coli*, *Staphylococcus aureus*, *Enterococcus* spp., *Pseudomonas aeruginosa* and *Klebsiella* spp. Typical pathogens in the healthcare environment also include *Candida* spp., *Acinetobacter* spp. and *Clostridium difficile (19)*.

Meticillin-resistant *S. aureus*

The average proportion of meticillin-resistant *S. aureus* (MRSA) was 24.9% (interquartile range (IQR) 11.4–42.7) globally in 2020 and 15.5% in EU/EEA countries in 2019, while in some countries, it was found to be as high as 25–50% *(29, 30)*.

Resistance to third-generation cephalosporins

The overall median resistance rate reported globally for third-generation cephalosporins was found to be quite high (40–50%) for BSI caused by *K. pneumoniae* and urinary tract infections caused by *E. coli* and *K. pneumoniae (29, 30)*. *E. coli* resistance to third-generation cephalosporins was on average 15.1% in EU/EEA countries in 2019, but higher than 50% in Italy and Bulgaria *(30)*. *E. coli* resistance to third-generation cephalosporins was on average 36.6% globally, from blood samples. An important difference in incidence of this resistance was observed between LMICs (58.3%; IQR 39.8–70.2) and HICs (17.53%; IQR 11.3–25.2) *(29)*.

Resistance to carbapenems

In 2020, the resistance of *Acinetobacter* spp. to carbapenems in BSIs was 64.3% (IQR 10.5–79.1) for imipenem and 64% (IQR 18.4–78) for meropenem, according to data reported globally *(29)*. In EU/EEA countries in 2020, carbapenem resistance among *K. pneumoniae*, *P. aeruginosa* and *Acinetobacter* spp., was on average 10%, 17.8% and 38% respectively *(30)*. The ECDC has recently noted that the negative impact of the COVID-19 pandemic on AMR is emerging in EU/EEA countries, in particular for typical health care-associated pathogens *(31)*; for example, in 2020, carbapenem resistance in *Acinetobacter* spp was equal to or above 50% in 55% of countries, mostly in southern and eastern Europe. Furthermore, a significant increase of the population-weighted carbapenem resistance mean in *E. coli* and *K. pneumoniae* and of the population-weighted vancomycin resistance mean in *E. faecium* was observed over time during 2016–2020 *(31)*. In a global survey conducted by WHO in 2014, the prevalence of MRSA, *E. coli* resistant to third-generation cephalosporin, and carbapenem resistance by Enterobacteriaceae and *P. aeruginosa* from blood samples was significantly higher in LMICs than in HICs *(32)*. This was also documented in the results of a surveillance study conducted by the International Nosocomial Infection Control Consortium between January 2010 and December 2015 in 703 intensive care units in LMICs across five continents, excluding Africa. From blood cultures, the overall resistance of *Pseudomonas* spp. to imipenem was 44.3% (compared with 26.1% in the USA in the same period). Resistance of *K. pneumoniae* to ceftazidime was 73.2% (vs 28.8%), and to imipenem 43.27% (vs 12.8%) *(33)*.

Resistance in *Candida* spp

Finally, resistance has increased in *Candida* spp. isolates in health care settings, with the recent emergence of *Candida auris*, a species that is echinocandin- and pan-resistant and which caused recent outbreaks in health care settings *(34, 35)*.

Emerging evidence on HAIs and AMR during the COVID-19 pandemic

Evidence emerging from surveillance networks on HAI and AMR in health care settings during the COVID-19 pandemic is still limited so far, but what we know is alarming. A 2021 report showed significant increases in in the standardized infection ratio for ventilator-associated events (35% increase); central line-associated BSI (24% increase), and in hospital-onset MRSA (15% increase) in the USA *(36, 37)*. In a London hospital group, a very significant increase of nosocomial bloodstream infections (both in COVID-19 and non-COVID-19 patients) was detected during 2020 compared with pre-pandemic historical trends *(38)*.

In some studies, an increased risk of HAIs was observed among COVID-19 patients, in particular for BSIs and ventilator-associated pneumonias due to multidrug-resistant organisms, compared with other critically ill patients in ICU *(39-41)*. A systematic review of studies published during the

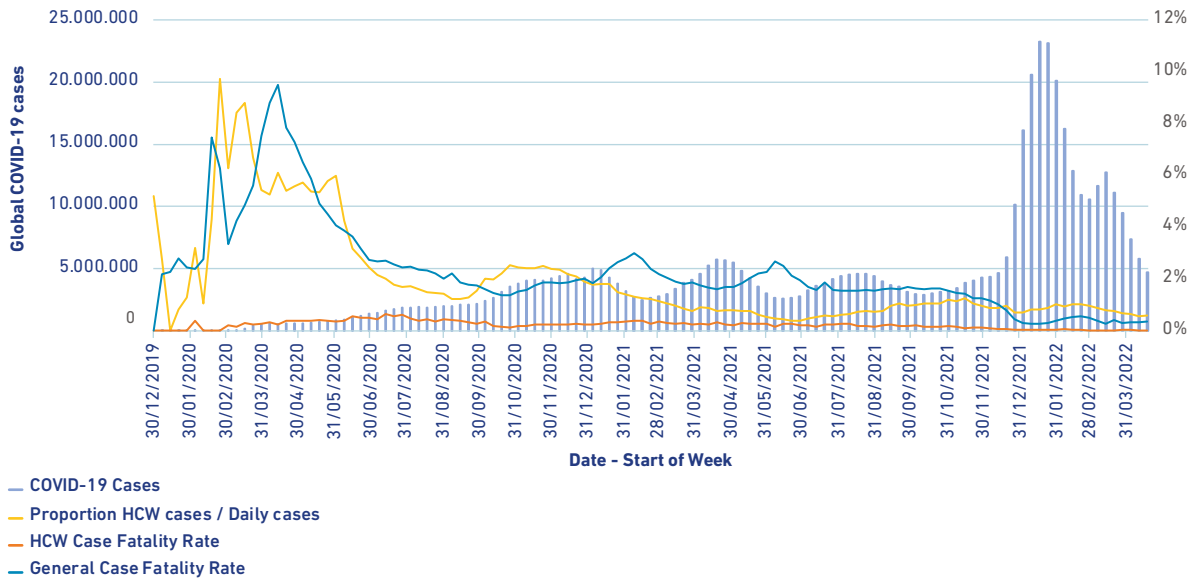
first 18 months of the pandemic found that the proportion of COVID-19 patients with co-infection due to resistant organisms ranged from 0.2% to 100% and the pooled prevalence of co-infection with resistant bacterial and fungal organisms across all included studies was 24% (95% CI 8–40) and 0.3% (95% CI 0.1–0.6) respectively. MRSA, carbapenem-resistant *Acinetobacter baumannii*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*, and multi-drug resistant *Candida auris* were most commonly reported. There were wide variations by hospital and geographical location and substantial heterogeneity *(42)*.

Considering this emerging and still limited evidence, the area of HAIs and AMR trends the has been identified as a current high priority within the WHO Research and Development Blueprint agenda in the context ofthe COVID-19 pandemic *(43)*.

SARS-CoV-2 spread in health care settings

Transmission in health care facilities has been a major problem also during the COVID-19 pandemic. Several studies have reported SARS-CoV-2 infections acquired in the health care setting among patients, ranging from 0% to 41% of inpatients *(44-48)*. According to a living systematic review, the prevalence of SARS-CoV-2 infection among health workers ranged from 0.2% to 43.3% based on PCR testing (57 studies), and 0.3% to 40.7% based on seroprevalence (81 studies) *(49)*. However, great variations over time and from country to country have been observed, and it is very difficult to distinguish between community- and health care-acquired infections. According to the WHO global surveillance database, the proportion of COVID-19 cases among health workers slightly exceeded 10% in the first wave. They declined to less than 5% by early-June 2020, and there was a further decline to 2.5% by September 2020 (Fig. 2.2), suggesting that improvements in IPC implementation made after the initial emerging spread of the virus may have contributed to the reduction of health workers' exposure in the workplace, while they remained exposed in a similar way as the rest of the general population outside health care facilities *(50)*. WHO estimated that between January 2020 and May 2021 there were 115 500 deaths (ranging between 80 000 and 180 000) caused by COVID-19 among health workers globally *(51)*. However, these data need to be interpreted with caution, as reporting of health care workers cases is hampered by significant limitations, including underreporting and variations in data quality and surveillance methods across countries and regions.

Fig. 2.2. Trends in COVID-19 cases and deaths among health care worker, globally, January 2020–April 2022



HCW: health care workers.
Source: WHO COVID-19 surveillance data base, accessible from https://covid19.who.int/more-resources.

The living systematic review by Chou and colleagues *(49)* on risk factors for SARS-CoV-2 among health workers found that higher infection rates in health workers were associated with unprotected exposures to COVID-19 patients. They were also a result of exposures to certain high-risk procedures, such as intubations and other aerosol generating procedures without the appropriate personal protective equipment (PPE), direct patient contact, or contact with bodily secretions *(49)*. This review found no differences between professional categories, sex or age, but higher rates were associated with Black, Hispanic and Asian race/ethnicity. Availability and correct use of PPE, hand hygiene and training in IPC were associated with decreased risk of SARS-CoV-2 infection, regardless of exposures *(49)*.

Additional information on exposure risk for SARS-CoV-2 infection among health workers comes from a WHO global multicentre case control study conducted in 94 facilities from 21 countries between August 2020 and December 2021, with the inclusion of 2959 health workers, monitored for SARS-CoV-2 serology and interviewed on their exposure risk and IPC knowledge (WHO, unpublished data).

The following risk factors associated with SARS-CoV-2 infection in health workers were identified through the interim multivariate analysis (WHO, unpublished data):

- exposure to COVID-19 patients with prolonged close contact (>15min within 1 metre);
- not always appropriately performing hand hygiene after close patient contact;
- exposure to personal items of COVID-19 patients;
- during prolonged exposures, not wearing a surgical mask or respirator appropriately; and
- during aerosol-generating procedures[1], not wearing a respirator appropriately.

What are the consequences of HAIs and AMR for patients and health workers?

The consequences of HAIs can be diverse and very serious, from requiring a prolonged stay in hospital, to long-term complications and disability, to premature death, not to mention the social and psychological repercussions resulting from suffering in the patient, family and communities. For the health system, the burden translates into added overload and costs (see Chapter 7).

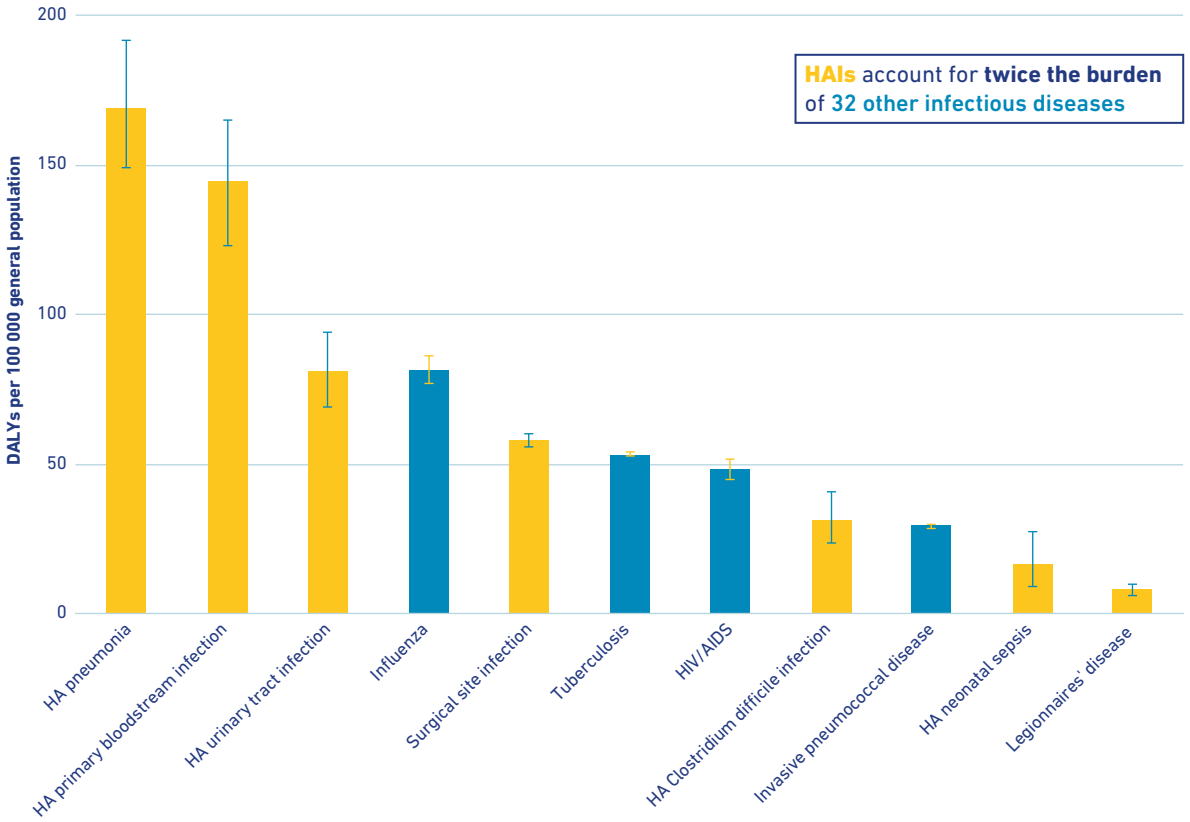
According to the WHO global report on sepsis, mortality among patients affected by health care-associated sepsis is 24.4%, with an increase to 52.3% among patients treated in ICUs *(26, 27)*.

According to a report on device-associated infections between 2003 and 2008 in 173 ICUs located in 25 countries in Africa, Asia, Europe and Latin America, crude excess mortality in adult patients for catheter-related urinary tract infections, BSIs, and ventilator-associated pneumonia was, respectively, 18.5%, 23.6%, and 29.3% *(52)*.

According to ECDC, in EU/EAA countries, the burden of the six most frequent HAIs in terms of disability and premature mortality (disability adjusted life-years (DALYs)) accounts for twice the burden of 32 other infectious diseases *(21)* (Fig. 2.3).

[1] The current WHO list of aerosol-generating procedures is as follows: tracheal intubation, non-invasive ventilation (e.g. BiLevel positive airway pressure, continuous positive airway pressure), tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, sputum induction by using nebulized hypertonic saline, dentistry and autopsy procedures.

Fig. 2.3. Comparing the burden of HAIs with other infectious diseases in EU/EEA (2011–2012)



DALYs: disability-adjusted life years, i.e. years of life lost to due to premature mortality and years lived with a disability resulting from HAIs; HA: hospital-acquired; HAIs: health care-associated infections; HIV/AIDS: human immunodeficiency virus/acquired immunodeficiency syndrome.
Source: *(21)*.

Antibiotic-resistant microorganisms are responsible for most of these infections. Some 75% of DALYs attributable to AMR in EU/EEA countries are a result of HAIs *(53, 54)*. The three most impactful antibiotic-resistant microorganisms determining 70% of the AMR burden are extended-spectrum beta-lactamase producing *E. coli*, MRSA and carbapenem-resistant *P. aeruginosa*.

Infections due to MRSA and microorganisms resistant to carbapenems have been associated with significantly increased morbidity and mortality and pose a serious threat, in particular in LMICs, where there may be a limited availability of antibiotics effective against these pathogens *(55-59)*.

Patients with infections due to MRSA have a significant increase in all-cause mortality, attributable mortality, septic shock, post-infection length of stay, discharge to long-term care for MRSA compared with meticillin-susceptible *S. aureus* (MSSA), and more than twofold risk increase for discharge to long-term care for MRSA compared with MSSA *(55)*.

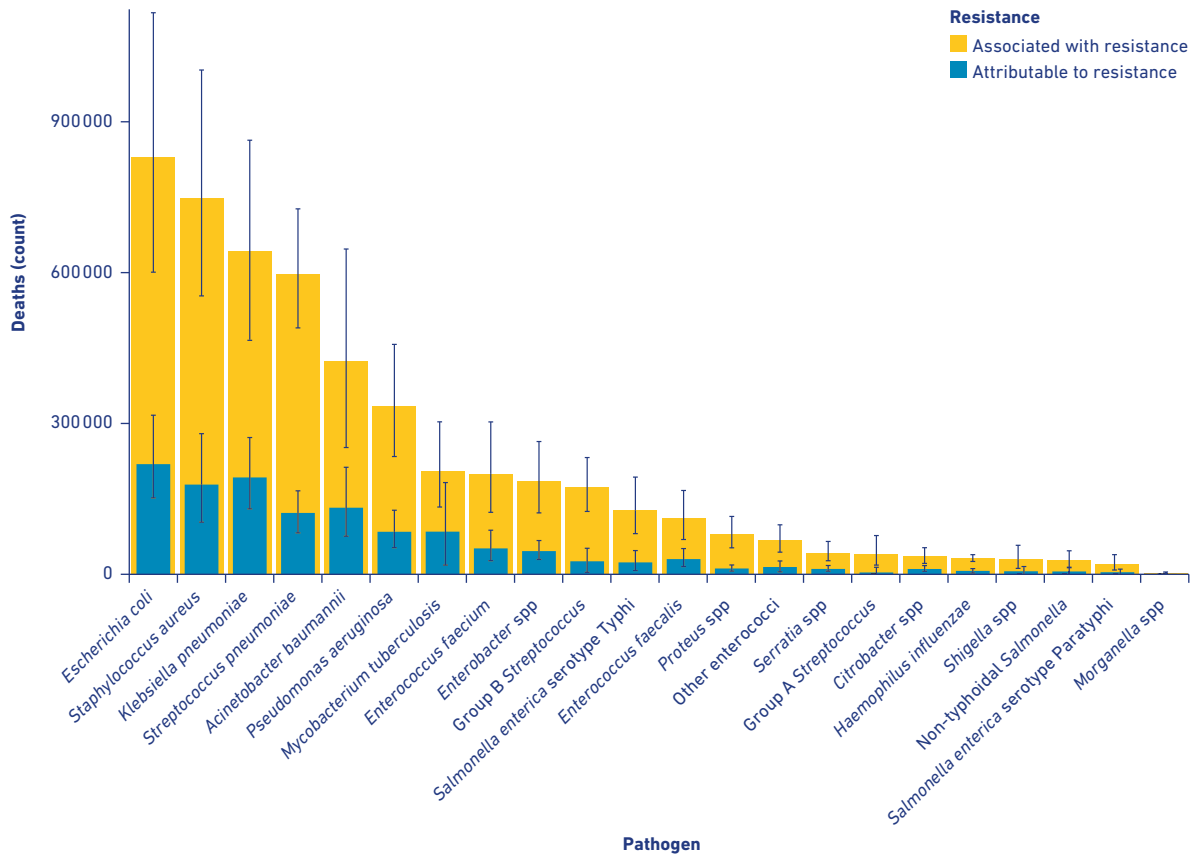
ECDC reported mortality ranging from 30% to 70% in patients with BSI caused by carbapenem-resistant Enterobacteriaceae *(56)*. In a multinational prospective cohort study in LMICs, patients with BSIs caused by carbapenem-resistant Enterobacteriaceae had significantly increased length of hospital stays and probability of in-hospital mortality, and decreased probability of being discharged alive *(57)*. One meta-analysis found that patients with BSI resulting from carbapenem-resistant *P. aeruginosa* were 3.07 times more likely to die than those with carbapenem-susceptible *P. aeruginosa* (95% CI 1.60–5.89) *(58)*. Another meta-analysis found a significant association between carbapenem

resistance and mortality among patients infected with *A. baumannii* (adjusted odds ratio: 2.49; 95% CI 1.61–3.84) *(59)*.

Between 2007 and 2015, the number of deaths attributable to infections with *K. pneumoniae* resistant to carbapenems increased sixfold. The number of deaths attributable to infections with third-generation cephalosporin-resistant *E. coli* increased fourfold *(54)*.

Finally, a recent landmark study reflected the burden of AMR as a leading cause of death globally with the highest impact in low-resource settings *(60)*. It estimated that, in 2019, the deaths associated with bacterial AMR were 4.95 million (95% UI 3.62–6.57), including 1.27 million (95% UI 0.91–1.71) deaths attributable to bacterial AMR, worldwide. The highest burden was in western sub-Saharan Africa, and the lowest in Australasia. Among the leading AMR pathogens responsible for this burden, five out of six were mainly health care-associated (Fig. 2.4).

Fig. 2.4. Global deaths (counts) attributable to and associated with bacterial antimicrobial resistance by infectious syndrome



Source: *(60)*.

CHAPTER 3.

IPC implementation at the national level

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Chapter 3. IPC implementation at the national level

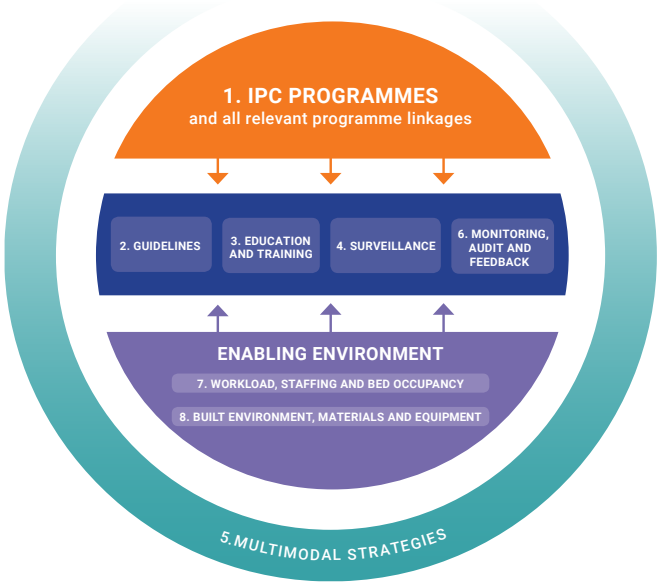
Key messages

- According to different self-assessments reported to WHO, in 2017–2018, 37.3% of countries on average did not have an IPC programme.
- In 2021, according to the system established to monitor the status of country progress towards the implementation of the AMR global action plan, 11% of countries still did not have an IPC programme or an operational plan whereas 54% of the countries reported having national IPC programmes or plans, but they were not being implemented, or implemented only in selected health facilities. Only 34% reported having an IPC programme implemented nationwide, and only 19% had a system to monitor its effectiveness and compliance with IPC practices.
- Compared with LICs, HICs were 8.29 times more likely to have a more advanced IPC implementation status; compared with upper-middle-income countries, they were 4.94 times more likely to have a more advanced IPC implementation status. Since the publication of the AMR Global Action Plan (GAP) in 2015 – in which IPC is part of Objective 3 – there has been little improvement in the implementation of IPC national programmes in LMICs.
- A detailed global survey on national IPC programmes carried out by WHO in 2021–2022, showed that an active IPC programme exists in 54.7% (58/106) of countries and only four out of 106 participating countries (3.8%) met all minimum requirements for IPC (none of these was a low- or lower-middle-income country).
- According to this survey, especially significant gaps are the lack of functioning IPC programmes with annual work plans and supported by a dedicated budget, the lack of support by the national level for IPC training roll-out and monitoring of its effectiveness, and limited expertise to conduct IPC monitoring.
- Despite some methodological limitations, comparing data from WHO national IPC global survey on national IPC programmes conducted in 62 countries in 2017–2018 and then again in 2021–2022, the following key findings emerge:
  - The percentage of countries having a national IPC programme remained relatively stable between 2017–2018 (64.5%) and 2021–2022 (61.3%). However, there has been a significant increase in the percentage of countries that have appointed at least a trained IPC focal point (21% vs 72.6%, $P<0.001$).
  - There was a significant increase in the proportion of countries having a dedicated budget for IPC between 2017–2018 (25.8%) and 2021-22 (48.4%; $P=0.02$).
  - The percentage of countries having an in-service IPC curriculum significantly increased, from 58.1% to 85.5% ($P=0.003$). However, in 2021–2022 only 41.5% of the countries reported that they were able to provide support for these training activities.
- In 2021–22, 75% of the countries reported that multimodal improvement strategies (MMIS) which are considered the gold standard for IPC interventions, are included in national IPC guidelines and IPC education and training as the best implementation approach. A similar percentage of countries stated that the national IPC focal point is responsible for the coordination of support for interventions aimed at improving IPC at the facility level.
- Across all surveys and data sets, there is a significant positive association between the income level of a country and the implementation of IPC at the national level.

National infection prevention and control programmes and dedicated budget

In order to help prevent HAIs and combat the spread AMR in health care, in 2016 WHO, in collaboration with partners and key players at country level, developed global recommendations on the core components of effective IPC programmes. Altogether, 11 recommendations and three good-practice statements were included in a new WHO IPC guidelines *(2)*. Six core components are recommended at the national level *(2, 5, 61, 62)*; these core components also apply at the facility level, along with an additional two core components, making eight in total *(2, 4, 62)* (see Fig. 3.1).

Fig. 3.1: The eight core components of IPC programmes



IPC: infection prevention and control.
Source: *(2)*.

Having an active IPC programme at the national level is a core component in the WHO recommendations, and a minimum requirement for IPC *(3)*. This should include, as a minimum, a full-time focal point trained in IPC and a dedicated budget for carrying out IPC strategies/plans.

The core components for IPC at the national level state that countries should implement "active, stand-alone, national IPC programmes with clearly defined objectives, functions and activities" for the purpose of preventing HAI and combating AMR through IPC good practices *(2, 5)*. National IPC programmes should be linked with other relevant national programmes and professional organizations *(2, 5)* particularly in setting national strategic direction on quality health services. As a minimum requirement to ensure the basic implementation level of IPC across the country and the safety of those accessing or working in the health care system, a functional IPC programme must be in place. This should include at least a full-time focal point trained in IPC and a dedicated budget for carrying out IPC strategies/plans *(3)*.

Various assessments undertaken in recent years evaluated IPC programmes and their core components. These were done in the context of the WHO global IPC programme, and as a part of the implementation monitoring of the international health regulations (IHR) and the global action plan to combat AMR.

2017–2018

According to WHO's voluntary global 2017–2018 survey of IPC implementation at the national level *(63)* (Box 3.1), national IPC programmes with an appointed technical team or focal person existed in only 55 of the 88 countries surveyed (62.5% (95% CI 52.4–72.6)). Clear variations existed across income levels, although they were not significant, with such programmes available in 70% (95% CI 53.6–86.4) of HICs and 45% (95% CI 23.2–66.8) of LICs *(63)*. Significant geographical differences were observed with a lower frequency of national IPC programmes in Africa (46.2%; 12/26; 95% CI 26.9–65.3) and the Eastern Mediterranean (58.3%; 7/12; 95% CI 30.4–86.2) (P<0.01). In this survey, only 26.1% (23/88; 95% CI 16.9–35.3) of the countries reported having a national budget dedicated to IPC activities and only one of these was a low-income country *(63)*.

Box 3.1. Methods of the 2017–2018 WHO global survey of IPC implementation at national level

The survey was based on semi-structured interviews with national focal points for IPC in 88 of the 140 countries that signed the First Global Patient Safety Challenge "Clean Care is Safer Care" *(64)*, representing 45.3% of WHO's 194 Member States.

Information about the existence of an IPC programme at the national level and its implementation at facility level is also provided by the IHR monitoring and evaluation framework *(65)* (Box 3.2).

Box 3.2. The IHR monitoring and evaluation framework

The IHR monitoring and evaluation framework *(65)* was developed to support the oversight and implementation of the IHR – in other words, a country's ability to develop and maintain core public health capacities. This framework consists of four complementary components: one mandatory (the State Party Self-Assessment Annual Reporting (SPAR) *(66)* tool) and three voluntary (the joint external evaluation (JEE) tool *(67)*, after-action reviews, and simulation exercises).

- The JEE tool *(67)* is a voluntary and external evaluation tool based on 49 indicators applied within 19 technical areas. Each technical area is given a level of capacity from 1 to 5 based on their review and available documentation for each specific technical area. IPC is defined as a core indicator under the AMR capacity.
- The SPAR tool *(66)* is a mandatory annual assessment based on 24 indicators across 13 International Health Regulation capacities. For each indicator, the reporting State Party is asked to select which of the five levels best describes the State Party's current status. In the SPAR tool, IPC was included, until 2021, in the same indicator as that for the capacity for chemical and radiation decontamination. It has become a stand-alone capacity indicator in the revised version of the SPAR tool that will be used from 2022 onwards.

According to the JEE reports, in 2017, 32.5% (13/40, 95% CI 17.3–47.7) of the countries had no national plans for IPC (WHO, unpublished data). This was consistent with the data of the previously mentioned WHO global national IPC survey conducted in in 2017–2018 when the figure was 41.7% (10/24, 95% CI 20.4–62.9) *(63)*. All of these were LMICs – predominantly LICs and lower-middle-income countries, and almost all of them in the African Region.

Also consistent with the 2017–18 WHO global national IPC survey *(63)*, the JEE reports showed that a country's capacity for IPC seemed in large part related to its income level. Most LMICs were at level 1 or 2 ("limited or no capacity"), while high-income countries achieved level 3 or above ("demonstrated or sustainable capacity"). However, given that enrolment of countries in JEE exercises is on voluntary basis, the data cannot show the full global scope of countries' capacities. Furthermore, according to the SPAR assessments, in the three years 2018/2019/2020, IPC capacity was significantly associated with national income levels. LICs and lower-middle-income countries showed lower IPC capacity levels than upper-middle-income countries and HICs. This was also true of WHO regions, with the African Region generally showing the lowest capacity levels.

National action plans to combat AMR are an opportunity for IPC implementation.

The third main objective of the WHO AMR GAP is to reduce the incidence of infection through effective hygiene and infection prevention *(68)*. As part of assessing the progress towards achieving these objectives, the WHO 2017–2018 global national IPC survey asked whether IPC was part of the AMR national action plan (NAP) *(63)*. Reassuringly, most participating countries (53/88, 60.2% (95% CI 50–70.5)) stated that IPC was part of their NAPs. However, the rate was significantly higher in HICs (24/30; 80% (95% CI 65.7–94.3)) than in LICs (6/20; 30% (95% CI 11.9–54.3)).

Since its inception in 2016, the Tripartite AMR Country Self-assessment Survey (TrACSS) has included a specific indicator on the status and implementation of national IPC programmes (indicator 8.1, Box 3.3) *(69)*.

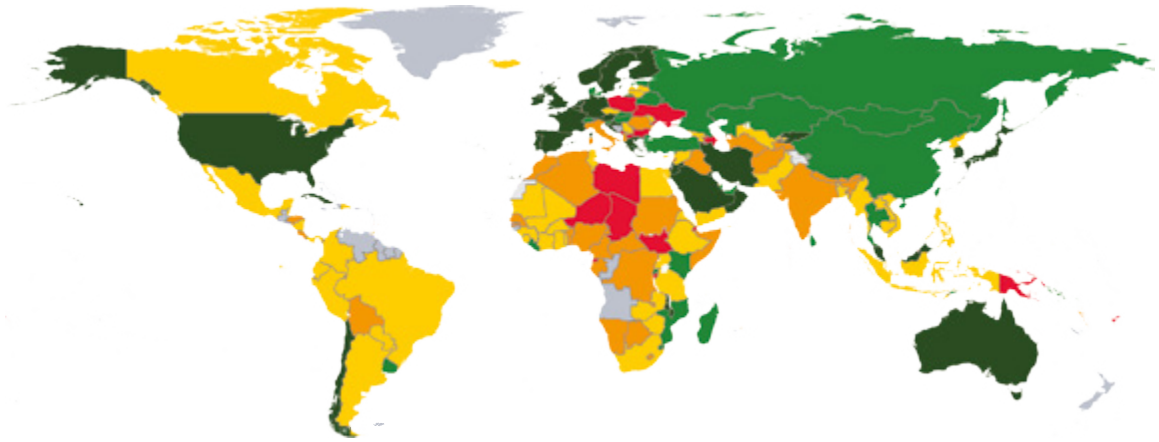
Box 3.3. Methods of the 2017-2018 WHO global survey of IPC implementation at national level

- A. No national IPC programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and WASH and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.

Source: *(69)*.

The distribution of countries across the five TrACSS levels according to the latest survey in 2020–2021 can be seen in the map (Fig. 3.2) *(69)*.

Fig. 3.2. Country map according to 2020–2021 TrACSS results (indicator 8.1)

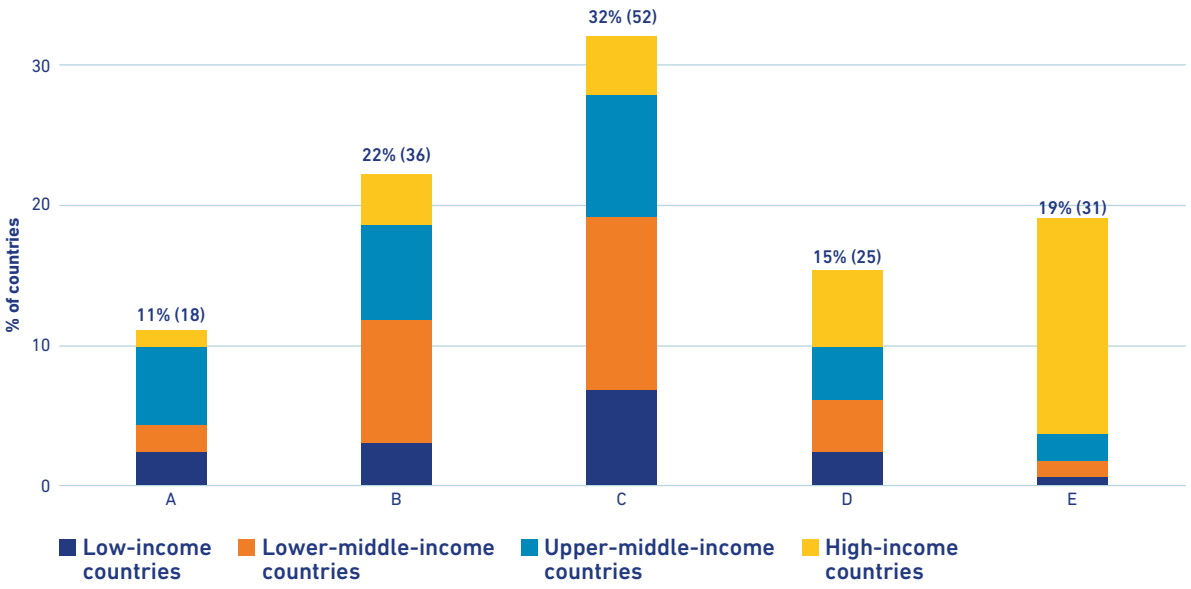


- A. No national infection prevention and control (IPC) programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Source: *(69)*.

In 2020–2021, 11% of countries still did not have an IPC programme or an operational plan (Figs. 3.2 and 3.3, A) and 54% of the countries reported having national IPC programmes or plans that were not being implemented, or that were being implemented only in selected health facilities (Figs. 3.2 and 3.3, B and C). Only 34% reported having an IPC programme implemented nationwide (Figs. 3.2 and 3.3, D and E), and only 19% of these had a system to monitor its effectiveness and compliance (Figs. 3.2 and 3.3, E).

Fig. 3.3. 2020–2021 TrACSS results for status and implementation of national IPC programmes by World Bank income level



Percentages of total countries (*N*=162) and numbers, by level.
Source: *(69)*.

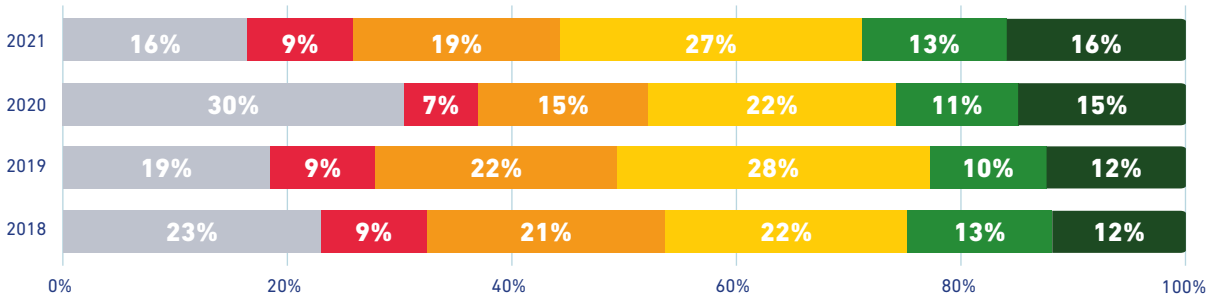
Looking at the 2020–2021 TrACSS results from the perspective of country levels of income, Fig. 3.3 shows that most HICs have an IPC programme fully in line with the WHO core components, including their implementation and monitoring (level E), whereas only one low-income country has such an IPC programme.

Through TrACSS, it is possible to explore the temporal trends of country responses to the IPC indicator. Looking at the last four-year period, from 2018 to 2021, when the indicator was always the same, there seem to be no substantial improvements in IPC globally, apart from modest increases of the number of countries in categories C and E (Fig. 3.4).

The following principal conclusions can be drawn from the analysis of the TrACSS results regarding IPC programme implementation by country income level over four years Add (WHO, unpublished data) (Fig. 3.4):

- Across all survey years, there was a significant positive association between the income level of a country and its likelihood of participating in the survey.
- Across all survey years, there was a significant association between the income level of a country and the implementation of IPC at the national level: the higher the income level, the higher the chances for the country to answer C, D or E in the TrACSS survey.
- For example, compared with low-income countries, high-income countries were 8.29 times more likely (95% CI 4.34–15.8) to have a more advanced IPC implementation status; compared with upper-middle-income countries, they were 4.94 more likely (95% CI 2.52–9.68) to have a more advanced IPC implementation status.
- Across the years assessed, the only significant statistical association indicating IPC improvement (i.e. moving from A to E) was observed for HICs progressing from levels D to E. Countries at other income levels did not improve their IPC implementation significantly since the start of monitoring of the implementation of the AMR GAP.

Fig. 3.4. IPC programmes levels according to TrACSS results from 2018 to 2021



A. No national IPC programme or operational plan is available.

B. A national IPC programme or operational plan is available. National IPC and WASH and environmental health standards exist but are not fully implemented.

C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.

D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.

E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.

No response.

Numbers are percentages of countries (*N*=194) answering A to E for that year of survey.
Source: *(69)*.

The above-mentioned data from SPAR and TrACSS provide a high-level overview of the situation of national IPC programmes in recent years (2020 for SPAR and 2020–2021 for TrACSS).

A more detailed recent analysis of the situation of implementation of the core components of IPC programmes is now available from the results of a WHO global survey on the IPC minimum requirements at the national level conducted in 2021–2022 (Box 3.4).

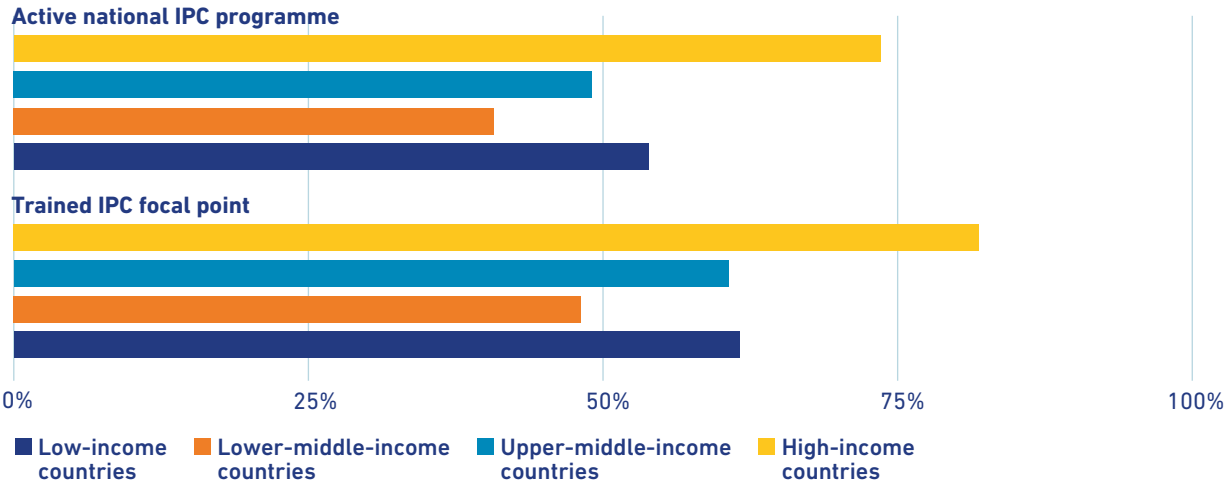
Box 3.4. Methods of the 2021–2022 WHO global survey on the IPC minimum requirements at the national level

This is a self-assessment survey carried out between 28 July and 10 December 2021, completed by IPC national focal points or other officials at the ministry level. It was submitted to WHO through the Global IPC Portal, a platform that supports situation analysis, tracking progress and making improvements to IPC programmes. The responses were based on the completion of the assessment tool of the minimum requirements for infection prevention and control programmes at the national level *(70)*.

In the survey of IPC implementation conducted at the national level in 2021–2022, a total of 106 countries participated, including 13 low-, 27 lower-middle, 33 upper-middle and 33 high-income countries. Overall, 54.7% (95% CI 45.1–64.3) of countries reported having an active national IPC programme (defined as a functioning programme with at least one IPC trained focal point, annual work plans and budget). Significant differences were found regarding this indicator across income levels, with a significantly higher proportion of HICs having an active national IPC programme compared with LMICs (Fig. 3.5). A slightly higher proportion (64.2%, 95% CI 54.9–73.4) had at least a national trained IPC focal point with dedicated time to support the programme. This means that

45.3% of the countries either did not have an IPC programme at all or had a programme that was not active (WHO, unpublished data). Some countries may have a national focal point but not a programme.

Fig. 3.5. IPC programmes levels according to TrACSS results from 2018 to 2021



IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

A comparison can be made with the results of the WHO 2017-2018 global survey *(63)* regarding some specific key indicators for 62 countries[2] which participated in both surveys.

Although the proportion of countries having a national IPC programme in 2021 has remained similar overall (61.3% versus 64.5% in 2017–2018), there was a significant increase in countries that appointed a trained IPC focal point (21% vs 72.6%, $P<0.001$) (WHO, unpublished data). This suggests that some countries have rapidly appointed an IPC focal point to cope with the COVID-19 pandemic situation, without as yet being able to set up a proper national IPC programme.

National IPC programmes must include a dedicated budget to be effective.

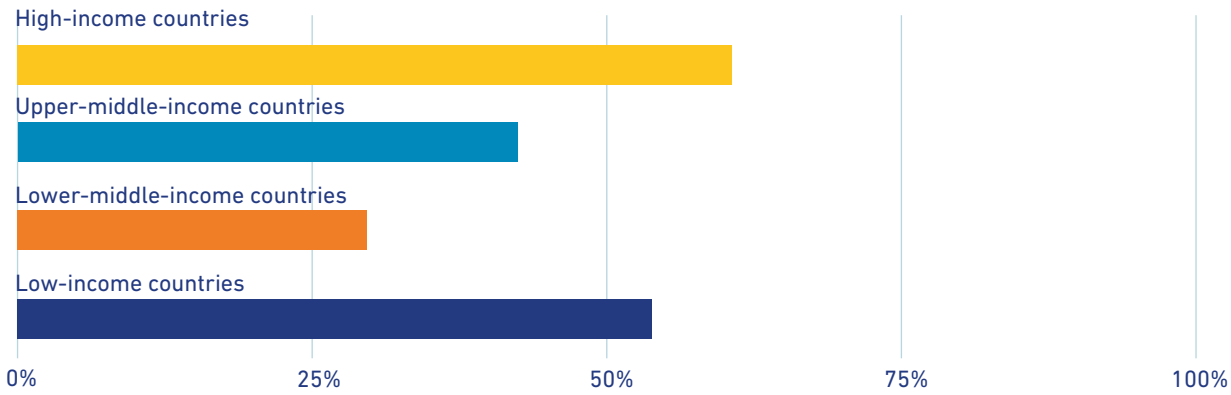
Active, stand-alone, national IPC programmes require a sustainable and dedicated budget to enable action and planned activities. The 2017–2018 global survey on national IPC programme implementation found that only a quarter of the countries surveyed had a dedicated budget for IPC (23/88; 26.1% (95% CI 17–35.3) *(63)*. A high proportion of respondents in the African and Eastern Mediterranean regions stated that there was no dedicated budget for the implementation of IPC programmes in their countries. Access to a dedicated budget was significantly higher in HICs than in LICs (50% ((95% CI 32.1–67.8) versus 5% (95% CI 0–14.5)) *(63)*.

Among countries having a dedicated budget for IPC, in 2017–2018 most responded that it was dedicated to: HAI surveillance (19/23), national guidelines production (18/23), carrying out the programme (17/23), IPC training and education (17/23), and monitoring and audit of IPC (14/23). Fewer countries responded that a budget had been assured for multimodal strategies used to implement IPC interventions (10/23), the built environment, materials and equipment at facility level (10/23), and workload, staffing, and bed occupancy (3/23) *(63)*.

[2] Afghanistan, Argentina, Bahrain, Benin, Bolivia (Plurinational State of), Brazil, Bulgaria, Burkina Faso, Burundi, Cameroon, Chad, Chile, China, Côte d'Ivoire, Denmark, Ecuador, Ethiopia, Finland, Georgia, Germany, Ghana, Guinea, Guyana, Iran (Islamic Republic of), Iraq, Italy, Jamaica, Jordan, Kenya, Kuwait, Kyrgyzstan, Liberia, Malawi, Malaysia, Malta, Mauritania, Mexico, Netherlands, Nicaragua, Nigeria, Norway, Oman, Panama, Paraguay, Peru, Philippines, Qatar, Republic of Moldova, Saudi Arabia, Serbia, Singapore, Spain, Sudan, Suriname, Sweden, Thailand, Trinidad and Tobago, Tunisia, Uganda, United Arab Emirates, United States of America, and Zimbabwe.

According to the recent 2021–2022 WHO global survey on national IPC minimum requirements, 46.2% (95% CI 36.6–55.9) of the countries reported that they had a protected and dedicated budget according to planned activities for IPC, with no significant differences across levels of income (Fig. 3.6) (WHO, unpublished data).

Fig. 3.6. Percentage of countries with a protected and dedicated budget for IPC, according to level of income



Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Comparing the results of the 2017–2018 *(63)* and the 2021–22 WHO global national IPC surveys for 62 countries, a significant increase in the proportion of countries having a dedicated IPC budget (48.4% in 2021, compared with only 25.8% of countries in 2017–2018 (P=0.02)) emerges (WHO, unpublished data). This might indicate that increased attention and prioritization was being given to IPC. It is likely that, in the context of the COVID-19 pandemic, budgets were dedicated to training and PPE procurement. While these improvements are undoubtedly remarkable, they need to be sustained. This will require strengthening actions in the near future.

The fact that only around one quarter of participating countries responded that the national IPC team was able to use a protected and dedicated budget clearly points to the need to ramp up funding to ensure that IPC programmes are effective. Moreover, there seems to be a need to ensure a budget is available for enabling factors at the health care facility level, such as the built environment, materials, equipment, workload, staffing, and bed occupancy. It is possible, however, that these elements are a part of other budget expenditures, which are not directly attributed to the national IPC team.

In addition, it would be important to understand and support the process used in the development of budget plans for IPC. What are the essential considerations to be made for the development of an IPC budget, and what should be the dimensions of an IPC budget at the national and at facility level, also depending on the level of care? It is also important to carefully consider how national IPC programmes are integrated with national strategic direction-setting on quality of care and services.

Implementation of IPC guidelines, training and education, monitoring, audit, feedback, and HAI surveillance

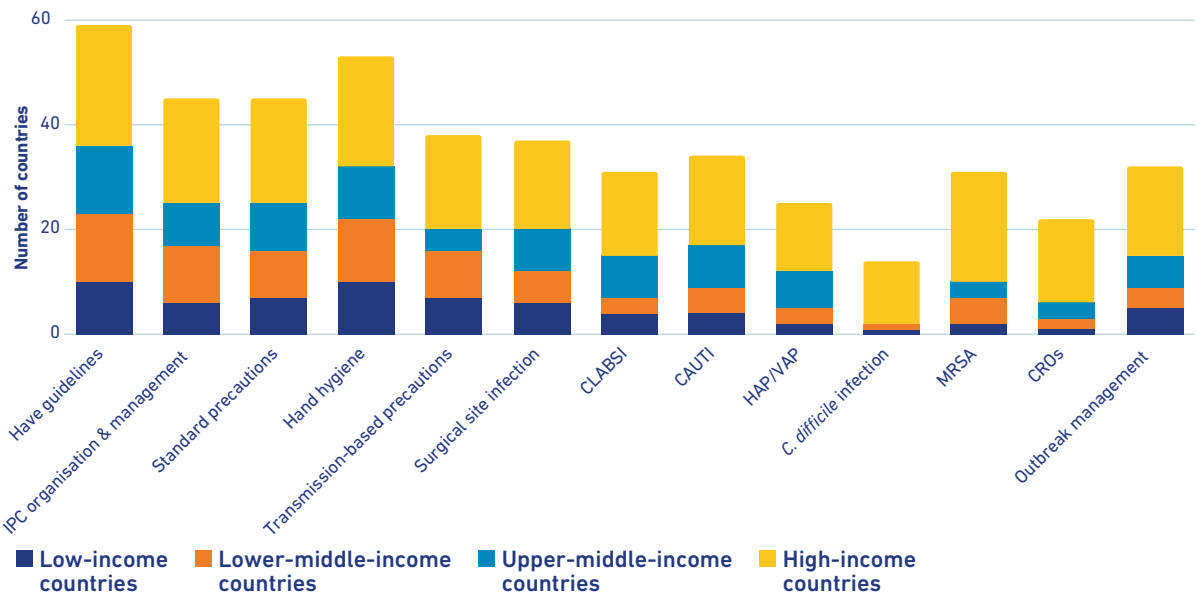
Guidelines are necessary to set standards and inform IPC training, implementation, and monitoring.

All countries should develop, make available and implement a set of evidence-based guidelines to reduce the burden of HAIs and AMR *(2, 5)*.

As a minimum, countries should have evidence-based, ministry-approved national IPC guidelines adapted to the local context and reviewed at least every five years *(3)*.

According to the WHO 2017–2018 global survey *(63)*, approximately two-thirds of countries (59/88; 67% (95% CI 57.2–76.8) stated that they had national IPC guidelines available. A greater proportion of these were in HICs (23/30; 76.7% (95% CI 61.5–91.8)), although this was not significantly greater than LICs (10/20; 50% (95% CI 28.1–71.9)). Most countries that reported having IPC guidelines had specific guidelines for hand hygiene; slightly fewer also had guidelines for standard IPC precautions and IPC organization and management. HICs consistently had more guidelines than countries at other income levels (see Fig. 3.7).

Fig. 3.7. Availability of general and specific IPC guidelines, according to World Bank income level classification of countries (2017–2018)



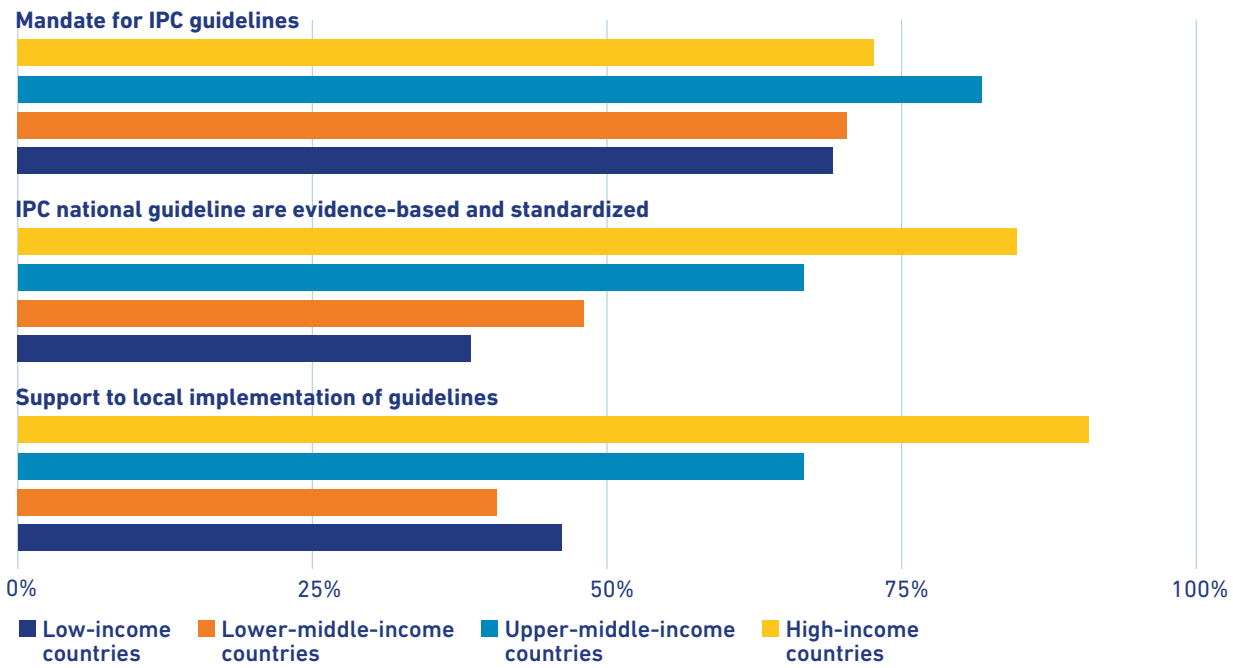
Total number of countries: 88. CLABSI: central-line-associated bloodstream infection; CAUTI: catheter-associated urinary tract infection; HAP: hospital-acquired pneumonia; VAP: ventilator-associated pneumonia; MRSA: meticillin-resistant *Staphylococcus aureus*; CRO: carbapenem-resistant Enterobacterales and/or *Acinetobacter baumannii* and/or *Pseudomonas aeruginosa*.
Source: *(63)*.

The numbers of countries reporting specific guidelines targeting priority pathogens and infections recommended by WHO *(71)*, were as follows: guidelines for MRSA were available in 52.5% of countries, for multidrug-resistant gram-negative organisms in 37.3%, and for *Clostridium difficile* in 23.7%. However, only 12/59 countries (20% (95% CI 10.1–30.6)) reported having guidelines for all these WHO priority pathogens: 10 were HICs, one was a LMIC, and one was a LIC *(63)*.

Standardized and evidence-based IPC guidelines developed or endorsed by the Ministry of Health are the critical starting point for achieving best IPC practices at the point of care, but the value of having them is completely jeopardized if there are no implementation and monitoring plans. According to the 2017–2018 global survey *(63)*, only 36.4% (32/88; 95% CI 27.1–46.8) of countries had a guideline implementation strategy and only 21.6% (19/88; 95% CI 14.3–31.3) had a system for their compliance evaluation.

The most recent data from the 2021–2022 global survey on IPC minimum requirements at the national level (see Box 3.4) show that, while 74.5% (95% CI 66.1–83) of countries state that the national IPC programme has a mandate to produce IPC guidelines, fewer countries report that they actually have evidence-based, standardized national IPC guidelines and that they engage in actions to support implementation and local adaptation, with significantly lower likelihood among LMICs compared with HICs (Fig. 3.8) (WHO, unpublished data).

Fig. 3.8. Percentage of countries (*N*=106) with key IPC minimum requirements for IPC guidelines in place, by income level



IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

The comparative analysis between the WHO 2017–2018 *(63)* and 2021–2022 surveys showed that, while 72.6% of countries reported that they had national IPC guidelines in 2017–2018, 82.3% of countries stated that the national IPC programme had the mandate to produce IPC guidelines in 2021–2022 (WHO, unpublished data). This seems to indicate that no major progress has been made, although this comparison has the limitation that the indicator used in the two surveys was slightly different.

IPC training and education are needed for effective implementation of IPC guidelines and standard operating procedures.

The WHO recommendations on national IPC guidelines include a critical point about the need for health care workers' practical training on the recommended IPC practices, coordinated by the national IPC programme or focal point *(2, 5)*.

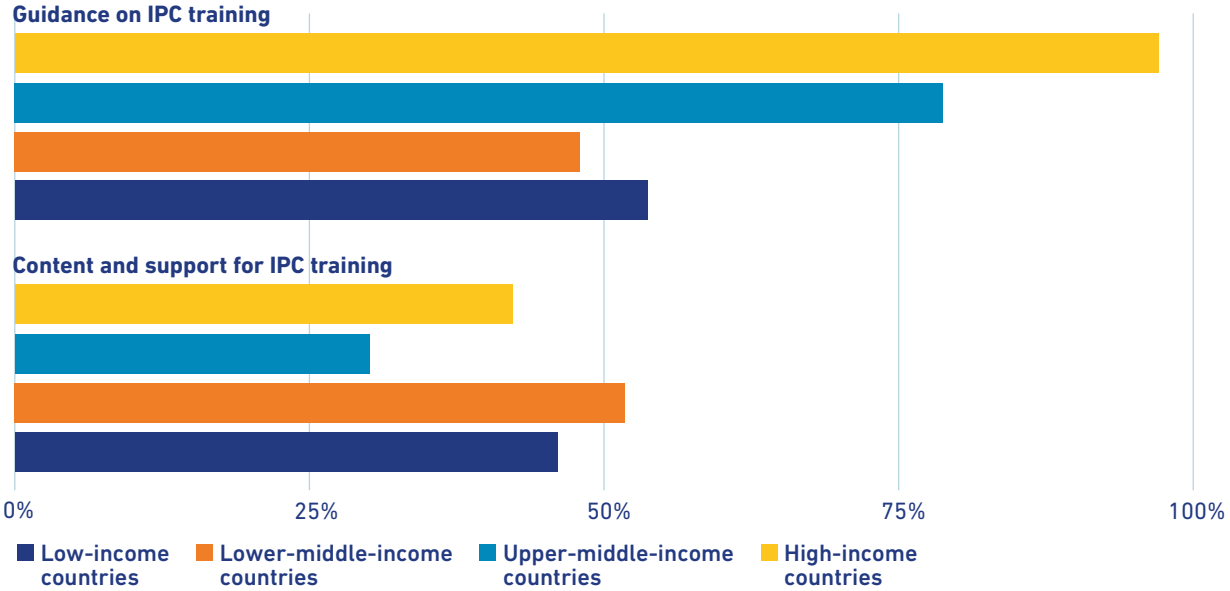
At a minimum, countries should set a national policy requiring all health workers to undergo in-service practical IPC training according to a curriculum aligned with national guidelines, and should evaluate the effectiveness of training *(3)*.

In the 2017–2018 survey *(63)*, 54.5% of countries (95% CI 44.1–64.9) reported having in-service IPC training *(63)*. Even fewer countries provided training at undergraduate level (35.2% (95% CI 25.2–45.2) and postgraduate level (42.1% (95% CI 31.8–52.4)). A small proportion of countries (20/88; 22.7% (95% CI 14–31.5)) reported having all three types of training (i.e. pre-graduate, in-service, and post-graduate training), with a significant difference across national income levels: 12/20 of the countries (60% (95% CI 38.5–81.5)) were at high-income level versus one country that was at low-income level.

In an additional WHO survey conducted at the facility level in 2019, the core component of IPC programmes that scored the lowest across 4440 health care facilities from 81 countries (see Part 4) *(72)* was IPC education and training.

The most recent data from the 2021–2022 WHO global survey on IPC minimum requirements at the national level show that, while around three-quarters of the countries provide recommendations for in-service IPC training at the facility level and have developed the related curriculum, only 41.5% of countries (95% CI 32–51) provide content and support for these training activities (Fig. 3.9). Furthermore, a minority of countries (28.3%; 95% CI 19.6–37) across all levels of income have a national system for monitoring the effectiveness of IPC training and education at least annually.

Fig. 3.9. Percentage of countries (*N*=106) with key IPC minimum requirements for training and education in place, by income level



IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

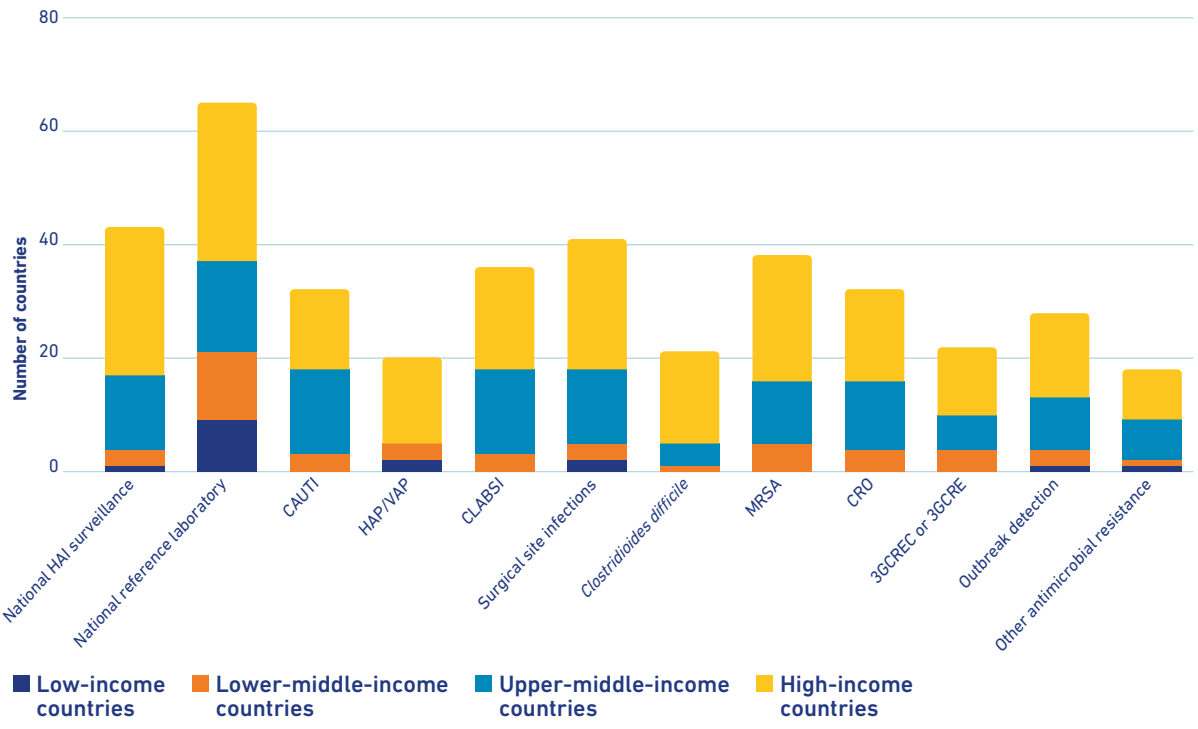
In the comparative analysis between the WHO 2017–2018 *(63)* and 2021–2022 surveys (62 countries), the proportion of countries having an in-service IPC curriculum significantly increased

from 58.1% in 2017–2018 to 85.5% in 2021–2022 (*P*=0.003). Considering that IPC training was the core component with the average lowest score in the facility level 2019 WHO IPC global survey *(72)* (see Chapter 4), it is a sign of remarkable progress to find countries increasingly adopting a systematic approach such as developing a curriculum to improve the knowledge of front-line staff. However, as mentioned above, the 2021–2022 survey also reveals that action by the national IPC programme to provide training at the facility level is still limited, although it may be the case that this mandate is being delegated to the subnational (i.e. district) level, or to the facility management.

Surveillance of HAI is critical to inform and guide IPC strategies.

The vast majority of countries with a national HAI surveillance system included at least one of the following types of HAI: catheter-associated urinary tract infection, hospital-acquired/ventilator-associated pneumonia, central-line-associated BSI or surgical site infections (37/41; 90.2% (95% CI 81.2–96.1)) (Fig. 3.10). Similarly, most countries with a national surveillance system included at least one WHO priority AMR/susceptibility pattern (35/41; 85.4% (95% CI 71.6–96.2)). However, just over half of the countries with a national HAI surveillance system included outbreak detection (23/41; 56.1% (95% CI 40.9–71.3)) (Fig. 3.10).

Fig. 3.10. HAI surveillance, by country and World Bank income level in 2017–18

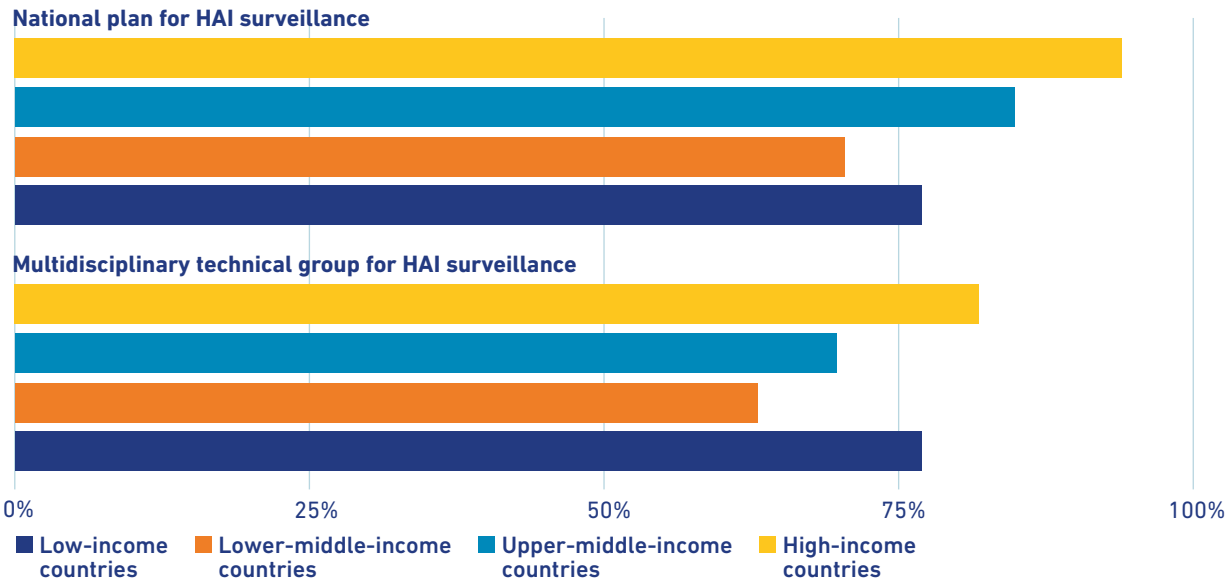


Total number of countries: 88. 3GCREC: third-generation cephalosporin-resistant *Escherichia coli*; 3GCRE: third-generation cephalosporin-resistant Enterobacteriales; CAUTI: catheter-associated urinary tract infection; CLABSI: central-line-associated bloodstream infection; CRO: carbapenem-resistant Enterobacterales and/or *Acinetobacter baumannii* and/or *Pseudomonas aeruginosa*; HAP: hospital-acquired pneumonia; MRSA: meticillin-resistant *Staphylococcus aureus*; VAP: ventilator-associated pneumonia.
Source: *(63)*.

The 2021–2022 global survey on IPC minimum requirements at the national level (Box 3.3) inquired only about the existence of a national strategic plan for HAI surveillance. It showed that the great majority of the countries have one (83%; (95% CI 75.8–90.3)), with no major significant differences by income level. Expertise and a multidisciplinary technical group for HAI surveillance are available at the national level in almost three-quarters of the countries (Fig. 3.11) (WHO, unpublished data).

These data are not comparable to the WHO 2017–2018 global survey (see Box 3.1), where the indicator was to actually have an HAI surveillance system in place and not just a plan; however, some progress may have been made, given the high proportion of countries (83%) having a plan for HAI surveillance.

Fig. 3.11. Percentage of countries (*N*=106) with key IPC minimum requirements for HAI surveillance in place, by income level



HAI: health care-associated infection.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

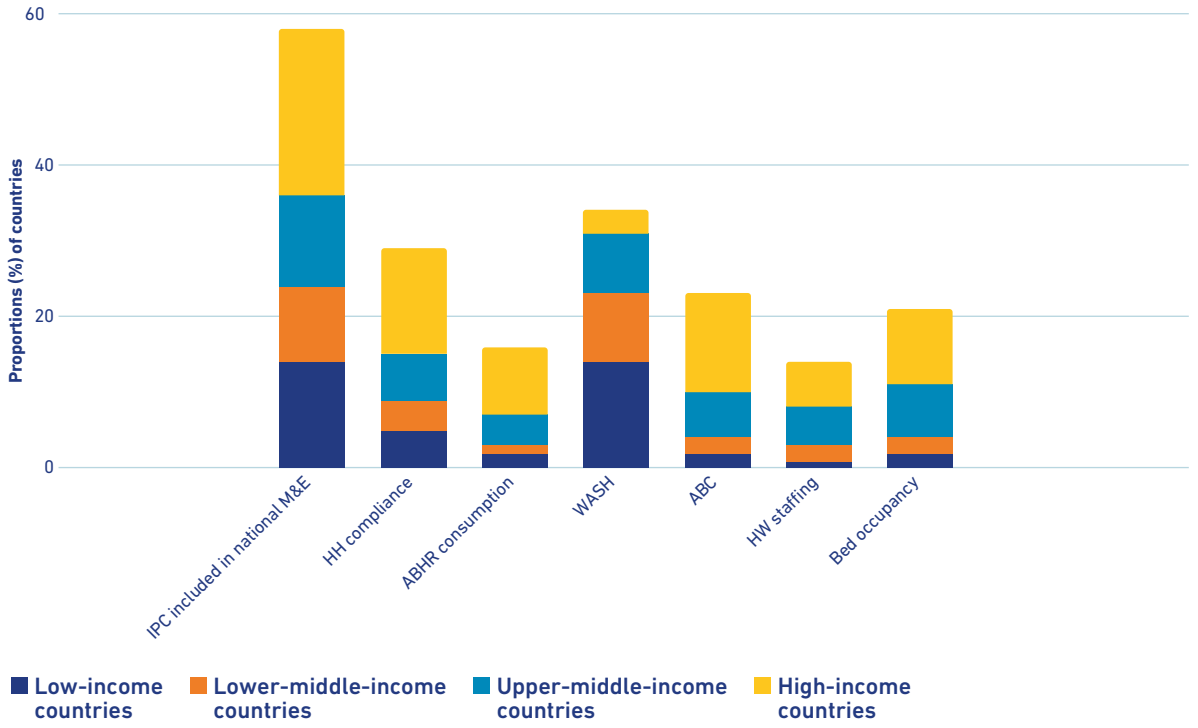
Documenting the progress and impact of IPC implementation: monitoring of IPC practices and feedback.

Another component that is critical to inform IPC strategies and action is monitoring and providing feedback on key indicators of IPC processes, infrastructure and practices. Undertaking these assessments is relatively simpler and more affordable than conducting HAI surveillance. As part of these efforts, appropriate hand-hygiene monitoring with feedback is strongly recommended by WHO as a key performance indicator at the national level and as an IPC minimum requirement at the facility level *(2, 3, 5)*. The monitoring and auditing efforts should be matched by training on ways to collect the data, including an integrated system for the collection, analysis and feedback of data.

In 2017–2018, it was reported that IPC-related indicators were monitored in 65.9% of the countries (58/88; (95% CI 56.0–75.8)) (Fig. 3.12) *(63)*. Of these, 37.9% were classified as high income (22/58; (95% CI 25.4–50.4)) and 24.1% as low income (14/58; (95% CI 12.1–35.2). Half of the 58 countries (29/58; (95% CI 37.5–62.9)) included regular (at least annual) monitoring of hand hygiene compliance, which is a WHO minimum requirement. Around half of these were in HICs (14/29; 48.3% (95% CI 30.1–66.5)). Significantly fewer were in LICs (5/29; 17.2% (95% CI 7.60–34.5)).

No participating country had all of the IPC-related indicators included in their national monitoring and evaluation efforts. Indicators monitored more often included hand hygiene compliance (see above), water and sanitation systems (58.6%; 34/58), antibiotic consumption (39.7%; 23/58), bed occupancy (36.2%; 21/58), alcohol-based handrub consumption (27.6%; 16/58), and health care worker staffing levels (24.1%; 14/58) (Fig. 3.12).

Fig. 3.12 Monitoring of IPC practices, by country and World Bank income level in 2017–2018



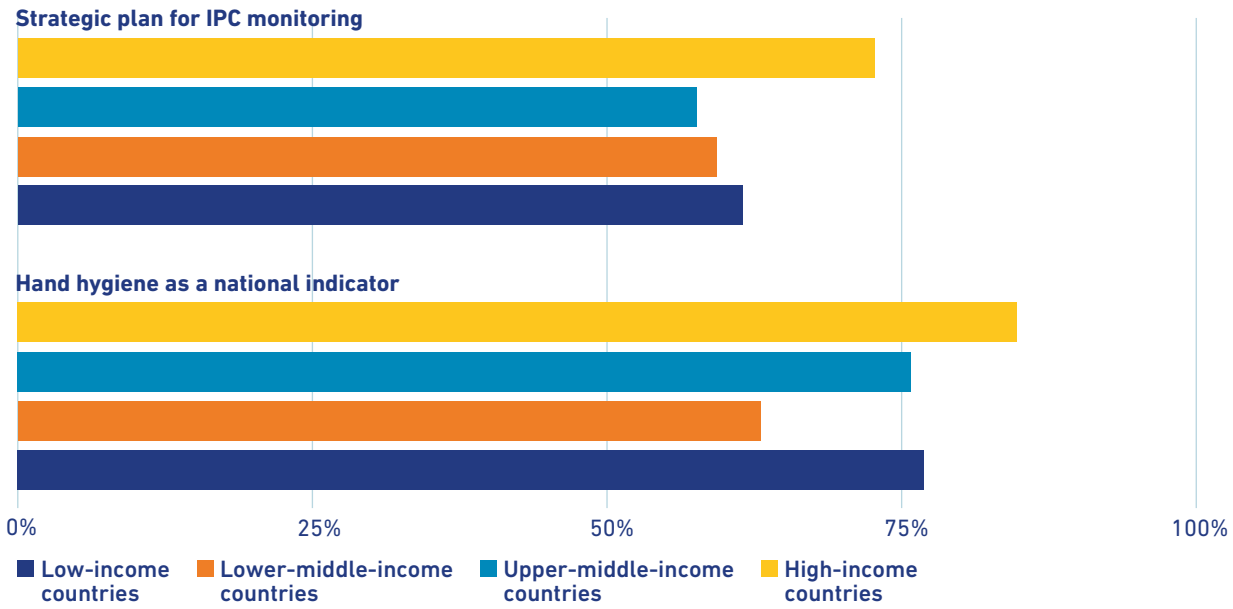
Total number of countries: 88. ABC: antibiotic consumption; HH: hand hygiene; ABHR: alcohol-based handrub; WASH: water, sanitation and hygiene; HW: health worker.
Source: *(63)*.

Most countries collecting IPC indicators for WASH were categorised as being low- or lower-middle-income. This might be because donor funding is often conditional on the monitoring and evaluation of WASH interventions. The lower rates of monitoring and evaluation in HICs could be a result of many countries having standards embedded in their regulations for health care facilities.

The results of the 2021–2022 WHO global survey on IPC minimum requirements at the national level (Box 3.3) show that, overall, 75.5% of countries (95% CI 67.1–83.8) reported having a strategic plan for IPC monitoring, including an integrated system for data collection and analysis. Furthermore, 81.1% (95% CI 73.6–88.7) of countries have a minimal set of core IPC indicators for health care facilities (WHO, unpublished data). However, in a lower number of countries (63.2%; 95% CI 53.9–72.5), hand hygiene compliance monitoring and feedback was identified as a key national indicator at the very least for reference hospitals (WHO, unpublished data). No significant differences across levels of income have been observed for IPC monitoring and evaluation (WHO, unpublished data) (Fig. 3.13).

Similar to those for HAI surveillance, these data are not comparable to those collected in the WHO 2017–2018 global survey *(63)*. In the latter, the indicator was "to have an IPC monitoring system in place" whereas the minimum requirement assessed in 2021–2022 was "having at least a strategic plan for IPC monitoring". However, the high proportion of countries (75.5%, 95% CI 67.1–83.8) stating that they have a strategic plan for IPC monitoring, will likely include many that have the system for it in place. Comparing countries that participated in both WHO surveys, in 2017–2018, only 30.6% of countries reported that hand hygiene was monitored, while in 2021–2022, hand hygiene compliance monitoring and feedback was identified as a key national indicator – at the very least for reference hospitals – in 64.5% of countries (P<0.001) (WHO, unpublished data).

Fig. 3.13. Percentage of countries (*N*=106) with key IPC minimum requirements for IPC monitoring and evaluation in place, by income level



IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Adoption of the multimodal approach to IPC implementation

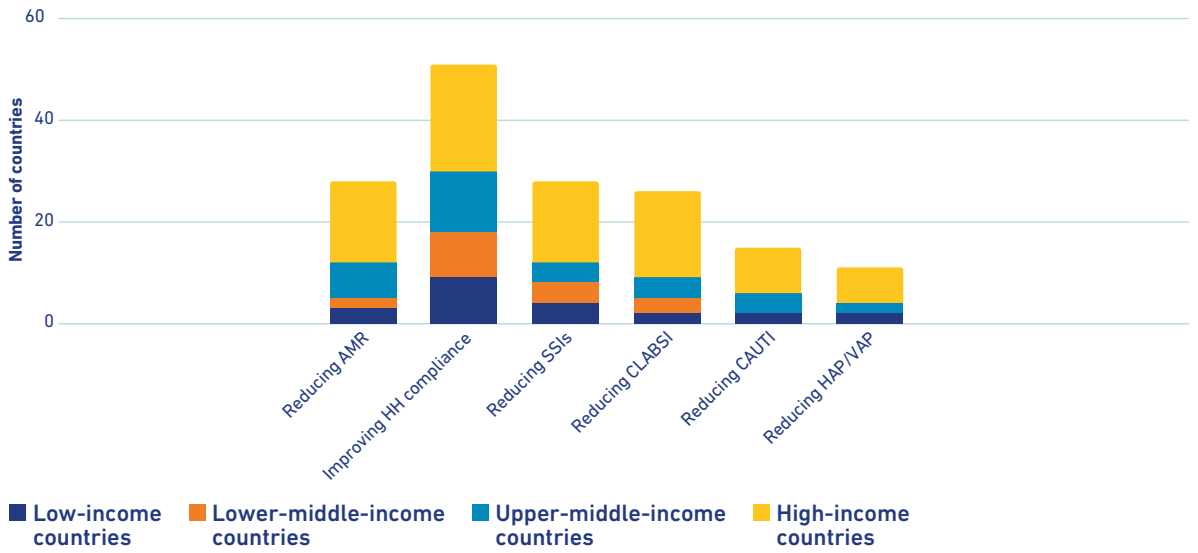
Multimodal improvement strategies (MMIS) are a range of activities that target different influencers of human behaviour (see Part 8 for more detailed explanations) (see Chapter 8) *(2, 5)*. Scientific evidence indicates that **MMIS are the most effective way to implement hand hygiene and other IPC interventions** *(61, 62, 73, 74)*.

Therefore, WHO strongly recommends that MMIS should be supported and coordinated by national IPC programmes and implemented at the facility level *(2, 5)*. As a minimum requirement, they should be used to implement standard and additional precautions in health care facilities, according to the level of care *(3)*.

Around half of the countries responding to the WHO 2017–2018 global survey *(63)* stated that IPC activities were implemented through MMIS (52.3%, 46/88 (95% CI 41.8–62.7)). Of these countries, 41.3% (19/46; (95% CI 27.1–55.5)) were classified as HICs, while 17.4% (8/46; (95% CI 6.44–28.3)) were LICs. All of the 46 countries reporting that they supported and coordinated MMIS indicated that these were applied to hand hygiene interventions. Other outcomes targeted were related to reducing surgical site infections (28/46; 60.9% (95% CI 46.8–75.0)), AMR (26/46; 56.5% (95% CI 42.2–70.8)), reducing central line-associated BSI (25/46; 54.3% (95% CI 40.0–68.7)), reducing catheter-associated urinary tract infection (15/46; 32.6% (95% CI 19.1–46.2)) and reducing hospital-acquired pneumonia/ventilator-associated pneumonia (11/46; 23.9% (95% CI 11.6–36.2)) (Fig. 3.14).

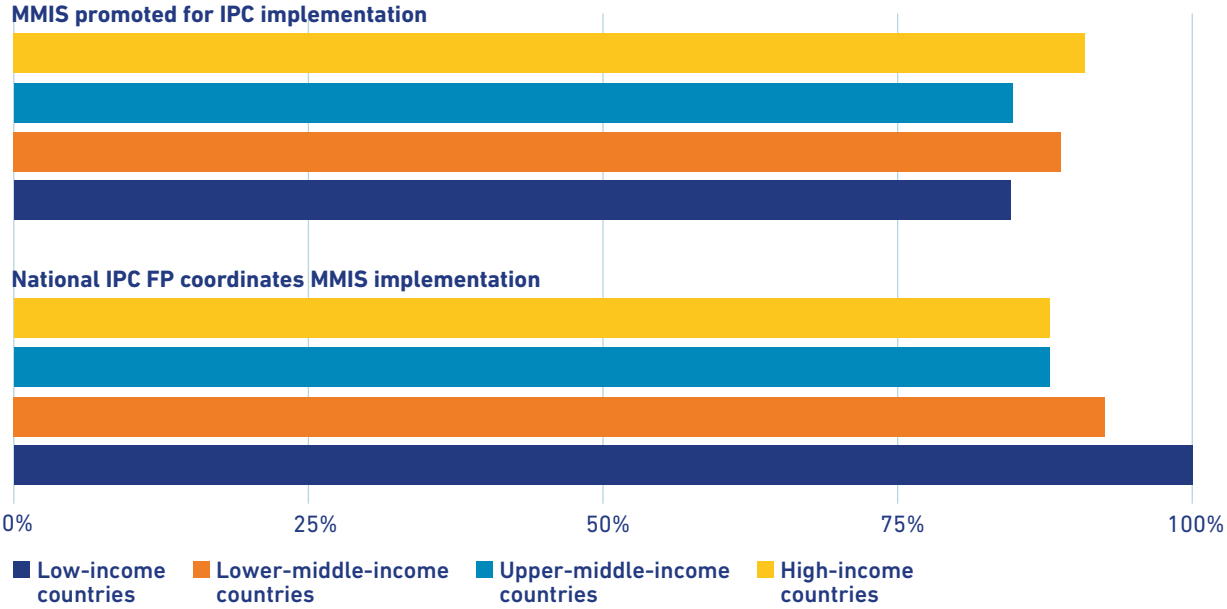
According to the 2021–2022 global survey on IPC minimum requirements at the national level, the situation seems to have improved significantly. Indeed, 87.7% (95% CI: 81.4–94.1) of responding countries reported that MMIS are included as the best implementation approach in national IPC guidelines and IPC education and training. A similar percentage of countries stated that the national IPC focal point coordinates support for local implementation of IPC improvement interventions (Fig. 3.15). However, a lower proportion of countries (66%; 95% CI 56.9–75.2) indicated that the national IPC focal point has knowledge of implementation science and MMIS and their application to IPC (WHO, unpublished data).

Fig. 3.14. IPC outcomes targeted by multimodal improvement strategies, by country World Bank income level, in 2017–2018



Total number of countries: 88. AMR: antimicrobial resistance; HH: hand hygiene; SSI: surgical site infections; CLABSI: central-line-associated bloodstream infection; CAUTI: catheter-associated urinary tract infection; HAP: hospital-acquired pneumonia; VAP: ventilator-associated pneumonia.
Source: *(63)*.

Fig. 3.15. Proportion of countries (*N*=106) with key IPC minimum requirements for MMIS in place, by income level



FP: focal point; IPC: infection prevention and control; MMIS: multimodal improvement strategies.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

CHAPTER 4.

IPC implementation at the health care facility level

Chapter 4. IPC implementation at the health care facility level

Key messages

- A voluntary global survey carried out by WHO in 2019 of 4440 health care facilities in 81 countries across all six WHO regions and all World Bank income levels provided a snapshot of the implementation of IPC core components in health care facilities just before the COVID-19 pandemic.
- The level of implementation of IPC core components ranged from "inadequate" to "advanced", with significantly lower scores in low-income and lower-middle-income countries compared with HICs. LICs scored at a "basic" level of IPC implementation on average.
- HICs had more-developed IPC in place for all core components, while lower-income countries had notably poor implementation of IPC guidelines, training and education, monitoring, audit, feedback and HAI surveillance.
- At the facility level, IPC minimum requirements must be in place to provide at least the minimum protection and safety to patients, health workers and visitors. The 2019 survey showed that only 15.2% of participating facilities met all indicators designated as WHO IPC minimum requirements; whereas 92.9% met at least half of these indicators. No facility in any LIC had all the IPC minimum requirements in place, and only 19.0% of tertiary specialized health care facilities in HICs had implemented all of them.
- Even where IPC programmes are in place, they are often not able to function appropriately and sustainably in an enabling environment. In 2019, IPC programmes existed in almost all secondary and tertiary health care facilities. However, particularly in LMICs, the facilities lacked full-time IPC professionals, an allocated IPC budget, routine microbiological laboratory support, and appropriate workload, staffing and bed occupancy.
- Despite the surge in response to the COVID-19 pandemic, not all essential IPC human resources, supplies and products are available after two years into the pandemic. There continues to be a shortage of PPE, and the creation of a COVID-19-safe environments (i.e. a dedicated entrance for screening, a separate room for a suspected COVID-19 patient, etc.) is still suboptimal in some countries.
- The lack, or limited availability, of PPE was confirmed in WHO pulse surveys carried out in 2020 and 2021 on continuity of essential health services during the COVID-19 pandemic. The lack of IPC supplies and poor application of best practices were shown to be major reasons for the disruption of essential health services in 44% of countries in 2020 and 26% of countries in 2021.
- The 2020 global report on WASH in health care provided a striking picture: 1.8 billion people were using health care facilities that lacked basic water services and 800 million people were using facilities with no toilets. And yet implementing WASH services in health care facilities would require relatively modest investments (US$ 6.5 billion to US$ 9.6 billion until 2030).

Implementation of the IPC core components

The IPC core components mentioned for the national level also apply in health care facilities. This is generally supported by a broader and/or stronger body of scientific evidence *(2, 61, 62, 74)*. The first six core components are the same at facility level as those at the national level, with adaptations and differentiation according to the type of care provided (from tertiary to primary care). At the facility level, two additional core components are recommended by WHO which are critical to ensure that adequate staffing, infrastructure and supplies support appropriate IPC practices. Specific IPC minimum requirements also exist to ensure the basic implementation of IPC according to the type of health care facility *(3)* (see Chapter 8).

A global survey conducted by WHO in 2019 just before the COVID-19 pandemic started, provided a snapshot on the implementation of the IPC core components in 4440 health care facilities in 81 countries across all six WHO regions and all World Bank income levels *(72)* (Box 4.1).

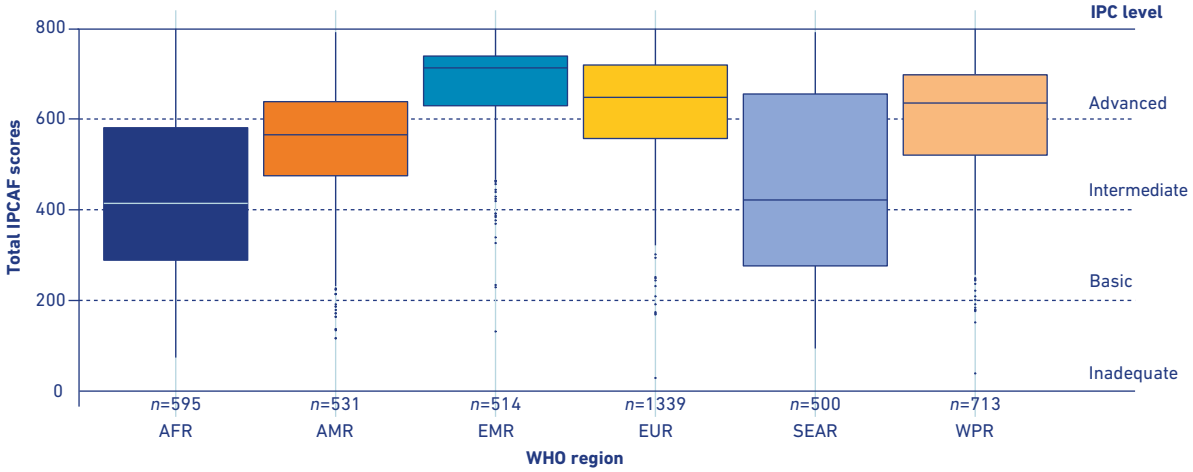
Box 4.1. Instrument and scoring system for the 2019 WHO global survey

The survey was based on the IPC Assessment Framework (IPCAF) *(72, 75)* for health care facilities. This is a structured self-administered validated tool that assesses a detailed list of 81 indicators related to the IPC core components. It provides an overall and by-component scoring system ranging from 0 to 800 and determining facility allocation to four different levels, from "inadequate" to "advanced".

Implementation of IPC core components ranged from "inadequate" to "advanced", with a total weighted IPCAF median score of 605 (IQR: 450.4–705), corresponding to the lower range of the "advanced" level. However, as it is likely that participating facilities had a specific commitment to improving IPC, this could have led to an overestimation of the IPCAF scores.

In the 2019 global survey *(72)*, a large number of health care facilities participated from all regions, although there were considerable differences in participation between regions (with 1339 health care facilities participating in the WHO European Region and 500 health care facilities participating in the WHO South-East Asia Region). Large differences were also noted in scores within each region, indicating different levels of progress in IPC (Fig. 4.1). This probably reflects once again the disparities in resources available. Facilities from the WHO Eastern Mediterranean Region scored the highest, closely followed by the WHO European and Western Pacific Regions. Results from the WHO Eastern Mediterranean Region were significantly higher than those from the WHO African Region (Fig. 4.1).

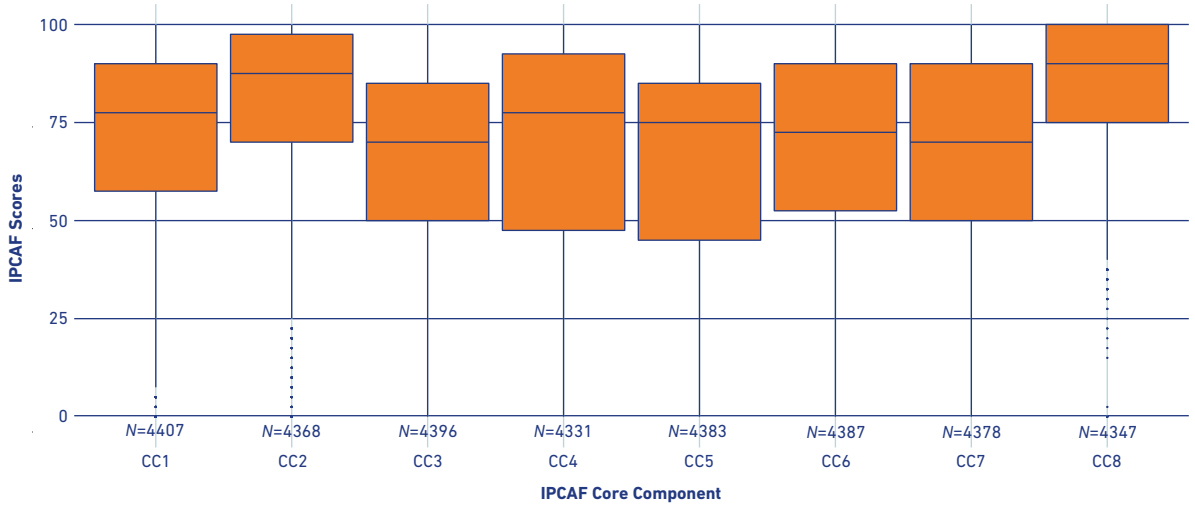
Fig. 4.1. IPCAF weighted scores, by WHO region, 2019



Total number of health care facilities=4192. IPCAF: infection prevention and control assessment framework; IPC: infection prevention and control. WHO regions; AFR: African Region; AMR: Region of the Americas; SEAR: South-East Asia Region; EMR: Eastern Mediterranean Region; EUR: European Region; WPR: Western Pacific Region.
Source: 2019 WHO global survey on IPC programmes at the facility level *(72)*.

No significant differences were reported in the scoring of the implementation of each core component. The highest scores were for the Core Components 8 on the "built environment, materials and equipment for IPC", and 2 on "IPC guidelines" (Fig. 4.2). The lowest scores were for the Core Components 7 on "workload, staffing and bed occupancy", and 3 on "IPC education and training". The largest differences between low- and high-income countries were for Core Component 4 on "HAI surveillance" and 6 on "monitoring, audit of IPC practices and feedback", both of which require more expertise, time and investments to be implemented – which are less available in settings with limited resources *(72)*.

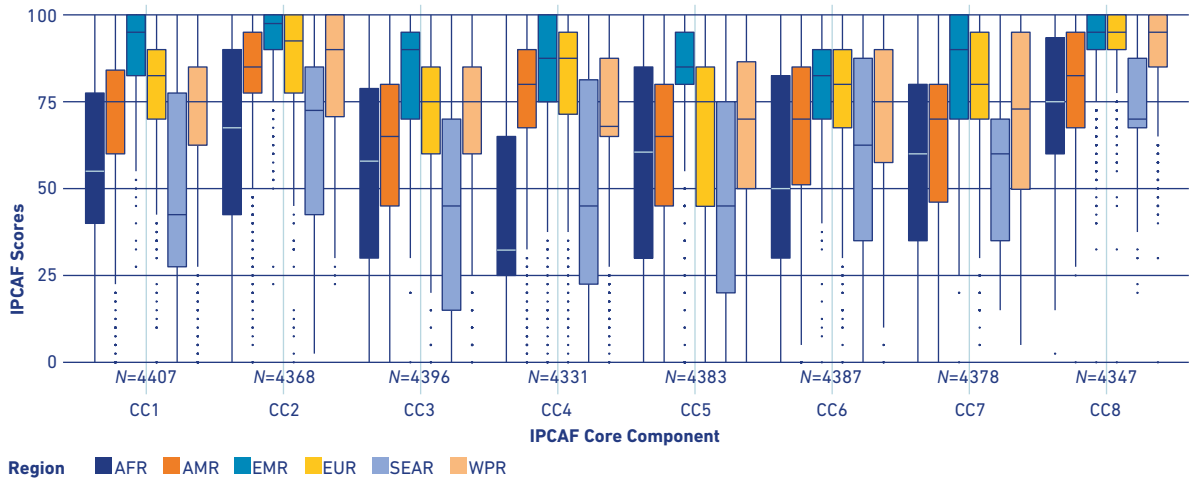
Fig. 4.2. IPCAF weighted overall core component-specific scores, 2019



Includes all facilities that completed the survey for each core component.
CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: MMIS for implementing IPC activities; CC6: IPC monitoring, audit and feedback; CC7: Workload, staffing and bed occupancy at the facility level; CC8: Built environment, materials and equipment for IPC; IPCAF: infection prevention and control assessment framework; IPC: infection prevention and control.
Source: 2019 WHO global survey on IPC programmes at the facility level *(72)*.

The African and South-East Asia Regions consistently scored lower than other regions for all IPC core components (Fig. 4.3).

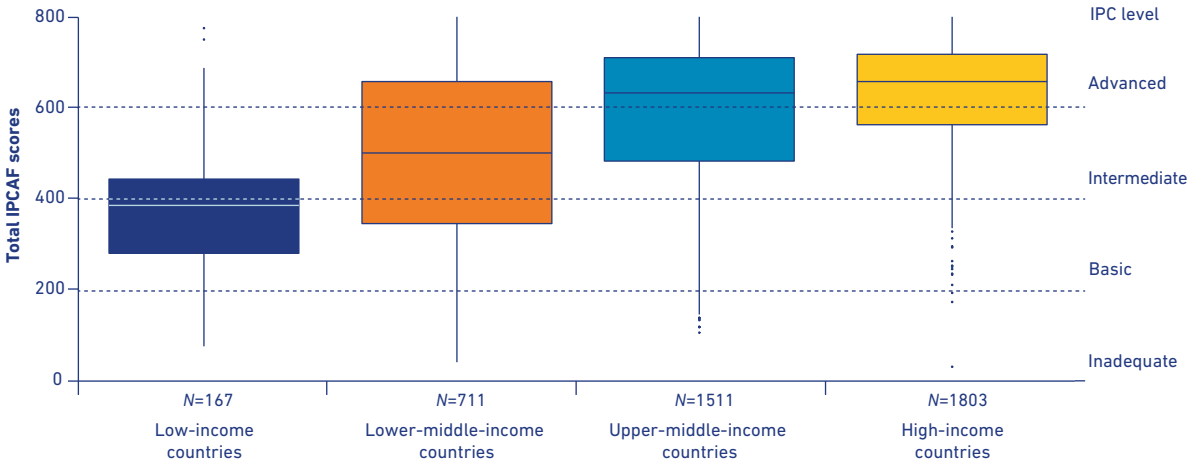
Fig. 4.3. IPCAF weighted core component scores, by WHO Region, 2019



CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: MMIS for implementing IPC activities; CC6: IPC monitoring, audit and feedback; CC7: Workload, staffing and bed occupancy at the facility level; CC8: Built environment, materials and equipment for IPC; IPCAF: infection prevention and control assessment framework. WHO regions: AFR: African Region; AMR: Region of the Americas; SEAR: South-East Asia Region; EUR: European Region; EMR: Eastern Mediterranean Region; WPR: Western Pacific Region.
Source: 2019 WHO global survey on IPC programmes at the facility level *(72)*.

Similar to results obtained at the national level (see Chapter 3) the overall IPCAF score varied according to income level. Compared with HICs, significant differences were found in LICs, which scored at a "basic" level of IPC implementation on average and 229.6 points lower, and lower-middle-income countries, which scored at intermediate level and 80.1 points lower *(72)* (Fig. 4.4).

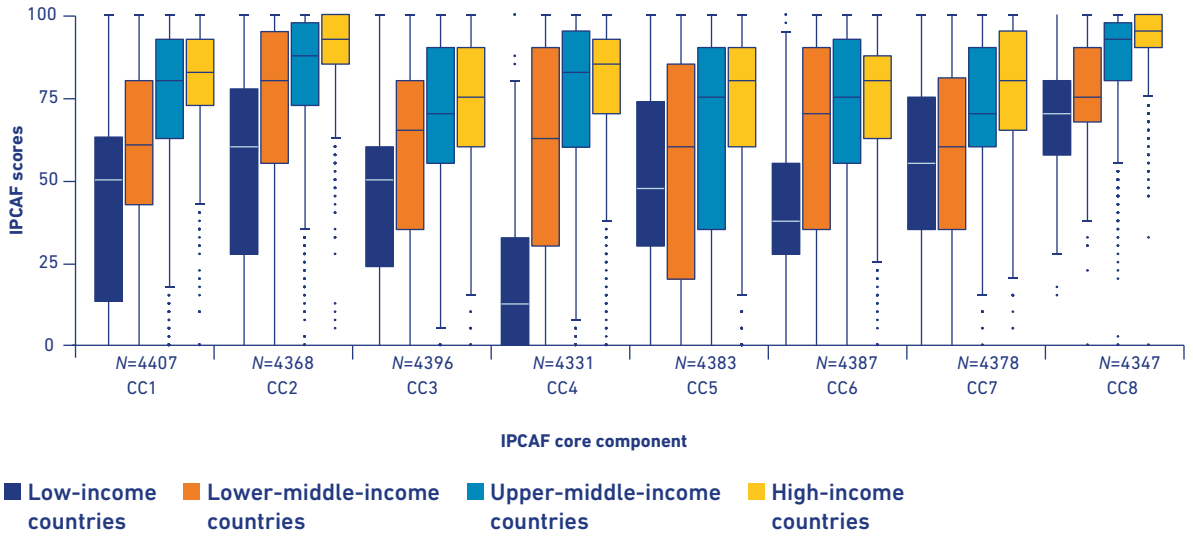
Fig. 4.4. IPCAF weighted overall scores, by World Bank income levels of participating countries, 2019



IPCAF: infection prevention and control assessment framework; IPC: infection prevention and control.
Source: *(72)*.

A consistent direct proportionality between specific core components scores and the country income level was also observed (Fig. 4.5).

Fig. 4.5. IPCAF weighted core component-specific scores, by World Bank income level of participating countries, 2019



IPCAF: infection prevention and control assessment; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: MMIS for implementing IPC activities; CC6: IPC monitoring, audit and feedback; CC7: Workload, staffing and bed occupancy at the facility level; CC8: Built environment, materials and equipment for IPC.
Source: 2019 WHO global survey on IPC programmes at the facility level *(72)*.

A significantly higher total IPCAF score was associated with tertiary care facilities (71.6 points higher, 95% CI: 20.4–122.8) compared with primary care facilities *(72)*.

The implementation of the WHO IPC minimum requirements at the facility level (defined as the IPC standards that should be in place at the national and facility level to provide minimum protection and safety to patients, health workers and visitors *(3)*), were also assessed during the 2019 IPCAF global survey *(72)*.

Among health care facilities with fully completed responses (*N*=3873), only 15.2% met all IPC minimum requirements. None of these facilities were in LICs.

However, the situation in HICs was not much better: all IPC minimum requirements were met by only 25.6% of primary care facilities, 9.0% of secondary health care facilities, and a staggeringly low 19.0% of tertiary care facilities. However, 92.9% of all participating facilities met at least half of the minimum requirements *(72)*.

IPC programme, human resources and built environment

During the IPCAF 2019 global survey *(72)*, Core Component 8, on the "built environment, materials and equipment for IPC", scored the highest (90; IQR 75–100) (Fig. 4.5). However, in the same survey, Core Component 7, on "workload, staffing and bed occupancy", which is closely related as an enabler of IPC, scored the lowest (70; IQR: 50–90). No significant differences across income levels were seen for this core component.

Core Component 1, on having an IPC programme, scored between 72.5% and 77.5%. In this, there were clear differences reported between LMICs and HICs (Fig. 4.5), although they were not statistically significant.

Overall IPCAF scores were significantly lower in LICs compared with HICs.

By extrapolating the IPCAF indicators that are specifically related to the IPC minimum requirements, almost all secondary and tertiary health care facilities (98.4%) reported the presence of an IPC programme. However, the functionality or activeness of such programmes greatly varied by income level, with fewer facilities in LICs than in HICs having access to a full-time IPC professional (13.8% vs. 74.7%), an allocated IPC budget (15.5% vs 73.4%) and routine microbiological laboratory support (42.2% vs. 96.4%) *(72)*.

These are striking findings, indicating that IPC programmes were mostly not enabled to function in LICs, since IPC expertise and staffing, as well as financial support, are essential to drive and sustain action.

Furthermore, only 59.4% of all facilities with completed surveys for the Core Component 7, on "workload, staffing and bed occupancy", reported adequate spacing between patient beds, while 62.6% had a system in place to respond to staffing needs *(72)*.

A good built environment is essential to support health workers in performing and adhering to IPC best practices and to enable safe patient care delivery and optimal quality of care.

Over 80% of facilities in HICs, at all care levels, met all built environment minimum requirements for Core Component 8. Fewer health care facilities in LICs reported that they had functioning hand hygiene stations at all points of care (24%), functioning toilets or latrines (53.6%), an energy/power supply (55.2%), continuously available water services (67.71%) and PPE (53.8%) *(72)*.

These discouraging findings were reported in 2019, just before the beginnings of the COVID-19 pandemic. While it might have been expected that the shocking situation and high pressure to improve outbreak readiness and response would lead to a substantial improvement, this was unfortunately not the case everywhere.

Recent assessments of current IPC and surge capacities for COVID-19 in hospitals and primary care facilities were carried out in 10 countries in the African Region[3] in 2021. Data were collected between July and December 2021 using a suite of WHO's frontline service readiness assessments *(76–78)*. The results showed that it is more likely that an IPC focal point can be found in hospitals than in primary care facilities (89% vs 65%) (WHO, unpublished data). Essential IPC supplies and products (i.e. liquid soap, hand sanitizer, biohazard bags, safety boxes, and body bags) were generally available, although almost half of hospitals do not have all five items (WHO, unpublished data).

There continues to be a shortage of PPE required to provide care to COVID-19 patients (surgical masks, respirators, gloves, face shields, goggles and gowns), with only 20% of primary facilities and 27% of hospitals having all items available for staff (WHO, unpublished data).

Additionally, implementation of a COVID-19-safe environment (i.e. dedicated entrance for screening, separated room for a suspect COVID-19 patient, etc.) is in place in about one quarter of primary care facilities and about one third of hospitals (WHO, unpublished data).

Although these very recent data collected by WHO refer to only a limited number of countries, the situation they depict is alarming because it indicates that major gaps still exist in IPC implementation even in COVID-19 facilities, despite the lessons learned from the pandemic and the increased attention and resources invested in IPC.

Furthermore, the lack, or limited availability, of PPE was also confirmed in two WHO pulse surveys on continuity of essential health services during the COVID-19 pandemic *(79, 80)*. In these surveys, conducted in 2020 and repeated in 2021, 43% and 26% of countries, respectively, cited the lack of IPC supplies and poor application of best practices as major reasons for the disruption of essential health services. This highlights the impact of defective IPC implementation, not only on the capacity to respond to COVID-19 directly, but also across the health system.

WASH minimum requirements are an essential part of the built environment necessary to support the implementation of IPC practices in health care facilities *(3)*.

Additional data on WASH in health care are available from a number of sources (Box 4.2).

[3] Burundi, Cameroon, Democratic Republic of the Congo, Ghana, Kenya, Mali, Namibia, Senegal, Seychelles, and Zambia.

Box. 4.2. Systems monitoring WASH indicators in health care facilities

- The WHO/UNICEF Joint Monitoring Programme (JMP) *(81)* for Water Supply, Sanitation and Hygiene regularly reports on WASH services in health care facilities, schools and households.
- The WHO/UNICEF global country tracker *(82)* reports on national actions to improve WASH in health care facilities.
- The WHO-led UN Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS) survey *(83)* analyses the policy and financing landscape for WASH more broadly, including in health care facilities.

According to data collected by the WHO/UNICEF JMP for Water Supply, Sanitation and Hygiene in 794 000 health facilities in 165 countries, WASH services are extremely poor *(84)*.

In 2019, one third of health care facilities did not have what is needed to clean hands where care is provided, one in four facilities lacked basic water services, and one in 10 had no sanitation services. This means that 1.8 billion people were using health care facilities that lack basic water services and 800 million were using facilities with no toilets *(84)*.

In the least developed countries, the situation was especially acute. An estimated 50% of health care facilities lacked basic water supplies, 63% lacked basic sanitation services, 26% lacked hand hygiene facilities at points of care, and 60% of health care facilities did not have systems to safely manage health care waste *(84)*.

These shocking data contrast with the estimated costs for achieving improvements in WASH services, which are relatively modest, and potentially within the scope of existing government health budgets.

Achieving universal coverage of basic WASH services in public health facilities in the 46 least developed countries will cost US$ 6.5 billion–US$ 9.6 billion between 2021 and 2030 *(85)*. An estimated US$ 2.9 billion–US$ 4.8 billion is needed in total capital investments and US$ 3.6 billion–US$ 4.8 billion is required for total operations and maintenance. Waste management accounts for the greatest share of costs (43–49%), followed by sanitation (21–28%), water (20%), and hand hygiene (10–11%). Resource needs are greatest for non-hospital facilities (94%) and for facilities in rural areas (68%). Annual operation and maintenance funding needs in 2030 are equivalent to only 4–6% of recurrent health spending by least developed countries in 2018.

Implementation of IPC guidelines, training and education, monitoring, audit and feedback and HAI surveillance

Appropriate implementation of IPC guidelines at the point of care to protect patients and health workers from infection requires the availability of standard operating procedures at the facility level, and targeted and regular education and training of staff.

In the WHO 2019 global survey, Core Component 3, "IPC Education and training", was among the core components that scored the lowest (weighted median score 70; IQR: 50–85) (Fig. 4.2) *(72)*.

Although the scores for having IPC guidelines (Core Component 2) were the highest (87.5; IQR 70–97.5), there was a substantial difference in scores between low- and high-income countries (60 vs. 92.5, respectively) (Fig. 4.2) *(72)*. Hence, these results might question the effectiveness of such guidelines, even when these are available.

When considering the IPCAF indicators that are related to the IPC minimum requirements, most facilities, at all levels of care, had IPC guidelines for various elements of standard and transmission-based precautions. However, more secondary and tertiary health care facilities in HICs had guidelines for the prevention of specific HAIs than they did in LICs. Although guidelines are readily available, IPC education and training varied by income level. Fewer facilities in LICs, compared with HICs, offered IPC training to health workers (50.4% vs. 90%), at least upon hiring, including cleaners or other health workers involved in care (39.5% vs. 83.5%) *(72)*.

Among the COVID-19 facilities assessed in 10 countries of the WHO African Region[3] (WHO, unpublished data) in June/July 2021, many hospitals (74%) reported that they had available all the essential IPC guidelines for COVID-19. However, only about one quarter of the primary care facilities (26%) had them. Training on IPC practices and use of PPE was provided in 60% of hospitals and supportive supervision activities in only 47%. In primary care facilities, there was insufficient training (provided in only 46% of facilities) and supportive supervision (34%). These recent data highlight again that limited progress has been achieved in some countries despite the stimulus of the pandemic, and that there are major gaps in IPC in primary care, which are likely to hamper the quality and safety of care provided at this critical level of the health system.

In the 2019 IPCAF global survey *(72)*, the weighted median scores for the core components related to monitoring, audit of IPC practices and feedback, and HAI surveillance, were between 72.5 and 77.5 points (out of 100) (Fig. 4.2). However, large differences were found in the weighted median core component scores between low- and high-income countries for HAI surveillance (12.5 vs 85), and monitoring, audit of IPC practices and feedback (37.5 vs. 80) (Fig. 4.5). HAI surveillance was part of an IPC programme in more than 90% of tertiary care facilities. However, its execution by trained personnel responsible for such activities varied by income level, with only 2.8% carried out in LICs, and as much as 99.1% carried out in HICs. A great difference was also seen in having a well-defined plan for monitoring key IPC indicators between LICs and HICs (18.4% vs. 77%). More than 80% of primary, secondary and tertiary health care facilities that completed surveys reported monitoring of hand hygiene compliance and having trained personnel for such activities. However, fewer secondary and tertiary health care facilities utilized or provided feedback to staff (58.5%) or leadership (58.3%).

CHAPTER 5.

Focus on hand hygiene

Chapter 5. Focus on hand hygiene

Key messages

- Appropriate hand hygiene practices can save lives, is effective in preventing infections, generates economic savings and is an IPC minimum requirement in all health care facilities.
- Implementing a multimodal hand hygiene improvement strategy is the most effective way to improve hand hygiene practices and contribute to ensuring IPC is in place in health care facilities.
- Yet, available evidence showed that compliance with hand hygiene recommendations during health care delivery remains suboptimal around the world, with an average of 59.6% compliance levels in intensive care units up to 2018, and extreme differences between HICs and LICs (64.5% vs 9.1%).
- In studies systematically reviewing different periods, average compliance, in the absence of specific improvement interventions, was found to be 40% up to 2009, and 41% between 2014 and 2020.
- The 2020 WHO global progress report on WASH in health care facilities revealed that one in three lacked hand hygiene supplies (either soap and water or alcohol-based handrubs) at the point of care.
- The most recent WHO global survey on hand hygiene programmes in health care facilities conducted in 2019 showed an intermediate implementation level (350/500 points), overall, with significant differences according to income level of participating countries ("advanced" in HICs and "basic" in LICs), showing a disparity between hand hygiene practice implementation in resource-rich and resource-poor settings.
- According to the WHO 2019 global survey, alcohol-based handrub, the most efficient means to achieve appropriate hand hygiene, was available in only 17% of facilities in LICs (vs 75% of facilities in HICs) and the recommended consumption of at least 20 litres of handrub per 1000 patient-days was only achieved in 9% of LIC facilities compared with 36% of facilities in HICs.
- The availability of resources seems to be an important driver in the implementation of appropriate hand hygiene. However, a sustained improvement of hand hygiene practices is possible only in an enabling organizational environment and institutional culture (the so-called "institutional safety climate") – and yet, within multimodal hand hygiene improvement strategies the element scoring lowest was having an institutional safety climate for hand hygiene.

Implementation of hand hygiene: global status

Practising hand hygiene is a simple action that can save lives.

This is demonstrated by extensive evidence showing that hand hygiene is effective in reducing HAIs and AMR *(73, 86–90)*. WHO built upon this evidence and carried out further research in order to develop strong recommendations, implementation strategies and comprehensive tools to support the setting up of hand hygiene programmes, their sustainability, and monitoring (Box 5.1).

Box 5.1. Hand hygiene minimum requirements to assure minimal safety of patients, health workers and visitors in health care facilities *(3)*

WHO recommends as a minimum requirement for IPC that health care facilities should implement multimodal strategies to achieve hand hygiene improvement. In this context, hand hygiene is also recommended in all health care facilities as a minimum requirement:

- within standard operating procedures;
- for training of all health workers;
- as an indicator for monitoring and feedback; and
- as part of the built environment necessary to provide safe and quality care.

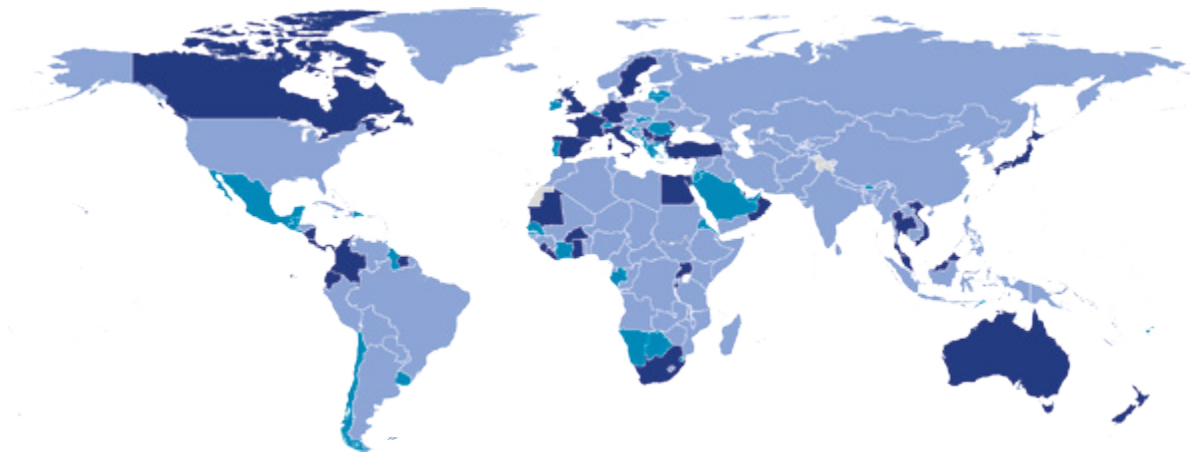
In particular, having the materials and facilities to perform appropriate hand hygiene readily available at the point of care is part of the core components of IPC programmes. Furthermore, hand hygiene monitoring is strongly recommended as a key performance indicator at the national level.

Yet, available evidence showed that compliance with hand hygiene recommendations during health care delivery remains suboptimal around the world, with an average of 59.6% compliance levels in intensive care units up to 2018, and extreme differences between HICs and LICs (64.5% vs 9.1%) *(91)*.

In studies systematically reviewing different periods, average compliance, in the absence of specific improvement interventions, was found to be 40% up to 2009, and 41% between 2014 and 2020 *(86, 92)*. Over the last 10 years, WHO has facilitated several global surveys on hand hygiene, either using direct observation of compliance with recommended practices *(93)*, or assessing hand hygiene programmes at the facility level *(94)*. In 2010, overall compliance with hand hygiene before touching a patient was 51% globally *(93)*. According to a systematic review up to 2009, it was 21% *(92)*. These differences may have been due to different study methods and selection bias of the facilities included in the WHO survey. Three global surveys assessing the level of progress of hand hygiene programmes in health care facilities around the world were conducted by WHO in 2010, 2015 and 2019 *(94, 95)*. A validated tool, the Hand Hygiene Self-Assessment Framework (HHSAF) *(96, 97)*, based on the WHO Multimodal Hand Hygiene Improvement Strategy, was consistently used. HHSAF surveyed five elements: system change; training and education; evaluation and feedback; reminders in the workplace; and institutional safety climate.

The 2019 survey included a representative sample of 3372 health care facilities in 109 countries *(95)*. Countries from all regions participated, with participation levels ranging from 63% (22/35) of the countries in the Americas, to 33% (9/27) of the countries in the WHO Western Pacific Region (Fig. 5.1). More than 25% of the facilities were in LMICs, a significant increase compared with earlier surveys. Slightly more than 50% of high- and upper-middle-income countries participated, as opposed to 35% of lower-middle-income countries and 28% of LICs.

Fig. 5.1. Country participation in the global HHSAF survey, 2019



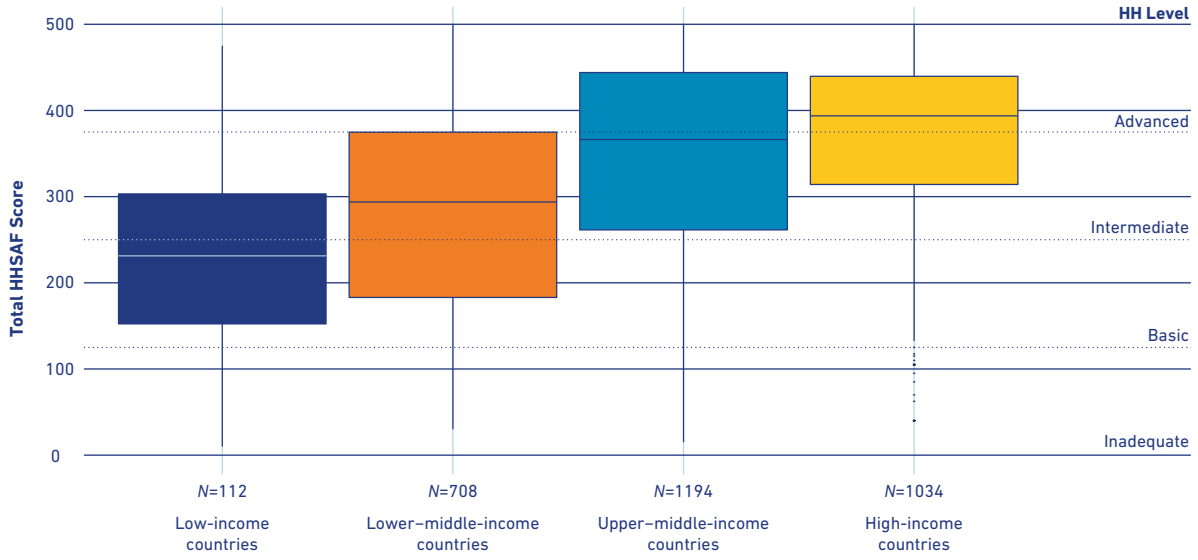
Participating countries after application of the minimal response threshold to ensure representativeness.
Total number of countries: 90, total number with nationally coordinated data collection: 33.
Source: 2019 WHO global survey on hand hygiene at the facility level *(95)*.

The HHSAF requires respondents to assign points against specific indicators.

The overall global results show hand hygiene was at an intermediate implementation level (350/500 points). The total HHSAF average score was associated with country income level, showing a disparity between hand hygiene practice in resource-rich and resource-poor settings *(95)*.

There was a significant difference between HICs (which had an "advanced" level of 395/500 points) and LICs (with a "basic" level of 233/500 points; see Fig. 5.2).

Fig. 5.2. Overall weighted HHSAF scores, by country and World Bank income levels



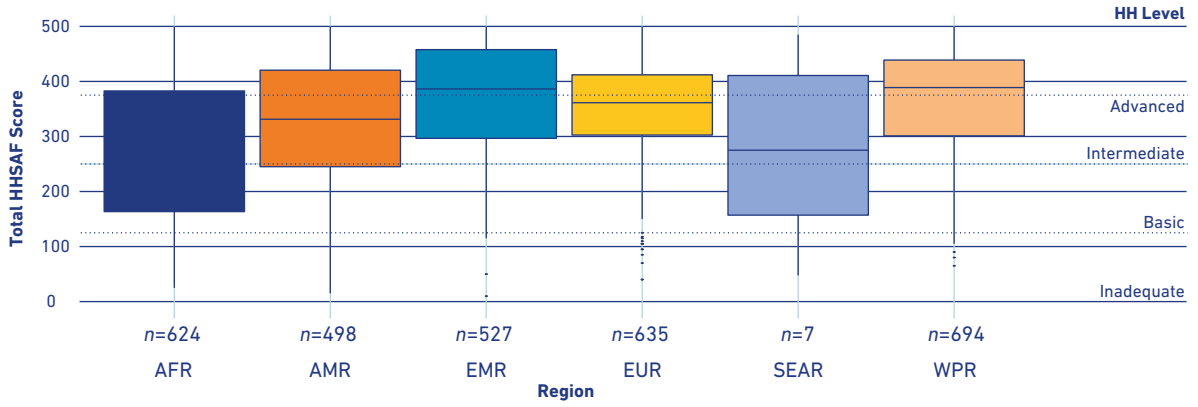
N=3048. HH: hand hygiene; HHSAF: hand hygiene self-assessment framework.
Source: 2019 WHO global survey on hand hygiene at the facility level *(95)*.

Compared with health care facilities in HICs, those in LICs scored almost 30% fewer points, lower-middle-income countries scored 15% fewer points and no difference was found with upper-middle-income countries (Fig. 5.2).

About a quarter of health care facilities, mainly those in LICs, showed basic or inadequate levels of hand hygiene.

Implementation also differed by WHO region (Fig. 5.3), with total HHSAF scores ranging from 276 (lower range of the "intermediate" level) in South-East Asia, to 390 (lower range of the "advanced" level) in the Western Pacific, although these differences were not significant. Similarly, differences across the HHSAF elements were not significant across WHO regions *(95)*.

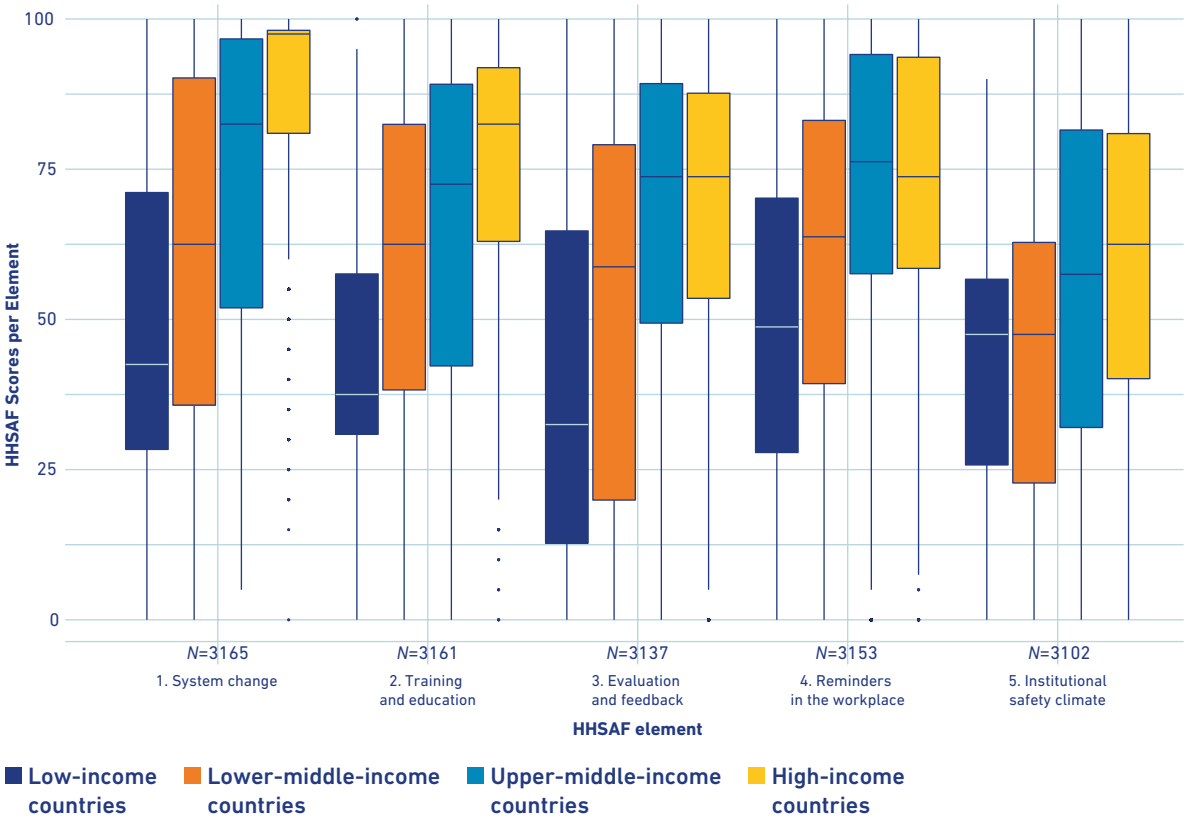
Fig. 5.3. Weighted Hand HHSAF scores, by region



N=3048 including only complete surveys. HH: hand hygiene; HHSAF: hand hygiene self-assessment framework.
WHO regions: AFR: African Region; AMR: Region of the Americas; SEAR: South-East Asia Region; EMR: Eastern Mediterranean Region; EUR: European Region; WPR: Western Pacific Region.
Source: 2019 WHO global survey on hand hygiene at the facility level *(95)*.

Overall, facilities achieved the highest score in implementing the infrastructure change and making supplies available to enable hand hygiene (the "System change" average score was 85/100) (Fig. 5.4) *(95)*.

Fig. 5.4. Weighted element-specific scores for the five elements of the HHSAF survey, 2019, by World Bank income level



HHSAF: hand hygiene self-assessment framework.
Source: 2019 WHO global survey on hand hygiene at the facility level *(95)*.

Some 66% of health care facilities in LICs reported that they were able to ensure continuous procurement of hand hygiene supplies (the figure was almost 100% in HICs). However, alcohol-based handrub supplies were reported to be continuously available in only 17% of facilities in LICs (vs 75% of facilities in HICs) and the recommended consumption of at least 20 litres of handrub per 1000 patient-days only occurred in 9% of facilities in LICs compared with 36% in HICs *(95)*.

The advanced system change implementation found overall in facilities participating in the 2019 global survey contrasts with data reported by 2020 WHO global progress report on WASH in health care facilities *(84)*, which revealed that one in three lacked hand hygiene supplies at the point of care. Furthermore in 12 countries (all LMICs) of the 71 with data available through the WHO/UNICEF JMP for Water Supply, Sanitation and Hygiene in 2019, more than half of health care facilities lacked hand hygiene facilities at points of care.

A study of 147 hospital delivery facilities in seven countries with the highest burden of neonatal mortality and accounting for over 97% of neonatal deaths in East Asia and the Pacific found that a low percentage of facilities had all needed supplies and infrastructure for enabling appropriate hand hygiene practices *(98)*. Only 44% of hospitals had clean sinks with water, soap and hand drying methods in the delivery room, 40% in neonatal care units and 10% in postnatal care rooms. Appropriate hand hygiene was practised in all observed deliveries in a higher proportion of hospitals where all delivery rooms had a sink with water and soap compared with hospitals where this was not available in all rooms (50% vs 39%, *P*=0.29) *(98)*.

Given the data reported so far and in particular, the system change score in the 2019 HHSAF survey, the main driver for implementation of appropriate hand hygiene appears to be the availability of resources in general, and more dedicated resources for hand hygiene, such as budget for alcohol-based handrub or continuous availability of hand hygiene supplies.

However, resources alone will not achieve the implementation of proper hand hygiene. It is also feasible that there could be untapped synergies with wider efforts on enhancing quality of care. Creating an organizational environment and institutional culture that prioritize high compliance with hand hygiene to achieve patient and health worker safety (the so-called "institutional safety climate") is an effective approach to improve practices and ensure sustainability. However, this was the least implemented element of the WHO multimodal strategy (average score 55/100), with the remaining three elements scoring between 70 and 75 points (Fig. 5.4). The lack of patient engagement and absence of hand hygiene leaders were the main drivers for the low score in "Institutional safety climate" *(95)*.

Scores for all five elements of HHSAF were consistently directly proportional to country income level: the higher the income level, the higher the scores. These differences were significant for elements related to "System change" and "Training & education". "Evaluation and feedback" in LICs was the lowest-scoring element across the survey (see Fig. 5.4) *(95)*. This suggests (confirming findings from other studies) that LICs do not monitor IPC-related indicators adequately, despite these being IPC core components and minimum requirements.

Training and education on hand hygiene was suboptimally implemented at all income levels: 80.6% of HCFs reported offering regular hand hygiene training, despite only 42.8% reporting having a dedicated budget. Another striking difference was the number of models or champions in health care facilities: 28% in LICs versus 88% in HICs *(95)*.

No substantial differences were found between the results of this 2019 survey and the one conducted in 2015 using the same assessment tool, except for a significant increase of the hand hygiene score in HICs (18 points) *(95)*.

CHAPTER 6.

Regional focus: situation analysis, actions, gaps and challenges in implementation of IPC

Chapter 6. Regional focus: situation analysis, actions, gaps and challenges in implementation of IPC

Key messages

- The COVID-19 pandemic has exposed many challenges and gaps in IPC in all regions and countries, including those which had the most advanced IPC programmes.
- However, it has also provided an unprecedented opportunity to make a situation analysis and rapidly scale up outbreak readiness and response through IPC practices, and to strengthen IPC programmes across the health system.
- All WHO regional and country offices have been using a uniform approach to support countries in capacity building and progressing IPC action; this relies on joint evaluations with the local authorities and partners of the status of IPC programmes and activities, plans development, and impact and sustainability evaluations using a cycle and step-wise approach as well as multimodal improvement strategies.
- The 2021–2022 WHO global survey on national IPC programmes revealed remarkable differences, some significant gaps, and a lack of progress over time, across WHO regions in the implementation of the IPC core components, in particular regarding the minimum requirements for each core component.
- Recent improvements compared with previous surveys were also reported by countries in particular in the following areas: having an appointed IPC-trained national focal point, a budget dedicated to IPC and in-service IPC curriculum; developing national IPC guidelines and a national programme or plan for HAI surveillance; promotion of multimodal strategies for IPC interventions; establishing hand hygiene compliance as a key national indicator.
- At this point, based on the momentum created by the COVID-19 pandemic, there is a clear engagement and progress in scaling up actions to put in place minimum requirements and core components of IPC programmes, which are being strongly supported by WHO and other key players.

Introduction

The COVID-19 pandemic has exposed many challenges and gaps in IPC in all regions and countries, including those which had the most advanced IPC programmes. However, it has also provided an unprecedented opportunity to make a situation analysis and rapidly scale up outbreak readiness and response through IPC practices, and to strengthen IPC programmes across the health system. This section of the report analyses the common challenges experienced by countries in all regions in building strong IPC programmes and implementing best practices. It also provides situation analyses of every region, highlighting the achievements and the gaps according to recent assessments and inputs provided by the IPC focal points in the WHO regional offices.

Main challenges

Although the WHO recommendations on the core components for IPC programmes *(2)* are based on evidence about the effectiveness and cost-effectiveness of IPC and have been agreed upon by many countries and stakeholders, implementing them requires time, expertise and resources. Thus, some aspects of implementation can be challenging, mostly because IPC is not sufficiently prioritized or budgeted at country and facility levels and local expertise is lacking in some countries. This and other obstacles are common across all regions and most countries. One major issue repeatedly observed is the discrepancy between IPC core components reported to exist (e.g. IPC programmes or guidelines) and the evident lack of implementation of IPC structure and action at the point of care. Furthermore, lack of coordination among different programmes within the Ministry of Health and among partners at the country level often involves the risk of duplication of efforts and sometimes, to lack of alignment and harmonization and conflicting messages and approaches. Finally, within the regions and the same country, wide disparities exist in IPC and WASH infrastructures and IPC practices, making a uniform approach to improvement more difficult to implement.

Table 6.1. Common challenges and gaps in IPC in all regions, by WHO Core Component

Core Component	Challenges and current gaps
CC1. IPC programmes	• Competing interests/programmes and services • Lack of financial investments in IPC • Lack of institutionalization, leadership and weak legal frameworks • Limited integration of IPC into other programmes
CC2. National and facility level IPC guidelines	• Lack of guidelines and technical documents according to international standards • Developing IPC guidelines is a demanding process requiring specific expertise • Lack of templates to develop national and facility level guidelines
CC3. IPC education and training	• Lack of IPC experts and mentors • Lack of standardized IPC curricula, including within pre-graduate courses (e.g. medicine, nursing, midwifery) and in-service training, and for post-graduate specialization • Lack of career pathways and development for IPC professionals
CC4. HAI surveillance	• Lack of expertise among auditors • Need for high financial investment
CC5. Multimodal strategies for implementing IPC activities	• Work practices, behaviours and organization that do not conform to international standards
CC6. IPC monitoring, audit and feedback	• Limited translation of monitoring plans into real activities • Limited use of data for action
CC7. Workload, staffing and bed occupancy at the facility level	• Chronic general problem of poor staff/patient ratio (insufficient nurses, and doctors and other professionals) • Lack of human resources dedicated to IPC activities • Health care-associated infections not included within occupational health policies
CC8. Built environment, materials and equipment for IPC	• Weak capacity of microbiology laboratories • Inadequate supplies and infrastructure, including WASH • Procurement and distribution difficulties up to the point of care • Cost and market limitations in LMICs

CC: core component; HAI: health care-associated infections; IPC: infection prevention and control; LMICs: low- and middle-income countries; WASH: water, sanitation and hygiene.

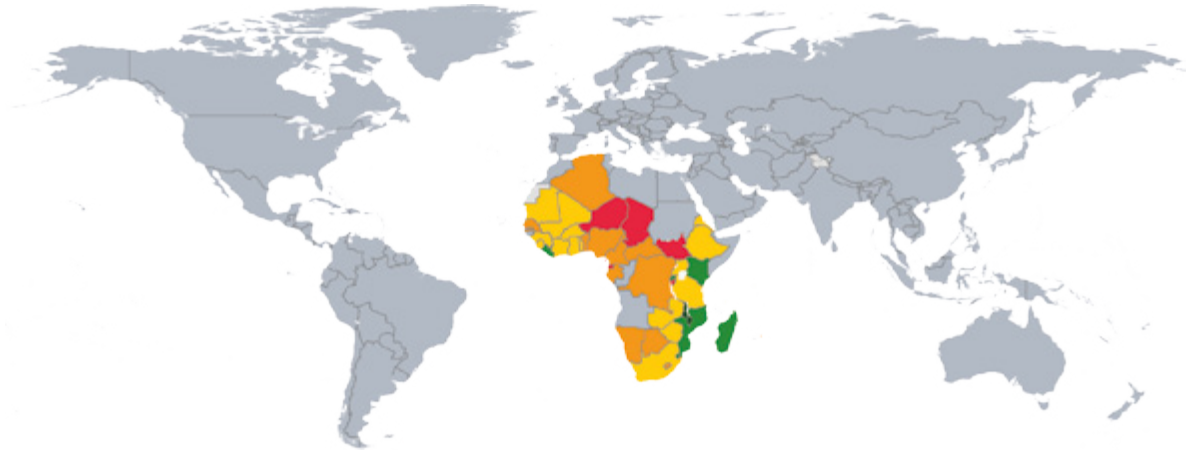
African Region

Situation analysis

- According to the country self-assessments through TrACCS, in 2020–2021 *(69)*, 42.5% (17/40) of countries in the WHO African Region either did not have an IPC programme or plan, or they had one but had not fully implemented it. Only 17.5% (7/40) of countries had an IPC programme supported by plans and guidelines implemented nationwide (Fig. 6.1).
- The more detailed 2021–2022 global survey on IPC minimum requirements at the national level *(70)* showed the following (Table 6.1; *n*=18/50 countries[4] in the WHO African Region) (WHO, unpublished data):
  - Similar to the TrACCS data, a low proportion of countries (44.4%) had an active national IPC programme, and 33.3% had at least an appointed IPC-trained focal point with dedicated time for IPC tasks.
  - 55.6% of the countries had a dedicated budget for IPC.
  - 83.3% of the countries had a mandate to produce IPC national guidelines, but only 44.4%, of these were produced according to evidence and international standards; in only 33.3% of countries, the local adaptation of guidelines and implementation was addressed through standard operating procedures.
  - In 94.4% of the countries, a curriculum for IPC in-service training was available; however, in 50% of the countries, recommendations for in-service training are provided, content and support for IPC training at the facility level are provided by the national IPC team.
  - 83.3% of the countries had a plan for HAI surveillance but it was unclear if a system for this was in place and functioning; a system for IPC monitoring and feedback was in place in 66.7% of the countries, with hand hygiene as a key national indicator in 61.1% of them.
  - Multimodal strategies were promoted through the inclusion of this approach in the development of IPC guidelines, education and training in all countries.
- Comparing data from this recent 2021–2022 global survey with a previous similar survey conducted in 2017–2018 *(63)*, in 16 countries (Table 6.2) identified a range of improvements in the following critical indicators: having an appointed IPC-trained national focal point, a budget dedicated to IPC and in-service IPC curriculum; developing a national programme or plan for HAI surveillance; using multimodal strategies for IPC interventions; establishing hand hygiene compliance as a key national indicator.
- No improvements were seen in respect of the proportion of countries with an active national IPC programme, evidence-based and standardized national IPC guidelines, and IPC indicator monitoring systems (Table 6.2), although in some cases the indicators used in the two surveys were not the same.
- These surveys provide an interesting and current snapshot of IPC in the African Region. However, only 18/50 countries of the African Region participated in 2021–2022 global survey and the comparison with the 2017–2018 global survey was possible for 16; thus, these findings may have limitations and should be interpreted with caution.

[4] Benin, Burkina Faso, Burundi, Cameroon, Chad, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Kenya, Liberia, Malawi, Mauritania, Nigeria, and Sao Tome and Principe.

Fig. 6.1. Country progress in implementation of IPC and WASH programmes in the African Region, 2020–2021



- A. No national IPC programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Source: *(69)*.

Table 6.2. Proportion of countries with selected reported IPC minimum requirements in the African Region, 2021–2022

Core Component	Indicator	African Region (*n*=18)[a]		Total countries (*N*=106)[b]	
		Number	%	Number	%
CC1	Active national IPC programme	8	44.4	58	54.7
	Trained IPC focal point with dedicated time	6	33.3	49	46.2
	Dedicated budget	10	55.6	49	46.2
CC2	Evidence-based national IPC guidelines according to international standards	8	44.4	68	64.2
	Guidelines adapted and implemented	6	33.3	69	65.1
CC3	National IPC curriculum for in-service training	17	94.4	85	80.2
CC4	National strategic plan for HAI surveillance	15	83.3	88	83.0
CC5	IPC improvement interventions coordinated and supported by national IPC focal point	18	100.0	96	90.6
	Multimodal strategies promoted	18	100.0	93	87.7

Core Component	Indicator	African Region (*n*=18)[a]		Total countries (*N*=106)[b]	
		Number	%	Number	%
CC6	National strategic plan for IPC monitoring	12	66.7	80	75.5
	Hand hygiene compliance as key national indicator	11	61.1	67	63.2

[a] Number of countries from the African Region that enrolled in the survey.
[b] Total number of countries that enrolled in the survey.

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Table 6.3. Comparison of selected indicators in the WHO 2017–2018 *(63)* and 2021–2022 national IPC global surveys in the African Region (16 countries[a])

Core Component	First national survey (2017–2018)			Second national survey (2021–2022)		
	Indicator	Countries	%	Indicator	Countries	%
CC1	National IPC programme	8	50.0	National IPC programme	8	50.0
	Trained national IPC focal point(s)	2	12.5	Trained national IPC focal point(s)	11	68.8
	Dedicated budget for IPC	0	0	Dedicated budget for IPC	9	56.2
CC2	National IPC guidelines exist	10	62.5	National IPC programme mandated to produce IPC guidelines	14	87.5
	Guidelines developed from international standards	8	50.0	Guidelines developed from international standards	6	37.5
CC3	In-service IPC curriculum	6	37.5	In-service IPC curriculum	15	93.8
CC4	National programme/ system for HAI surveillance	0	0	National strategic plan for HAI surveillance	13	81.2
CC5	Multimodal strategies used to implement IPC practices at the facility level	9	56.2	Multimodal strategies promoted	16	100.0
CC6	IPC indicators monitored	13	81.2	Strategic plan and system for IPC monitoring	11	68.8
	Hand hygiene compliance monitored	4	25.0	Hand hygiene compliance as a key national indicator	10	62.5

[a] A total of 16 countries in the WHO African Region enrolled in both surveys: Benin, Burkina Faso, Burundi, Cameroon, Chad, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Kenya, Liberia, Malawi, Mauritania, Nigeria, Uganda, and Zimbabwe.

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Actions

- The WHO African Regional Office and country offices are currently strongly supporting 11 countries[5] to strengthen the implementation of the IPC core components according to a stepwise approach tailored to local needs. Appointing national focal points and teams, conducting IPC basic and advanced training and developing a national IPC action plan have been prioritized in all 11 countries.
- In response to the high COVID-19 infection rates among health workers, countries in the African Region have been working on a stepwise approach to develop national strategies to protect health workers, including operational plans and implementation of surveillance systems with focus on HAIs.
- The WHO African Regional Office is collaborating with the Infection Control Africa Network to develop a three-week curriculum for national IPC focal points and teams, followed by post-course mentorship.
- A policy brief for an IPC legal framework was recently issued by the Africa Centres for Disease Control and Prevention *(99)*; developed in collaboration with WHO and other partners, it describes the regulatory approach to promoting compliance and also calls for a scientific approach to prevent harm caused by infection to patients and health workers. This model legal framework will allow the African Union Member States to develop their national public health law or legal framework that will guide and underpin the operations of IPC.

[5] Chad, Côte d'Ivoire, Guinea, Lesotho, Madagascar, Mali, Namibia, Rwanda, Senegal, South Sudan, and Togo.

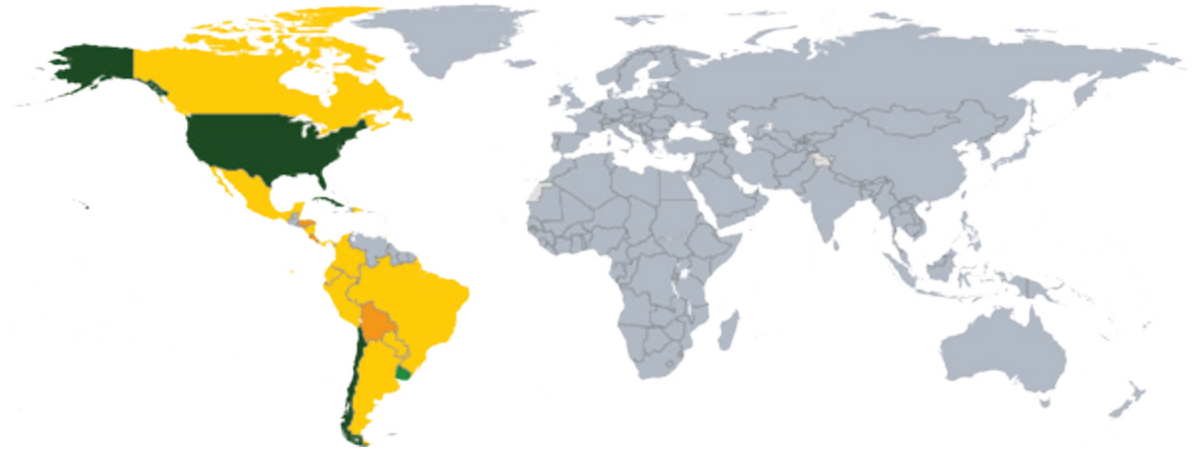
Region of the Americas

Situation analysis

- The Regional Meeting on IPC: Beyond COVID-19 *(100)* highlighted the progress made throughout the Region – despite the diversity of situations observed – ranging from highly institutionalized IPC programmes to the establishment of activities and standards in health facilities. The COVID-19 pandemic has had an impact, heightening awareness about IPC programmes and the progress made in the organization and structure of IPC programmes; standards and the development and implementation of guidelines; training entities and the application of IPC training and education; and staffing. However, challenges that remain were also identified, including an excessive workload and reassignment and turnover of human resources, along with a weakening of HAI surveillance.
- According to the country self-assessments through TrACCS, in 2020–2021 *(69)*, 30.4% (7/23) of the countries in the WHO Region of the Americas either did not have an IPC programme or plan or they had one but had not fully implemented it. Only 17.4% (4/23) of the countries had an IPC programme supported by plans and guidelines implemented nationwide (Fig. 6.2).
- The more detailed 2021–2022 global survey on IPC minimum requirements at the national level *(70)* showed the following (Table 6.4; *n*=20/35[6] countries in the Region of the Americas) (WHO, unpublished data).
  - 65.0% of the countries had an active national IPC programme and 50% of the countries at least had an appointed IPC-trained focal point with dedicated time for IPC tasks. Furthermore, 50.0% of the countries had a dedicated budget for IPC.
  - In 85.0% of the countries there was a mandate to produce IPC national guidelines and in 70.0%, these were produced according to evidence and international standards; in 75.0% of the countries, local adaptation and implementation of guidelines through standard operating procedures was addressed.
  - In 80.0% of the countries, a curriculum for IPC in-service training was available, but the national IPC team provided content and support for IPC training of health workers at the facility level in only 20.0% of the countries.
  - 90.0% of the countries had a plan for HAI surveillance and 85.0% of countries reported having a system for IPC monitoring and feedback in place, with hand hygiene as a key national indicator in 65.5%.
  - Multimodal strategies were promoted through the inclusion of the approach in the development of IPC guidelines, education and training in 90.0% of the countries.
- By comparing data of this recent 2021–2022 global survey with a previous similar survey conducted in 2017–2018 *(63)*, improvements were identified in the following critical indicators in 15 countries (Table 6.5): having an appointed IPC trained national focal point; national IPC guidelines; an in-service IPC curriculum; conducting HAI surveillance; using multimodal strategies for IPC interventions; having an IPC indicators' monitoring system; and hand hygiene compliance monitoring as a key national indicator (WHO, unpublished data).
- No improvements were seen in the proportion of countries with an active national IPC programme, a budget dedicated to IPC, or evidence-based and standardized national IPC guidelines (WHO, unpublished data) (Table 6.5).
- These surveys provide an interesting and current snapshot of IPC in the Region of the Americas. However, only 20/35 countries of this Region participated in the 2021–2022 global survey and the comparison with the 2017–2018 global survey was possible for 15; thus, these findings may have limitations and should be interpreted with caution.

[6] Argentina, Belize, Bolivia (Plurinational State of), Brazil, Canada, Chile, Colombia, Cuba, Ecuador, Guyana, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, United States of America, and Uruguay.

Fig. 6.2. Country progress in implementation of IPC and WASH programmes in the Region of the Americas, 2020–2021



- A. No national IPC programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Source: *(69)*.

Table 6.4. Proportion of countries with selected reported IPC minimum requirements in the Region of the Americas, 2021–2022

Core Component	Indicator	Region of Americas (*n*=20)[a]		Total countries (*N*=106)[b]	
		Number	%	Number	%
CC1	Active national IPC programme	13	65.0	58	54.7
	Trained IPC focal point with dedicated time	10	50.0	49	46.2
	Dedicated budget	10	50.0	49	46.2
CC2	Evidence-based national IPC guidelines according to international standards	14	70.0	68	64.2
	Guidelines adapted and implemented	15	75.0	69	65.1
CC3	National IPC curriculum for in-service training	16	80.0	85	80.2
CC4	National strategic plan for HAI surveillance	18	90.0	88	83.0
CC5	IPC improvement interventions coordinated and supported by national IPC focal point	18	90.0	96	90.6
	Multimodal strategies promoted	18	90.0	93	87.7

Core Component	Indicator	Region of Americas (*n*=20)[a]		Total countries (*N*=106)[b]	
		Number	%	Number	%
CC6	National strategic plan for IPC monitoring	17	85.0	80	75.5
	Hand hygiene compliance as key national indicator	13	65.0	67	63.2

[a] Number of countries from the Region of the Americas that enrolled in the survey.
[b] Total number of countries that enrolled in the survey.

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Table 6.5. Comparison of selected indicators in the WHO 2017–2018 *(63)* and 2021–2022 national IPC global surveys in the Region of the Americas (15 countries[a])

Core Component	First national survey (2017–2018)			Second national survey (2021–2022)		
	Indicator	Countries	%	Indicator	Countries	%
CC1	National IPC programme	12	80.0	National IPC programme	11	73.3
	Trained national IPC focal point(s)	6	40.0	Trained national IPC focal point(s)	8	53.3
	Dedicated budget for IPC	6	40.0	Dedicated budget for IPC	6	40.0
CC2	National IPC guidelines exist	13	86.7	National IPC programme mandated to produce IPC guidelines	14	93.3
	Guidelines developed from international standards	12	80.0	Guidelines developed from international standards	9	60.0
CC3	In-service IPC curriculum	9	60.0	In-service IPC curriculum	12	80.0
CC4	National programme/ system for HAI surveillance	10	66.7	National strategic plan for HAI surveillance	14	93.3
CC5	Multimodal strategies used to implement IPC practices at the facility level	7	46.7	Multimodal strategies promoted	13	86.7
CC6	IPC indicators monitored	8	53.3	Strategic plan and system for IPC monitoring	12	80.0
	Hand hygiene compliance monitored	5	33.3	Hand hygiene compliance as a key national indicator	8	53.3

[a] A total of 15 countries in the Region of the Americas enrolled in both surveys: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Ecuador, Guyana, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, United States of America.

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Actions

- Over the course of the last two decades, the Pan American Health Organization has supported national capacity building of countries in the Region of the Americas to address the implementation of IPC practices. This included the development of technical documents, provision of training on IPC principles, implementation of HAI surveillance, investigation and containment of HAI outbreaks, monitoring and evaluation of IPC programmes, routinely and in the context of the COVID-19 pandemic[7].
- Continued assessment of the WHO core components for IPC has been carried out at both national and facility levels, along with the associated development of work plans to address the identified gaps.
- In collaboration with USCDC, the Regional Office is implementing an innovative project aimed at the early detection and intensive containment of emergent mechanisms of AMR in health care settings in the context of a broader strategy to strengthen HAI surveillance. As of April 2022, this project is ongoing in six countries[8].
- Supported by the Pan American Health Organization, in cooperation with the WHO collaborating center at the University of Maryland and the USCDC, seven countries[9] are implementing a respiratory protection programme which provides technical guidance, supplies and on-the-job training for IPC professionals to foster respiratory protection in health care facilities.
- The WASH team is working to increase stakeholders' awareness involved in the provision of water, sanitation and hygiene services to improve sanitary conditions in health facilities. There is ongoing work in health facilities to integrate WASH and IPC approaches in risk management for health emergencies and disasters.

[7] For more information, please refer to https://www.paho.org/en/technical-documents-coronavirus-disease-covid-19.
[8] Argentina, Belize, Chile, Costa Rica, Ecuador, and Uruguay.
[9] Bahamas, Belize, Bolivia (Plurinational State of), Costa Rica, Dominica, El Salvador, and Jamaica.

South-East Asia Region

Situation analysis

- According to the country self-assessments through TrACCS, in 2020–2021 *(69)*, 36.4% (4/11) of the countries in the WHO South-East Asia Region either did not have an IPC programme or plan, or they had one but had not fully implemented it. Only 27.3% (3/11) of the countries had an IPC programme supported by plans and guidelines implemented nationwide (Fig. 6.5).
- The more detailed 2021–2022 global survey on IPC minimum requirements at the national level *(70)* showed the following (Table 6.6; *n*=6/11[10] countries in the WHO South-East Asia Region) (WHO, unpublished data).
  - 50.0% of the countries had an active national IPC programme, and 33.3% of them had at least an appointed IPC-trained focal point with dedicated time for IPC tasks.
  - 50.0% of the countries had a dedicated budget for IPC.
  - In 66.7% of the countries, there was a mandate to produce IPC national guidelines and in 50.0% of them, these were produced according to evidence and international standards and updated; in 66.7% of the countries, local adaptation and implementation of guidelines through standard operating procedures was addressed.
  - In 83.3% of the countries, a curriculum for IPC in-service training was available; in 50% of the countries, recommendations for in-service training were provided, and in 16.7%, content and support were provided by the national IPC team.
  - 83.3% of the countries had a plan for HAI surveillance, and a system for IPC monitoring and feedback was in place in 66.7% of the countries, with hand hygiene as a key national indicator in 50% of them.
  - Multimodal strategies were promoted through the inclusion of the approach in the development of IPC guidelines, education and training in all countries.
- Only one country participated in both the WHO national IPC global surveys conducted in 2017–2018 *(63)* and then 2021–2022; thus, no regional comparisons are possible.

[10] Bangladesh, Bhutan, Indonesia, Maldives, Sri Lanka, and Thailand.

Fig. 6.3. Country progress in implementation of IPC and WASH programmes in the South-East Asia Region, 2020–2021

- A. No national IPC programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Source: *(69)*.

Table 6.6. Proportion of countries with selected reported IPC minimum requirements in the South East Asia Region, 2021–2022

Core Component	Indicator	South-East Asia Region (*n*=6)[a]		Total countries (*N*=106)[b]	
		Number	%	Number	%
CC1	Active national IPC programme	3	50.0	58	54.7
	Trained IPC focal point with dedicated time	2	33.3	49	46.2
	Dedicated budget	3	50.0	49	46.2
CC2	Evidence-based national IPC guidelines according to international standards	3	50.0	68	64.2
	Guidelines adapted and implemented	4	66.7	69	65.1
CC3	National IPC curriculum for in-service training	5	83.3	85	80.2
CC4	National strategic plan for HAI surveillance	5	83.3	88	83.0

Core Component	Indicator	South-East Asia Region (*n*=6)[a]		Total countries (*N*=106)[b]	
		Number	%	Number	%
CC5	IPC improvement interventions coordinated and supported by national IPC focal point	6	100.0	96	90.6
	Multimodal strategies promoted	6	100.0	93	87.7
CC6	National strategic plan for IPC monitoring	4	66.7	80	75.5
	Hand hygiene compliance as key national indicator	3	50.0	67	63.2

[a] Number of countries from the South-East Asian Region that enrolled in the survey

[b] Total number of countries that enrolled in the survey

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Actions

- In 2015, responding to the need for attention to patient safety in Member States of the South-East Asia Region, the WHO Regional Office launched the Regional Patient Safety Strategy 2016–2025 *(101)* which includes IPC as one of the six strategic objectives. Since then, countries are implementing the strategy with some particularly focusing on IPC.
- During the COVID-19 pandemic, IPC practices were strengthened at acute health care facilities, including hand hygiene programmes. Where existing, national IPC guidelines were adapted to the context of COVID-19. Assessments of existing IPC practices and facilities were carried out to better understand which IPC practices and adjustments were needed for the pandemic response. Furthermore, infection surveillance of HCWs was implemented by Member States as part of the regular monitoring of IPC-related interventions. Countries scaled up PPE procurement, including through strengthening in-country production.
- With support from international agencies and national stakeholders, WHO made training packages and guidance documents available to Member States and held online sessions to facilitate sharing of country experience on disposal of dead bodies, practical IPC aspects for community management of cases, and IPC challenges in the context of the emergence of new variants of concern.
- An interesting example of improvement has been the implementation of IPC tailored to the local situation in the Cox's bazar area (see Annex 3). In collaboration with WHO and relevant partners, local authorities and teams established IPC committees and IPC focal persons in 137 health care facilities in the Rohingya camps and all eight sub-district referral health care facilities, used check lists for IPC assessments, and undertook training of trainers to create local expertise.

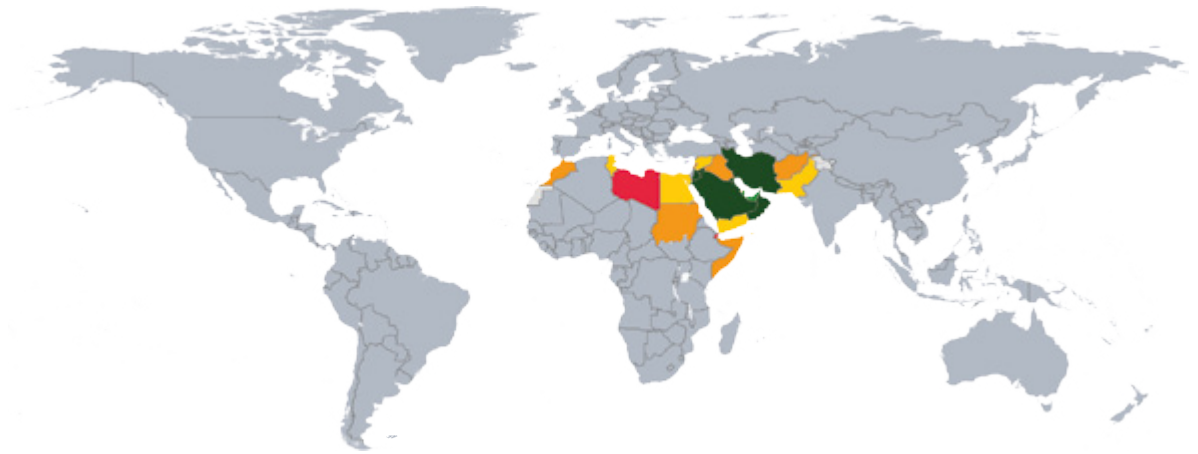
Eastern Mediterranean Region[11]

Situation analysis

- Countries in the WHO Eastern Mediterranean Region have renewed their commitment to strengthen IPC policies and practices through the endorsement of regional resolutions in 2010 (Infection prevention and control in health care: time for collaborative action, Regional Committee resolution EM/RC57/R.6) *(102)* and in 2017 (Antimicrobial resistance in the Eastern Mediterranean Region, Regional Committee resolution EM/RC64/R.5) *(103)*.
- The current COVID-19 pandemic and other recent major epidemics in the Region, such as Middle East respiratory syndrome coronavirus (MERS-CoV) and the 2009 Influenza A (H1N1) pandemic, were magnified mainly as a result of inadequate IPC practices at the health facility level and the lack of fully implemented and functioning IPC programmes at the national level.
- According to the country self-assessments recorded through TrACCS in 2020–2021 *(69)*, 42.9% (9/21) of the WHO Eastern Mediterranean Region countries either did not have an IPC programme or plan or they had one but had not fully implemented it. Only 33.3% (7/21) of the countries had an IPC programme supported by plans and guidelines implemented nationwide (Fig. 6.2).
- The more detailed 2021–2022 global survey on IPC minimum requirements at the national level *(70)* showed the following (Table 6.7; *n*=22/22[12] in the WHO Eastern Mediterranean Region) (WHO, unpublished data).
  - 68.2% of the countries had an active national IPC programme, yet only 36.4% of the countries had a dedicated budget. 53.6% of the countries had an appointed IPC-trained focal point with dedicated time for IPC tasks.
  - In 72.7% of the countries, the national IPC team had a mandate to produce IPC national guidelines and in 63.6% these were produced according to evidence and international standards.
  - In 72.7% of the countries, a curriculum for IPC in-service training was available; in 63.6% of the countries, recommendations for in-service training were provided and in 59.1%, content and support for IPC training at the facility level were provided by the national IPC team. Only 27.3% of the countries were monitoring the effectiveness of training at least annually.
  - 59.1% of countries had a plan for HAI surveillance but it was unclear if a system for it was in place and functioning, whereas a system for IPC monitoring and feedback was in place in 63.6%, with hand hygiene as a key national indicator in 59.1% of them.
  - Multimodal strategies were promoted through the inclusion of the approach in the development of IPC guidelines, education and training in 68.2% of the countries.
- Significant improvements were identified in the following critical indicators by comparing data of this recent 2021–2022 global survey with a previous similar survey conducted in 2017–2018 *(63)*, in 12 countries (Table 6.8): having a national IPC programme and an appointed IPC-trained national focal point, a budget dedicated to IPC, national IPC guidelines, and a national programme/system for HAI surveillance; using multimodal strategies for IPC interventions; having IPC monitoring and hand hygiene compliance as a key national indicator. No improvement was seen in numbers of countries with an in-service IPC curriculum for the training of health care workers.

[11] Where "countries" are mentioned, these should be understood to include countries, territories and areas, and not just countries only.
[12] Afghanistan, Bahrain, Djibouti, Egypt, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Pakistan, occupied Palestinian territory, including east Jerusalem, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, and Yemen.

Fig. 6.4. Country progress in implementation of IPC and WASH programmes in the Eastern Mediterranean Region, 2020–2021



- A. No national IPC programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Source: *(69)*.

Table 6.7. Proportion of countries with selected reported IPC minimum requirements in the Eastern Mediterranean Region, 2021–2022

Core Component	Indicator	Eastern Mediterranean Region (*n*=22)[a]		Total countries (*N*=106)[b]	
		Number	%	Number	%
CC1	Active national IPC programme	15	68.2	58	54.7
	Trained IPC focal point with dedicated time	14	53.6	49	46.2
	Dedicated budget	8	36.4	49	46.2
CC2	Evidence-based national IPC guidelines according to international standards	4	63.6	68	64.2
	Guidelines adapted and implemented	13	63.6	69	65.1
CC3	National IPC curriculum for in-service training	16	59.1	85	80.2
CC4	National strategic plan for HAI surveillance	13	72.7	88	83.0

Core Component	Indicator	Eastern Mediterranean Region (*n*=22)[a]		Total countries (*N*=106)[b]	
		Number	%	Number	%
CC5	IPC improvement interventions coordinated and supported by national IPC focal point	19	59.1	96	90.6
	Multimodal strategies promoted	15	68.2	93	87.7
CC6	National strategic plan for IPC monitoring	14	63.6	80	75.5
	Hand hygiene compliance as key national indicator	13	59.1	67	63.2

[a] Number of countries from the Eastern Mediterranean Region that enrolled in the survey; [b] Total number of countries that enrolled in the survey.

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.

Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Table 6.8. Comparison of selected indicators in the WHO 2017–2018 *(63)* and 2021–2022 national IPC global surveys in the Eastern Mediterranean Region (12 countries[a])

Core Component	First national survey (2017–2018)			Second national survey (2021–2022)		
	Indicator	Countries	%	Indicator	Countries	%
CC1	National IPC programme	7	58.3	National IPC programme	10	83.3
	Trained national IPC focal point(s)	2	16.7	Trained national IPC focal point(s)	10	83.3
	Dedicated budget for IPC	2	16.7	Dedicated budget for IPC	8	66.7
CC2	National IPC guidelines exist	6	50.0	National IPC programme mandated to produce IPC guidelines	11	91.7
	Guidelines developed from international standards	6	50.0	Guidelines developed from international standards	11	91.7
CC3	In-service IPC curriculum	9	75.0	In-service IPC curriculum	9	75,0
CC4	National programme/ system for HAI surveillance	3	25.0	National strategic plan for HAI surveillance	11	91.7
CC5	Multimodal strategies used to implement IPC practices at the facility level	6	50.0	Multimodal strategies promoted	8	66.7
CC6	IPC indicators monitored	5	41.7	Strategic plan and system for IPC monitoring	9	75.0
	Hand hygiene compliance monitored	3	25.0	Hand hygiene compliance as a key national indicator	9	75.0

[a] A total of 12 countries in the WHO Eastern Mediterranean Region enrolled in both surveys: Afghanistan, Bahrain, Iran (Islamic Republic of), Iraq, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Sudan, Tunisia, United Arab Emirates.

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.

Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Actions

- Key players such as the WHO Eastern Mediterranean Regional Office and other partners (for example, the UK Health Security Agency Public Health England) have been supporting countries to respond to the COVID-19 pandemic and to ensure its sustainability through health system governance to advance the development, implementation, and monitoring of IPC national programmes, policies and strategies.
- To support IPC training and expertise capacity building, the Regional Office is developing a prototype for an IPC national training curriculum including basic concepts on IPC.
- As a result of careful local situation analyses and gaps identification jointly with WHO and other partners, by the end of 2021 three countries[13] had newly established national IPC units with dedicated staff to coordinate their national programmes or a national IPC advisory committee.
- In 2021, five countries[14] have been developing their first set of national IPC guidelines.

[13] Afghanistan, Pakistan, Iraq.
[14] Iraq, Afghanistan, Libya, occupied Palestinian territory, including east Jerusalem, Tunisia.

European Region[11]

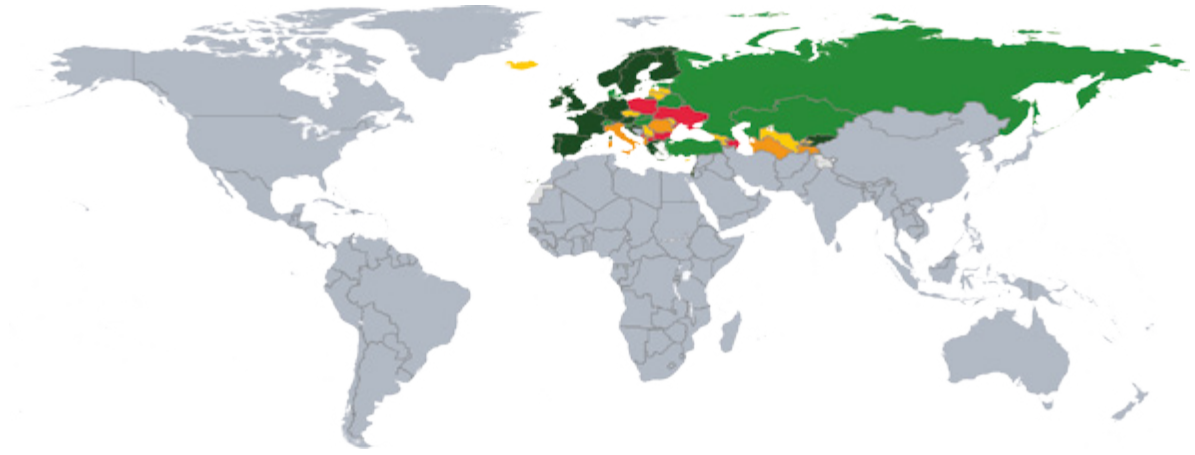
Situation analysis

- The European Strategic Action Plan on Antibiotic Resistance *(104)* was adopted by Member States in September 2011. Among other priorities, the plan promoted the systematic implementation of IPC measures for the prevention and treatment of bacterial infections in health care settings.
- Between 2017 and 2019, 14 countries in the Region conducted the voluntary JEE[15]. The average score among participant countries showed that attributes of IPC were in place; however, sustainability has not been ensured, such as through inclusion in the operational plan of the national health sector with a secure funding source.
- According to the country self-assessments collected through TrACCS, in 2020–2021 *(69)*, 26.0% (13/50) of countries in the WHO European Region at all income levels still either did not have an IPC programme or plan, or they had one but had not fully implemented it. 54.0% (27/50) of countries had an IPC programme supported by plans and guidelines implemented nationwide (Fig. 6.4) and a majority of these countries also have a mechanism to monitor effectiveness of IPC programmes and compliance with recommendations. However, this is possible only in HICs so far.
- The more detailed 2021–2022 global survey on IPC minimum requirements at the national level *(70)* showed the following (Table 6.9; *n*=34/53[16] countries in the WHO European Region).
  - 47.1% of the countries had an active national IPC programme and 38.2% of the countries at least had an appointed IPC trained focal point with dedicated time for IPC tasks. Only 44.1% of them had a dedicated budget for IPC.
  - In 61.8% of the countries, there was a mandate to produce IPC national guidelines. In 76.5% of countries, these were produced according to evidence and international standards; in 82.4% of the countries, guideline local adaptation and implementation through standard operating procedures was addressed.
  - In 73.5% of the countries, a curriculum for IPC in-service training was available and in 88.2% of countries, recommendations for in-service training were provided; however, content and support for training was provided by the national IPC team in only 44.1% of the countries.
  - 91.2% of the countries had a plan for HAI surveillance and in 82.4% of the countries, a multidisciplinary technical group for HAI surveillance was established at the national level. A system for IPC monitoring and feedback was in place in 79.4%, with hand hygiene as a key national indicator in 64.7% of them.
  - Multimodal strategies were promoted through the inclusion of the approach in the development of IPC guidelines, education and training in 91.2% of the countries, with support from the national level in 85.3%.
- By comparing data of this recent 2021–2022 global survey with a previous similar survey conducted in 2017–2018 *(63)*, improvements were identified in the following critical indicators in 14 countries (Table 6.10): countries with an appointed IPC trained national focal point; in-service IPC curriculum; national programme for HAI surveillance; promotion of multimodal strategies for IPC interventions; IPC monitoring; and hand hygiene compliance as a key national indicator.
- No improvements were seen in the proportion of countries with an active national IPC programme, IPC dedicated budget or national IPC guidelines (Table 6.10).
- These surveys provide an interesting and current snapshot of IPC in the European Region. However, 34/53 countries of the European Region participated in the 2021–2022 global survey and the comparison with the 2017–2018 global survey *(63)* was possible only for 14; thus, these findings may have limitations and should be interpreted with caution.
- Although significant progress has been made in the last five years, according the latest TrACCS results *(69)*, 26% of countries in the European Region still have limited or inexistent IPC programmes at national level. Among those are high-, middle-, and low-income countries.
- Most countries share many of the same challenges such as getting and keeping IPC on the national public health agenda; ensuring the sustainability of IPC programmes with the adequate human and financial resources; developing evidence based guidelines adapted to the local context and needs combined with the absence of accessible quality evidence in a national language; creating or maintaining IPC training and education programmes for a broad range of tasks, levels of education and experience of the healthcare workforce; encouraging reporting of HAI; implementing IPC measures using multimodal strategies; and implementing the monitoring and feedback required to ensure IPC interventions are applied correctly.

[15] Albania, Armenia, Belgium, Finland, Georgia, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, North Macedonia, Serbia, Slovakia, Switzerland, Turkmenistan. For more information about the Joint External Evaluation (JEE), please refer to https://www.who.int/emergencies/operations/international-health-regulations-monitoring-evaluation-framework/joint-external-evaluations.

[16] Countries, territories and areas participating: Albania, Armenia, Azerbaijan, Bulgaria, Cyprus, Czechia, Denmark, Estonia, Finland, France, Georgia, Germany, Hungary, Ireland, Israel, Italy, Kazakhstan, Kyrgyzstan, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Republic of Moldova, Serbia, Slovenia, Spain, Sweden, Tajikistan, Turkey, the United Kingdom, Ukraine and Kosovo. (All references to Kosovo in this document should be understood to be in the context of the United Nations Security Council resolution (UNSCR) 1244 (1999)).

Fig. 6.5. Country progress in implementation of IPC and WASH programmes in the European Region, 2020–2021



- A. No national IPC programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Source: *(69)*.

Table 6.9. Proportion of countries with selected reported IPC minimum requirements in the European Region, 2021-2022

Core Component	Indicator	European Region (*n*=34)[a]		Total Countries (*N*=106)[b]	
		Number	%	Number	%
CC1	Active national IPC programme	16	47.1	58	54.7
	Trained IPC focal point with dedicated time	13	38.2	49	46.2
	Dedicated budget	15	44.1	49	46.2
CC2	Evidence-based national IPC guidelines according to international standards	26	76.5	58	64.2
	Guidelines adapted and implemented	28	82.4	69	65.1
CC3	National IPC curriculum for in-service training	25	73.5	85	80.2
CC4	National strategic plan for HAI surveillance	31	91.2	88	83.0
CC5	IPC improvement interventions coordinated and supported by national IPC focal point	29	85.3	96	90.6
	Multimodal strategies promoted	31	91.2	93	87.7

Core Component	Indicator	European Region (*n*=34)[a]		Total Countries (*N*=106)[b]	
		Number	%	Number	%
CC6	National strategic plan for IPC monitoring	27	79.4	80	75.5
	Hand hygiene compliance as key national indicator	22	64.7	67	63.2

[a] Number of countries from the European Region that enrolled in the survey

[b] Total number of countries that enrolled in the survey

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Table 6.10. Comparison of selected indicators in the WHO 2017–2018 *(63)* and 2021–2022 national IPC global surveys in the European Region (14 countries[a])

Core Component	First national survey (2017)			Second national survey (2021–22)		
	Indicator	Countries	%	Indicator	Countries	%
CC1	National IPC programme	9	64.3	National IPC programme	6	42.9
	Trained national IPC focal point(s)	1	7.1	Trained national IPC focal point(s)	12	85.7
	Dedicated budget for IPC	6	42.9	Dedicated budget for IPC	5	35.7
CC2	National IPC guidelines exist	12	85.7	National IPC programme mandated to produce IPC guidelines	7	50.0
	Guidelines developed from international standards	12	85.7	Guidelines developed from international standards	11	78.6
CC3	In-service IPC curriculum	9	64.3	In-service IPC curriculum	12	85.7
CC4	National programme/ system for HAI surveillance	12	85.7	National strategic plan for HAI surveillance	14	100.0
CC5	Multimodal strategies used to implement IPC practices at the facility level	8	57.1	Multimodal strategies promoted	13	92.9
	IPC indicators monitored	12	85.7	Strategic plan and system for IPC monitoring	13	92.9
CC6	Hand hygiene compliance monitored	4	28.6	Hand hygiene compliance as a key national indicator	9	64.3

[a] A total of 14 countries in the European Region enrolled in both surveys: Bulgaria, Denmark, Finland, Georgia, Germany, Italy, Kyrgyzstan, Malta, Republic of Moldova, Netherlands, Norway, Serbia, Spain, and Sweden.

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Actions

- Since 2017, the WHO Regional Office for Europe is supporting Member States to assess the status of IPC programmes, revise national IPC strategies, and to implement the core components of IPC programmes at the national and acute health care facility levels. Activities addressing emergency preparedness or AMR in human health were found to be powerful entry points to implement or strengthen IPC capacities at country level.

- Between 2018 and 2020, at least one detailed assessment of IPC programmes at national level was conducted in 18 countries[17], using the Infection Prevention and Control Assessment Tool 2 (IPCAT2) *(105)*. In most of these countries IPC action plans were developed according to the findings. By the end of 2019, IPC focal points had prioritized activities to strength the national IPC programmes; develop IPC guidelines; improve national HAI surveillance strategies; develop national strategies for IPC training; and monitoring and evaluation of IPC practices.
- As part of AMR-related activities, six countries[18] started the process of updating their IPC guidelines. However, this task has proven to be difficult even in HICs. In 2019, the WHO Regional Office for Europe, with the financial assistance of the European Union, started the development of an easy-to-read roadmap on IPC guidelines development, adaptation, adoption and monitoring of adherence which will be published in 2022.
- Many countries of the European Region regularly conduct HAI surveillance through the networks of the ECDC *(106)* and with support from the WHO Regional Office. All European Union candidate and potential candidate countries were invited to join the 2016–2017 ECDC point prevalence survey of HAI and antimicrobial use, and 29 countries participated *(19)*. The ECDC point prevalence survey of HAI and antimicrobial use was then further piloted in six European countries[19] between 2019 and 2022.
- Most countries developed IPC training and education strategies, mainly focusing on providing advanced IPC education for IPC focal points and national and facility levels, and basic IPC training for all health workers.
- The COVID-19 pandemic helped countries in the Region to strengthen national IPC programmes, revise national IPC manuals and prioritize the IPC training of frontline health workers. Monitoring hand hygiene compliance and other IPC practices at the facility level are conducted in all countries in the Region, however monitoring strategies are very diverse.

[17] Albania, Armenia, Azerbaijan, Bulgaria, Estonia, Georgia, Kazakhstan, Kosovo (UNSCR 1244(1999)), Kyrgyzstan, Latvia, Lithuania, Montenegro, North Macedonia, Republic of Moldova, Serbia, Turkey, Turkmenistan, and Ukraine.
[18] Albania, Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, and Turkmenistan.
[19] Albania, Armenia, Kazakhstan, Montenegro, Republic of Moldova, and Ukraine

Western Pacific Region

Situation analysis

- The WHO Western Pacific Regional Office conducted a desk review in 2020 to assess the status of implementation of IPC Programmes in six LMICs in the Region. The findings will be published in a regional report.
- While financial and equipment supports have been provided by health stakeholders such as WHO and international partners, particularly during the COVID-19 pandemic, most countries have shortages in infrastructure, equipment, and materials for WASH and IPC.
- Ad-hoc monitoring of compliance with IPC practices is undertaken at facility level in four out of six countries. There is ongoing work to establish standardized IPC monitoring and evaluation at all levels of the health system and to integrate IPC indicators in hospital licensing standards. Using findings to inform IPC action plans is yet to be systematic.
- According to the country self-assessments reported through TrACCS, in 2020–2021 *(69)*, 23.5% (4/17) of the Western Pacific Region countries either did not have an IPC programme or plan or they had one but had not implemented it; 47.1% (8/17) of the countries had an IPC programme supported by plans and guidelines implemented nationwide (Fig. 6.6).
- The more detailed 2021–2022 global survey on IPC minimum requirements at the national level *(70)* showed the following (Table 6.11; *n*=6 countries[20] in the Western Pacific Region).
  - 50.0% of the countries had an active IPC programme and 66.7% had an appointed IPC-trained focal point with dedicated time for IPC tasks.
  - 50.0% of the countries had a dedicated budget for IPC.
  - In all countries, there was a mandate to produce IPC national guidelines. However, in 50.0% of them, these were produced according to evidence and international standards; and in 50.0% of countries, local adaptation and implementation of guidelines through standard operating procedures was addressed.
  - In all countries, a curriculum for IPC in-service training was available and in 66.7% of them, recommendations for in-service training were provided, and in 33.3%, content and support were provided by the national authorities.
  - In all countries there was a plan for HAI surveillance, but it was unclear if a system for it was in place and functioning. In addition to that, in all countries there was a system for IPC monitoring and feedback in place, with hand hygiene as a key national indicator in 83.3% of them.
  - Multimodal strategies were promoted through the inclusion of the approach in the development of IPC guidelines, education and training in 83.3% of the countries.
- By comparing data of this recent 2021–2022 global survey with a previous similar survey conducted in 2017–2018 *(63)*, improvements were identified in the following critical indicators in four countries (Table 6.12): having an appointed IPC trained national focal point; in-service IPC curriculum; conducting HAI surveillance; and monitoring of IPC indicators.
- No improvements were seen in the proportion of countries with an active national IPC programme; budget dedicated to IPC; evidence-based and standardized national IPC guidelines; promotion of multimodal strategies for IPC interventions; and hand hygiene compliance as a key national indicator (Table 6.12).
- These surveys provide an interesting and current snapshot of IPC in the Western Pacific Region. However, only 6/37 countries/areas of this Region participated in the 2021–2022 global survey and the comparison with the 2017–2018 global survey was possible only for 4; thus, these findings have limitations and should be interpreted with caution.

[20] China, Malaysia, Philippines, Singapore, Vanuatu, and Viet Nam.

Fig. 6.6. Country progress in implementation of IPC and WASH programmes in the Western Pacific Region, 2020–2021

- A. No national IPC programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Source: *(69)*.

Table 6.11. Proportion of countries with selected reported established IPC minimum requirements in the Western Pacific Region, 2021–2022

Core Component	Indicator	Western Pacific Region (*n*=6)[a]		Total countries (*N*=106)[b]	
		Countries	%	Countries	%
CC1	Active national IPC programme	3	50.0	58	54.7
	Trained IPC focal point with dedicated time	4	66.7	49	46.2
	Dedicated budget	3	50.0	49	46.2
CC2	Evidence-based national IPC guidelines according to international standards	3	50.0	68	64.2
	Guidelines adapted and implemented	3	50.0	69	65.1
CC3	National IPC curriculum for in-service training	6	100.0	85	80.2
CC4	National strategic plan for HAI surveillance	6	100.0	88	83.0
CC5	IPC improvement interventions coordinated and supported by national IPC focal point	6	100.0	96	90.6
	Multimodal strategies promoted	5	83.3	93	87.7

Core Component	Indicator	Western Pacific Region (*n*=6)[a]		Total countries (*N*=106)[b]	
		Countries	%	Countries	%
CC6	National strategic plan for IPC monitoring	6	100.0	80	75.5
	Hand hygiene compliance as key national indicator	5	83.3	67	63.2

[a] Number of countries from the Western Pacific Region that enrolled in the survey

[b] Total number of countries that enrolled in the survey

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Table 6.12. Comparison of selected indicators in the WHO 2017–2018 *(63)* and 2021–2022 national IPC global surveys in the Western Pacific Region (four countries[a])

Core Component	First national survey (2017–2018)			Second national survey (2021–2022)		
	Indicator	Countries	%	Indicator	Countries	%
CC1	National IPC programme	4	100	National IPC programme	3	75
	Trained national IPC focal point(s)	2	50	Trained national IPC focal point(s)	4	100
	Dedicated budget for IPC	2	50	Dedicated budget for IPC	2	50
CC2	National IPC guidelines exist	4	100	National IPC programme mandated to produce IPC guidelines	4	100
	Guidelines developed from international standards	4	100	Guidelines developed from international standards	3	75
CC3	In-service IPC curriculum	3	75	In-service IPC curriculum	4	100
CC4	National programme/ system for HAI surveillance	3	75	National strategic plan for HAI surveillance	4	100
CC5	Multimodal strategies used to implement IPC practices at the facility level	3	75	Multimodal strategies promoted	3	75
	IPC indicators monitored	3	75	Strategic plan and system for IPC monitoring	4	100
CC6	Hand hygiene compliance monitored	3	75	Hand hygiene compliance as a key national indicator	3	75

[a] A total of 4 countries in the Western Pacific Region enrolled in both surveys: China, Malaysia, Philippines, and Singapore

CC: core component; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, audit and feedback; HAI: health care-associated infections; IPC: infection prevention and control.
Source: WHO global survey on IPC minimum requirements at the national level, July 2021–January 2022 (WHO, unpublished data).

Actions

- Supported by the Western Pacific Regional Office and the WHO country offices, countries are developing IPC as a component of the national agenda, along with its integration into health systems.
- There is ongoing work to establish standardized IPC monitoring and evaluation at all levels of the health system and to integrate IPC indicators in the licensing standards of health care facilities.

- Moreover, countries are integrating IPC programmes into their health systems, with solid links to related programmes, such as WASH; mother and child health programmes; public health emergency; patients and health workers safety; and AMR.
- The WHO Western Pacific Regional Office is conducting a health system scoping review on IPC, together with country offices and national authorities. The short-term results of this review will provide evidence to define common IPC systems, identify barriers and enablers and provide evidence-based support to assess countries' IPC strategies and plans. In the long term, a regional IPC strategy may be developed as part of a patient safety strategy to guide Member States and promote the integration of the IPC programmes into their health system, aligned with the WHO Core Components for IPC programmes and the IHR requirements.

CHAPTER 7.

The impact and the economic side of IPC

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Chapter 7. The impact and the economic side of IPC

Key messages

- A range of IPC interventions have been shown to be highly effective in preventing HAI occurrence.
- Analyses pooling together the results of studies from systematic reviews, calculated that IPC interventions can achieve a significant reduction of HAI rates (in particular of catheter-associated bloodstream infections, catheter-associated urinary tract infections, surgical site infections, and ventilator-associated pneumonia) in the range of 35%–70%, irrespective of a country's income level.
- Whether implemented as a stand-alone intervention or integrated into multifaceted interventions, hand hygiene has been highlighted as the most effective single measure to reduce transmission by contact of microorganisms/pathogens and infection in health care settings.
- Enabling and ensuring appropriate hand hygiene was cost-saving in all populations tested, from health workers to visitors.
- Available data and modelling suggest that IPC is highly cost-effective and a "best buy" for public health as an approach to reducing infections and AMR in health care, improving health, and protecting health care workers.
- Enabling and ensuring appropriate hand hygiene was cost-saving in all populations tested, from health workers to visitors.
- Screening at patient admission with decolonization from potentially harmful microorganisms was consistently found to be cost-saving or cost-effective, especially when carrying out the selective screening of at-risk patients.
- Landmark institutional reports, such as those of the World Bank and the Organisation for Economic Co-operation and Development (OECD), confirmed the positive return on investment into appropriate IPC implementation and enforcement, particularly hand hygiene.
- Available data and modelling from OECD suggest that IPC is highly cost-effective and a "best buy" for public health as an approach to reducing infections and AMR in health care, improving health, and protecting health care workers.
- The implementation of a package including improved hand hygiene, antibiotic stewardship programmes and enhanced environmental hygiene in health care settings in OECD countries[21] would reduce the health burden of AMR by 85%, while producing savings of 0.7 euros per capita per year.
- Hand hygiene and environmental hygiene in health care facilities in particular, were found to be the most cost-saving interventions: applying these would more than halve the risk of dying as a result of infections with AMR pathogens, as well as decreasing the associated long-term complications and health burden by at least 40%. In particular, improving hand hygiene in health care settings could save about US$ 16.50 in reduced health care expenditure for every US dollar invested.
- These IPC interventions were affordable in all settings, including low-resourced ones.
- A recent study by OECD and WHO indicated that, during the first six months of the COVID-19 pandemic, the availability and rational use of appropriate PPE combined with rapid IPC training would have averted SARS-CoV-2 infections and related deaths among health care workers globally, while generating substantial net savings in all regions, independently from their income. Enhancing hand hygiene was also shown to be cost-effective in most regions.
- However, only a limited number of studies exist on the cost-effectiveness of IPC interventions, they are related to a limited number of specific infectious outcomes, and most of them have been carried out in HICs.
- More research is needed to identify evidence on the cost-effectiveness of IPC interventions, particularly in LMICs.

[21] Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom of Great Britain and Northern Ireland, and United States of America.

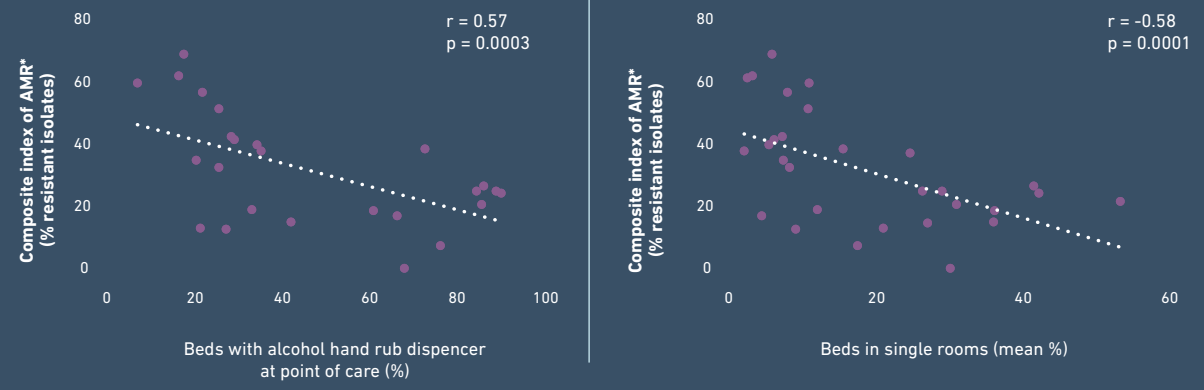
Evidence from the published scientific literature

A range of IPC interventions have been shown to be highly effective in preventing HAI occurrence. In 1985, Haley and colleagues published a landmark study showing that having an IPC programme including HAI surveillance and control activities, one trained IPC physician and one trained IPC nurse per 250 beds, and a system for reporting HAIs rates to practicing surgeons, led to a reduction of HAI rates by 32% in a representative sample of general hospitals in the USA *(107)*. This study identified the essential components of effective IPC programmes for the first time and marked a turning point in IPC, inspiring further research. Some 20 years later, WHO reviewed the literature *(61, 62)* and identified the core components of effective IPC programmes within global evidence-based guidelines *(2)* (see Chapter 8), building upon previous work undertaken by the University of Geneva and WHO, supported by ECDC *(74)*. Furthermore, analyses pooling together the results of studies from systematic reviews, calculated that IPC interventions can achieve a significant reduction of HAI rates (in particular of catheter-associated BSI, catheter-associated urinary tract infections, surgical site infections, and ventilator-associated pneumonia) in the range of 35–70%, irrespective of a country's income level *(74, 108, 109)*.

Whether implemented as a stand-alone intervention or integrated into multifaceted interventions, hand hygiene has been highlighted as the most effective single measure to reduce the transmission of microorganisms/pathogens and reduce infection in health care settings *(73, 90)*.

The effectiveness of IPC interventions to reduce AMR is very well illustrated. According to data from ECDC, there is a significant inverse association between the composite index of AMR (which mostly includes pathogens transmitted in health care settings) and the percentage of beds equipped with alcohol handrub dispensers at point of care, of beds in single rooms (for isolating patients with microorganisms resistant to antimicrobials) (Fig. 7.1), and the percentage of hospitals with at least 0.4 full time-equivalent IPC nurse for 250 beds *(53)*.

Fig. 7.1. Associations between a composite index of AMR* and IPC indicators in European acute care hospitals



Composite index of AMR: percentage of isolates resistant to first-level antimicrobial resistance markers in health care-associated infections, i.e. *S. aureus* resistant to meticillin (MRSA), *E. faecium* and *E. faecalis* resistant to vancomycin, Enterobacteriaceae resistant to third-generation cephalosporins, and *P. aeruginosa* and *A. baumannii* resistant to carbapenems.

r, Spearman's correlation coefficient; p, p-value.

Source: Reproduced with permission from *(53)*.

There are limited comparable data on the cost-effectiveness of IPC for HAIs. Few systematic reviews have attempted to summarize the evidence; most of the studies identified were performed in HICs *(110, 111)*.

Recent updated data are available from a WHO systematic review of the literature between 2009 and 2021 on the cost-effectiveness of IPC interventions for bacterial HAIs recommended by the

WHO IPC Core Components (Box 7.1), with a particular focus on LMICs and with a more detailed review of the study methodologies and quality (WHO, unpublished data).

Box 7.1. Summary of the interventions assessed

INTERVENTION	
	• Hand hygiene interventions targeting prevention and/or control of health care-associated infections (HAIs) • Screening, isolation and decolonization interventions targeting prevention and/or control of HAIs • Personal protective equipment targeting prevention and/or control of HAIs • IPC programmes involving an infection preventionist at the national or facility level • Education and training programmes • Environmental cleaning • Surveillance • Monitoring and evaluation • Multimodal strategies[i]

[i] Three or more components comprising: system change; education and training; monitoring infrastructures, practices, processes, outcomes and providing data feedback; reminders in the workplace/communications; and culture change with the establishment or strengthening of a safety climate.

Of the 67 studies identified in the systematic review, 36 were classified as "most reliable", according to specific criteria. Only nine out of the 67 studies were conducted in LMICs: one was in a LIC, eight in a lower-middle income country, and seven in upper-middle-income countries (WHO, unpublished data).

Most studies (22/36, 61.1%) were on the cost-effectiveness of universal (all patients) or selective (only some specific patients, such as those undergoing cardiothoracic and orthopaedic surgery) screening for colonization or infection by specific bacterial microorganisms upon admission (with or without decolonization, aiming at reducing the presence of bacteria in a patient's organism and at preventing transmission of HAIs and infections with AMR pathogens) (WHO, unpublished data).

Most studies focused on MRSA and found screening (both selective for some patient populations and universal) generally either cost-saving or cost-effective against the pre-defined threshold *(112-124)*. Selective screening was more cost-effective than universal screening *(113, 115, 116, 125-130)*.

Interventions to improve hand hygiene were almost always found to be cost-saving and in any case cost-effective in the settings under study.

Improvement of hand hygiene was cost-saving in preventing HAIs in all populations tested, from health workers to visitors *(114, 131–134)*. A very similar picture was found for environmental cleaning in health care facilities: regardless of comparator and setting, most studies found it to be cost-saving *(114, 131, 135, 136)*. Only one study modelling interventions to improve the use of PPE (increase availability of gloves and gowns, and allowing time for donning and doffing) did not find it cost-effective *(114)*.

Multimodal interventions to improve multiple IPC activities were found to be either cost-saving or cost-effective *(137–141)*.

No reliable studies evaluated the cost-effectiveness of interventions related to HAI surveillance, IPC education and training or IPC monitoring and evaluation.

Evidence from reports published by international organizations

In 2017, the World Bank published a landmark global report on the economic impact of AMR, the solutions to contain AMR and the return on investment for some of these interventions *(142)*. This report highlighted that:

a worldwide annual investment of US$ 1.3 billion for infection prevention would be needed, representing 14.4% of the total annual US$ 9 billion considered necessary to minimise and contain AMR.

In the World Bank modelling, these preventive measures included IPC in health care, improved waste disposal and raising awareness of AMR, among others.

Without these investments, the World Bank models predicted that the losses would be 30 times the amount considered in the investment *(142)*.

This would also imply returning to the pre-antibiotic era – which makes the containment of AMR an extremely cost-saving investment, and one in which IPC plays a prominent and crucial role.

The World Bank report *(142)* stated that "One of the best ways to prevent a return to the pre-antibiotic era is to practise hygiene in health facilities as if that return had already happened."

The World Bank report found that adherence to IPC guidelines was partial or poor overall and pointed out that improvement of both IPC-related structural factors and health care processes are needed to reduce the burden of HAIs and AMR.

The report identified IPC as being a critical part of investments towards universal health coverage (UHC) targets, as such investments have a direct impact on antimicrobial use levels and AMR *(142)*.

Setting requirements, including on IPC, as part of health care accreditation, for example, was mentioned as a systemic, practical and achievable means for implementation. In terms of specific IPC interventions, the report cited the improvement of hand hygiene practices as an example of a cost-saving way to decrease HAIs and the incidence of AMR infections in health care settings. This is particularly true, given the inconsistent and often poor practices observed and reported in many studies.

The Organisation for Economic Co-operation and Development (OECD) published a breakthrough international report on the economic impact of AMR in 2018 *(131)*. Similar to the World Bank report, the OECD's report, entitled *Stemming the Superbug Tide: Just a Few Dollars More*, found that the overall investments needed to tackle the rise of AMR would pay for themselves within one year and save US$ 4.8 billion per year thereafter. If investments are not secured on the other hand, AMR could drive complications that would cost US$ 3.5 billion per year.

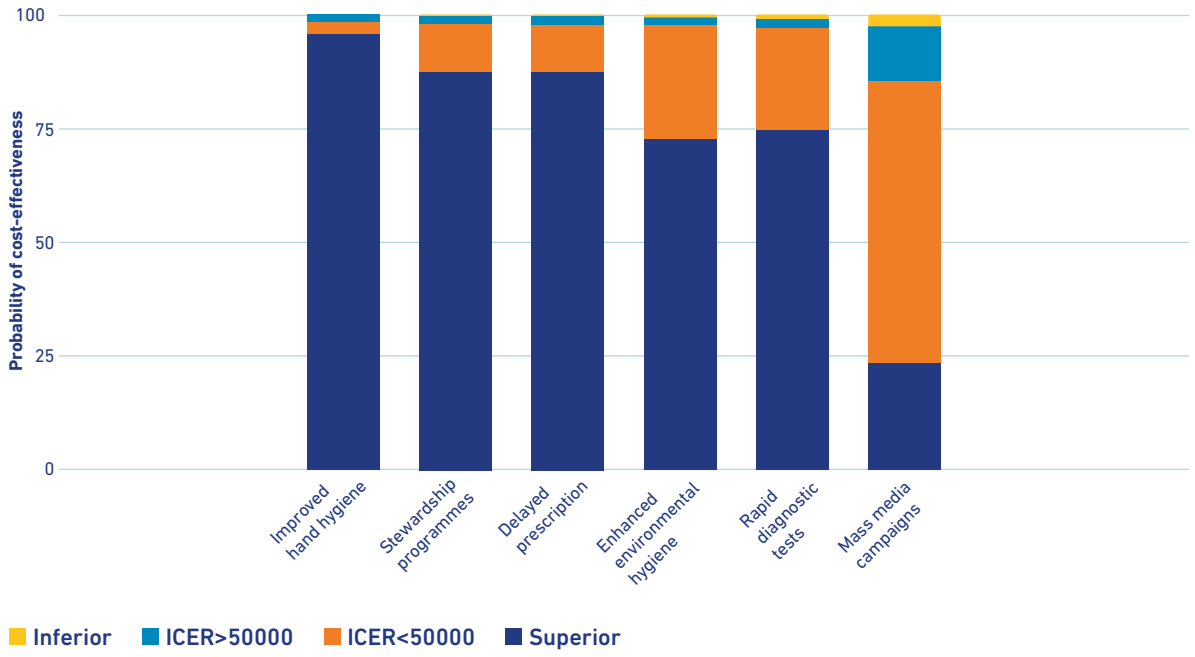
Regarding IPC, the report provides the following critical findings:

- IPC interventions were identified among the "best buys" modelled by the OECD researchers, based on their effectiveness, affordability, feasibility and cost-effectiveness.
- The implementation of a package including improved hand hygiene, antibiotic stewardship programmes and enhanced environmental hygiene in health care settings in OECD countries6 would reduce the health burden of AMR by 85%, while producing savings of 0.7 euros per capita per year.
- Hand hygiene and environmental hygiene in health care facilities in particular, were found to be the most cost-saving interventions: they would more than halve the risk of dying as a result of infections with AMR pathogens, as well as decreasing the associated long-term complications and health burden by at least 40%.
- In particular, improving hand hygiene in health care settings could save about US$ 16.5 in reduced health care expenditure for every US dollar invested.

These interventions, and improved hand hygiene in particular, were affordable in all settings, including countries at lower income levels.

An overview of the interventions tested is available in Fig. 7.2, which shows that the most cost-saving packages considered in the OECD models were those including IPC interventions.

Fig. 7.2. Probability of cost-effectiveness of interventions vs. business as usual



ICER: Incremental cost-effectiveness ratio. Interventions are ranked on their overall probability of being at least cost-effective (that is, an ICER<50 000 and superior).
Source: Adapted with permission from *(131)*.

Other institutional reports also found that HAIs represented a high and preventable economic burden. A 2017 OECD publication on patient safety found that

HAIs were one of the top five most common and impactful adverse events *(9)*.

These were comparable to the cost to the United Kingdom National Health Service of 2000 general practitioners or 3500 hospital nurses (equivalent to £1 billion in 2000) *(9)*.

The same report found that IPC guidelines, hand hygiene, as well as HAI detection, reporting and surveillance systems, were consistently most impactful on the safety of patients and in saving costs.

In 2020, a follow-up OECD report consolidated these findings and identified interventions to improve patient safety *(143)*. The report found that every investment in IPC to prevent HAIs would yield a seven-fold return.

Findings from the WHO/UNICEF JMP report *(84)*, indicate that WASH services were extremely poor in health facilities, hindering access to safe water and hygiene to 1.8 billion people.

The costs of achieving minimal WASH safety would be modest, ranging from US$ 6.5 billion to US$ 9.6 billion in the 46 least developed countries, less than half of which represent initial investments and the rest the costs of maintaining services until at least 2030. These represent 4–6% of the recurrent health spending in these countries *(84)*.

Furthermore, WHO and OECD have recently worked together to assess the return on investment on a global scale of IPC interventions to prevent health care-associated SARS-CoV-2 infection among health workers. Three IPC interventions were selected for the model: enhanced hand hygiene, increased access to PPE and IPC training combined with increased access to PPE. The analysis covered seven geographical regions, including members of the OECD and countries in the six WHO regions.

During the first six months of the COVID-19 pandemic, all IPC interventions tested would have averted SARS-CoV-2 infections among health workers, generating substantial net savings (up to US$ 7.23 billion for the intervention, including PPE combined with training) in all regions tested. The most cost-saving intervention would have been a combined approach where access to appropriate PPE was improved in combination with IPC training and education (WHO and OECD, unpublished data).

More specifically, appropriate availability and rational use of PPE combined with rapid IPC training and education could have halved SARS-CoV-2 infections among health workers in non-OECD countries in the Americas, Europe and countries in South-East Asia. The same intervention could have averted around one in every three new infections in the other WHO regions – the African Region, Eastern Mediterranean Region, Western Pacific Region – and the OECD countries.
The vital need to invest in increasing access to PPE and IPC training and education is demonstrated by the estimated substantial gains in the tune of US$ 7.23 billion net savings (savings remaining after taking into account the costs associated with scaling up the interventions) (WHO and OECD, unpublished data).

As a part of the public health response to the COVID-19 pandemic, a well-equipped national IPC programme already in place at the start of the pandemic would have driven community and workplace infection prevention. These would have included appropriate screening strategies, consistent use of respiratory protection and other PPE, and hand hygiene and other preventive behaviours, taking into consideration the specifics of culture and resources in each setting. In practice, the non-pharmaceutical interventions that worked in decreasing the spread of disease and minimizing its impact on societies were mainly preventive strategies adapted from IPC practice in health care.

CHAPTER 8.

WHO's approaches to IPC improvement

Chapter 8. WHO's approaches to IPC improvement

Building the foundations for IPC implementation and improvement

In 2005, WHO decided to prioritize attention and investments towards the prevention of HAIs, in the context of patient safety. WHO's "Clean Care is Safer Care" programme *(144)* was established within the Patient Safety Programme in 2005 to provide technical support and leadership to strengthen IPC around the world. It was the first Global Patient Safety Challenge, symbolising the importance of IPC. This programme had a predominant focus on hand hygiene improvement but was also covering other critical aspects such as injection safety and WASH in health care facilities. As part of this major effort to improve hand hygiene in health care, WHO launched a global campaign entitled "Save Lives: Clean Your Hands" in 2009. This campaign continues to secure strong support both at the facility and country level, in particular on World Hand Hygiene Day *(145)*, celebrated on 5 May every year.

Over the following years, the work on IPC has been expanded to many other areas and has been tackled in a comprehensive manner across several departments in both WHO headquarters and regional offices. The actions and products of many stakeholders supporting IPC at the international level have also been critical to advance technical support, implementation and country capacity building. Many of these stakeholders are part of the WHO Global IPC Network *(146)* and their work is well documented and embraced by WHO.

In early 2017, WHO and members of the WHO Global IPC Network issued a call for action and identified priorities for the next five years, at both the global and the country levels *(147)*. The identification of priorities at the global level (Table 8.1) represented the recognition that there was a need to intensify IPC support to countries and the international community.

It is important to acknowledge that a number of these priorities were promptly addressed by WHO, partners and the international IPC community and significant progress has been made since 2017 (Table 8.1).

Table 8.1. Priorities set in 2017 for IPC at the global level, with achievements as of March 2022

Priorities for IPC at the global level	Status of progress
Strengthen IPC in the health system perspective	
Strengthen IPC visibility and advocacy: convince decision-makers and stakeholders	Ongoing
Lead on IPC knowledge development: create standardised curricula templates that can be adapted locally ("adapt to adopt") and stimulate further research on priority areas	Achieved *(1)* and ongoing
Foster and promote IPC as a marker of quality: establish international IPC minimum standards	Achieved *(3, 148)*
Build active networks and stronger communications: ensure that patient safety and quality improvement leaders, as well as other health workers across all disciplines, are engaged to advocate for IPC	Achieved *(146, 149, 150)* and ongoing

Priorities for IPC at the global level	Status of progress
Elevate the role of IPC specifically to better combat AMR	
Strengthen the power to act: secure support for a "top-down" chief executive approach, empower IPC leads	Significant reinforcement needed
Improve evidence presentation to leaders: effectively outline available data and other information on the impact of IPC solutions on AMR	Achieved *(151–153)* and ongoing
Expand the narrative: help people visualise how IPC programmes can lead to AMR risk reduction	Achieved *(151, 152, 154, 155)* and ongoing

AMR: antimicrobial resistance; IPC: infection prevention and control.
Source: Adapted from *(147)*.

Already in 2008, WHO had convened experts to identify core components of IPC programmes and countries started to adopt and adapt them to their needs and reality.

Reflecting on the aftermath of the devastating outbreak of Ebola virus disease in West Africa, in 2015, WHO decided to build stronger foundations to the work on the IPC core components and developed comprehensive, evidence-based and consensus-based guidelines *(2)* (see Fig. 3.1), with the support of many IPC stakeholders and field implementers.

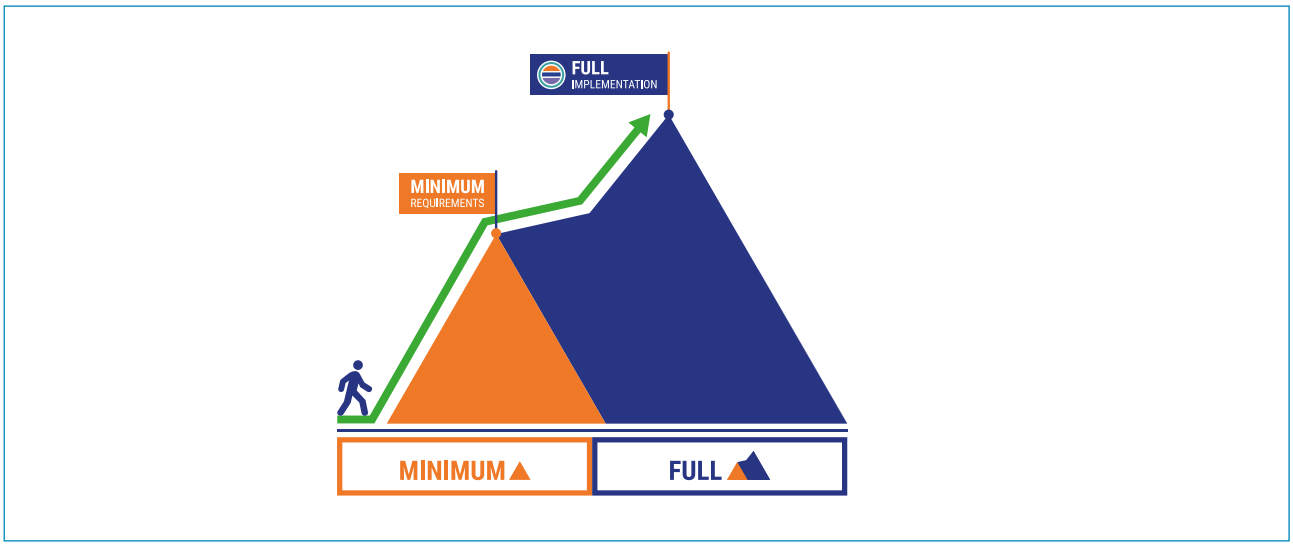
Recognising that the fulfilment of all IPC core components takes time and that countries may be at different stages of progress, with different capacities, available opportunities and resources, WHO addressed the global priority "to establish international IPC minimum standards" by developing the IPC "minimum requirements" *(3)*. These were directly derived from the IPC core components through a consensus-building process involving IPC stakeholders, experts and field implementers from around the world.

The minimum requirements represent the starting point for undertaking the journey to build strong and effective IPC programmes at the national and facility-level (Fig. 8.1) and should be in place in all countries and health care facilities to support further progress towards full and sustained implementation of all IPC core components *(2)* (see Annex 2).

In particular, for countries where IPC measures are limited or non-existent, it is critical to start by ensuring that at least minimum requirements for IPC *(3)* are in place as soon as possible, both at the national and facility level. Countries can then gradually progress to the full achievement of all requirements of the IPC core components *(2)* according to local priority plans (see Annex 2).

Whether applying the minimum requirements or full requirements, the implementation of the IPC core components should always be tackled using a stepwise approach, based on a careful assessment of the status of the IPC programme and local activities. A country or a health care facility may not be able to aim at putting in place all core components or even all minimum requirements at the same time.

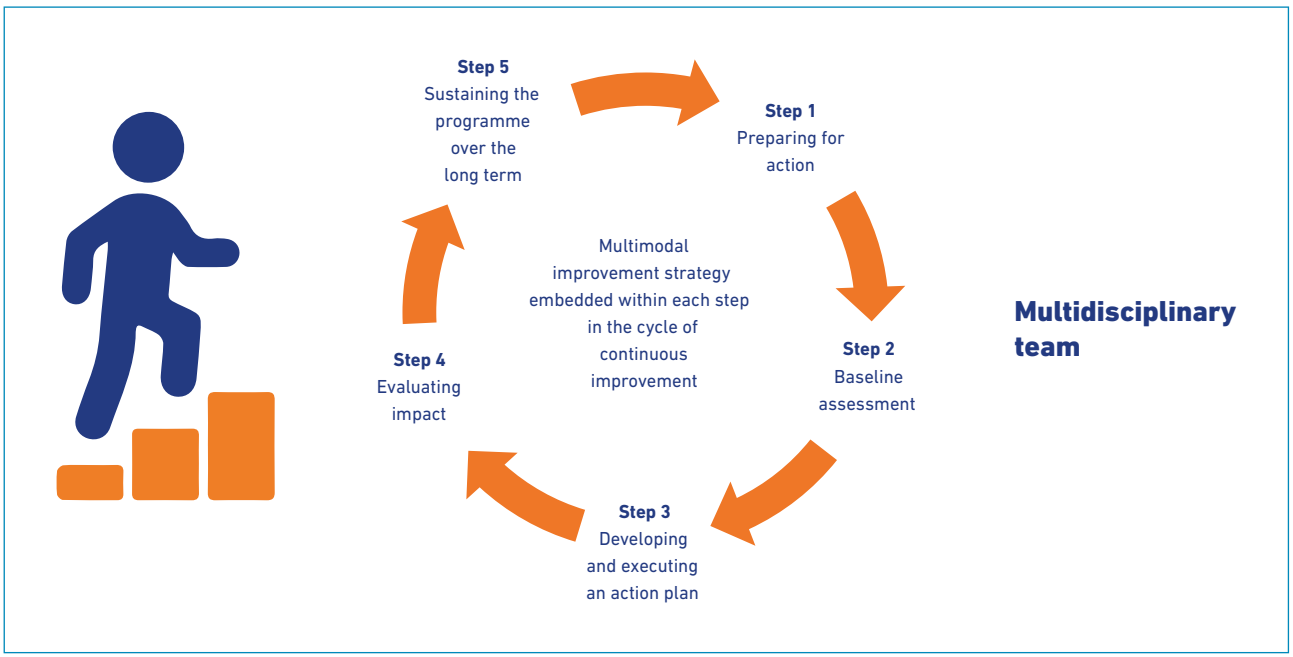
Fig. 8.1. Minimum versus full requirements to achieve effective IPC programmes



Source: *(3)*.

To undertake this process, WHO proposes a five-step cycle of implementation *(4, 5)* (Fig. 8.2. and Table 8.3) to support any IPC improvement intervention or programme, based on implementation and quality improvement science.

Fig. 8.2. The five-step implementation cycle to IPC improvement



The five-step improvement cycle approach is meant to be used for the management and planning of IPC programmes in general, as well as for specific improvement interventions (for example, hand hygiene or injection safety interventions). Each step (Box 8.3) is relevant to the process of improvement and the cycle should be continuously used and refreshed for several years for each IPC intervention, in order to ensure impact and sustainability.

With this approach, assessments should be conducted using the same standardized tools (national and facility level tools are available from WHO) *(70, 75, 97, 105)* for every evaluation step and in the spirit of improvement. This means that both strengths/achievements and gaps/challenges should be identified and, while the former can be used to reward and encourage local players, the latter should drive action to develop or refresh plans for improvement in a positive (and not punitive) way.

However, depending on the local situation, some steps may already have been achieved, while others may need gradual development or to be revisited.

Box 8.3. Description of the five-step cycle to IPC improvement

Step 1. Preparing for action

This step aims to ensure that all of the prerequisites that need to be in place for the success of an IPC intervention or programme are considered. These include starting to think about the identification of key players and their roles and responsibilities, as well as the necessary resources (human and financial), infrastructure/s, planning and coordination of activities. Of note, the preparations made can be refined through Step 3 after conducting Step 2.

Step 2. Baseline assessment

Conducting an objective baseline assessment of the current situation of the IPC core components and minimum requirements is critical for the identification of existing strengths and gaps. National and facility level standardized tools to assess the IPC core components and WASH are available from WHO.

Step 3. Developing and executing an action plan

Developing a tailor-made action plan that addresses the local reality and focuses on the priority areas for improvement identified through the baseline assessment is essential. The development and execution of an action plan should be based upon a multimodal improvement strategy and supported by a dedicated budget.

Step 4. Assessing impact

Conducting a follow-up assessment using the same tools as in step 2 is crucial to determine the effectiveness of the plan and achievement of the minimum requirements.

Step 5. Sustaining the programme over the long term and tackling additional priorities

Further review of the long-term impact and acceptability of the ongoing action plan, and ensuring its sustainability, are important steps in the cycle of improvement. This allows also an evaluation of the next steps and priorities for implementation of all minimum requirements and the IPC core components in full.

IPC: infection prevention and control; WASH: water, sanitation and hygiene.

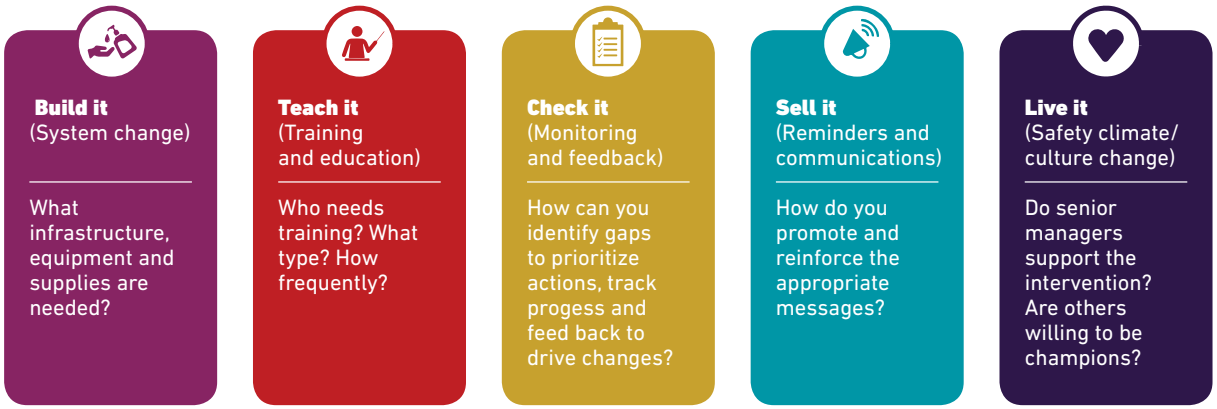
Based on compelling evidence and its own research especially in the field of hand hygiene, WHO recognized that MMIS *(2, 73, 156-158)* are the gold standard approach to implementing IPC interventions in the field. The use of the MMIS is the way to achieve the system change, climate and behaviour that supports IPC progress and, ultimately, the measurable impact that benefits patients and health workers.

The WHO MMIS comprises the following five elements *(156)*: 1) system change; 2) training and education; 3) monitoring and feedback; 4) reminders and communications; and 5) a safety culture. In other words, the strategy involves 'building' the right system, 'teaching' the right things, 'checking' the right things, 'selling' the right messages, and ultimately 'living' IPC throughout the entire health system (Fig. 8.3). Lessons from the field of implementation science suggest that targeting only one of these five elements (that is, using a 'unimodal' strategy) is more likely to result in improvements that are short-lived and not sustainable.

The MMIS was originally conceived for hand hygiene improvement but has also been used for other IPC improvements.

When developing an action plan to improve priority IPC interventions or address an identified gap, multimodal thinking means systematically asking targeted questions (Fig. 8.3).

Fig. 8.3. Multimodal thinking



In order to implement the MMIS and five-step implementation cycle, WHO developed a wide range of implementation tools *(155)* in a number of technical areas. These include manuals, training and promotion resources and assessment tools.

The five-step cycle and the MMIS can be applied to any IPC intervention and WHO adapted them to interventions for injection safety, the prevention of surgical site infections *(159, 160)*, and the prevention and control of carbapenem-resistant organisms *(161, 162)*.

Improving WASH and waste management in health care facilities

IPC and WASH interventions in health care facilities are complementary and indeed, the IPC Core Component 8 inherently includes WASH standards and strategies which WHO/UNICEF have developed *(163, 164)*. These strategies represent another excellent example of MMIS and step-wise approach perfectly aligned with the IPC ones just mentioned: the WHO/UNICEF strategy for WASH *(165)*. This strategy includes eight practical steps, which are based on a distillation of "what works" from lessons learned in over 30 countries *(165)*.

Specific steps include defining national roadmaps and setting targets, establishing and implementing national standards, engaging communities, and conducting operational research and learning (Fig. 8.4). All 194 WHO Member States committed to implementing these steps in the 2019 World Health Assembly Resolution on WASH in health care facilities, which also calls for more investment and efforts on IPC *(166)*.

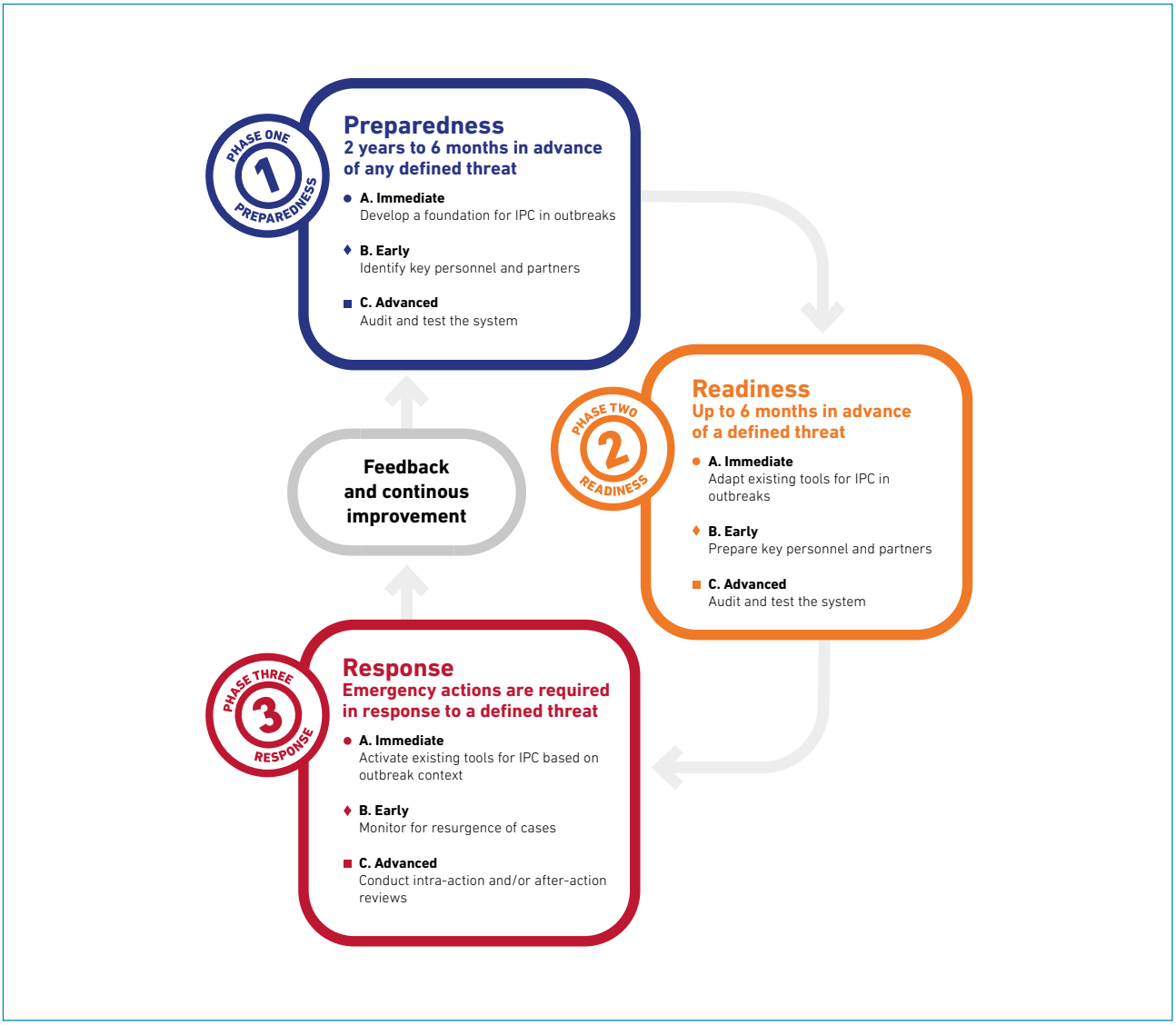
Strengthening IPC within outbreak preparedness, readiness and response

To ensure IPC implementation and optimize operations in the context of outbreaks, WHO developed a practical framework of actions for strengthening IPC within outbreak preparedness, readiness and response *(167)* (Fig. 8.5). This framework provides a stepwise approach to IPC outbreak management, and is accompanied by a toolkit providing helpful resources.

Fig. 8.4. Eight practical steps for WASH improvement

Source: *(165)*.

Fig. 8.5. IPC at the core of the preparedness, readiness and response framework



Source: *(167)*.

Key areas of work to make further progress in IPC in the next five years

Several additional achievements need to be attained by WHO and partners at the global and regional level in order to strengthen coordination and collaboration and in support of country capacity building and progress. Some priorities identified in 2017 remain to be achieved (see Table 8.1).

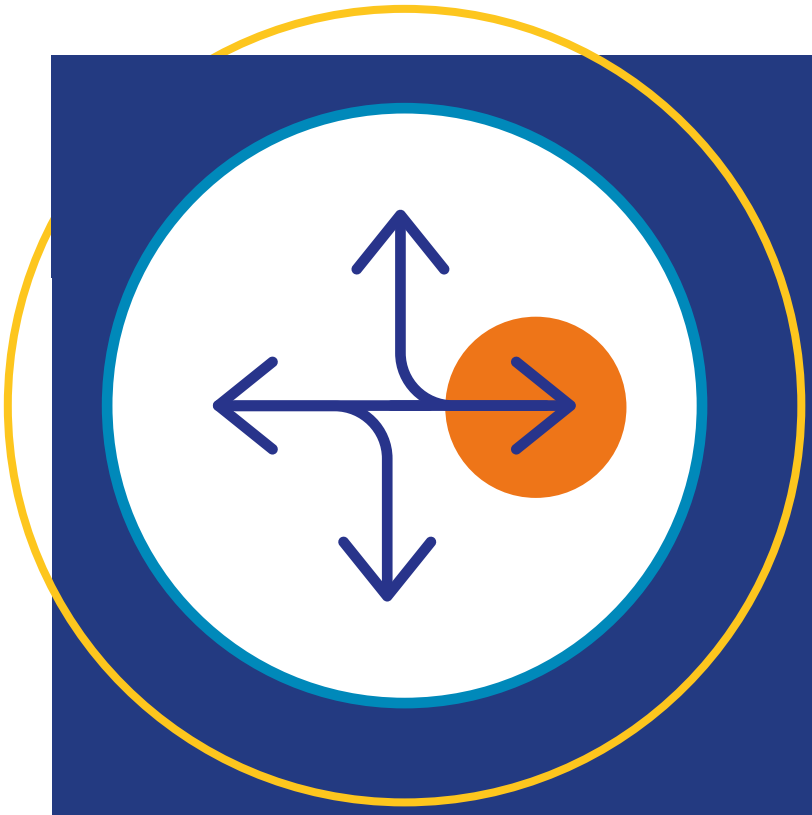
Furthermore, some key areas of work where progress is needed in IPC have been identified and WHO will work on them across its three levels and in close consultation with partners and member states in the next five years (Table 8.4).

Table 8.4. Key areas of work for further progress for IPC at the global level

Core Component	Key directions at the global level
CC1	• Co-develop with Member States a global IPC strategy to support IPC programmes institutionalization at national and facility level • Support and adapt horizontal approaches for IPC programmes across all levels of the health system and across other health programmes, (e.g., HIV, LTCF, PHC and TB treatment centres) • Strengthen IPC integration within national policies, strategies and action plans on AMR, patient safety and quality of care • Develop IPC accreditation/standards for all levels of care that can feed into wider system-wide efforts on accreditation
CC2	• Develop a comprehensive set of evidence-based guidelines covering all relevant IPC measures, including embedding them in clinical practices (e.g. maternal and neonatal care) • Develop targeted evidence-based IPC guidelines to address the most frequent antimicrobial-resistant pathogen • Strengthen linkages between IPC guideline implementation and quality improvement efforts at facility level • Strengthen country capacity to develop or adapt national IPC guidelines or guidance, especially in response to emerging threats
CC3	• Develop pre-graduate, in-service, and postgraduate IPC curricula • Develop a global strategy for IPC training and education • Partner with international organizations/societies to
CC4	• Develop adapted HAI definitions for low-resource settings • Develop key requirements for HAI surveillance systems and standardized protocols for HAI surveillance • Facilitate standardized data collection • Support improvement of quality laboratory standards
CC5	• Develop multimodal improvement strategies and tools for IPC guideline adaptation and implementation • Develop guidance on how to strengthen linkages between IPC activities and wider efforts on quality improvement at facility level
CC6	• Co-develop with Member States a global monitoring framework for IPC • Provide regular IPC monitoring data of global, regional and national IPC progress, also in the context of health systems, AMR, IHR and other programmes • Develop new monitoring tools to assess point-of-care IPC practices and IPC programmes and structures at different levels of the health system
CC7	• Support increasing the health work force • Support increasing human resources dedicated to IPC activities • Highlight IPC as a fundamental element of health workers' protection and occupational health strategies • Develop guidance for adequate IPC infrastructures within health facilities, including for specific infectious diseases such as COVID-19, EVD and TB

Core Component	Key directions at the global level
CC8	• Strengthen collaborations with key players in WASH in health care facilities • Support country roadmaps for hand hygiene and WASH improvement • Support mechanisms to improve access and appropriate use of PPE

AMR: antimicrobial resistance; CC1: IPC programmes; CC2: National and facility level IPC guidelines; CC3: IPC education and training; CC4: HAI surveillance; CC5: Multimodal improvement strategies for implementing IPC activities; CC6: IPC monitoring, evaluation and feedback; CC7: workload, staffing and bed occupancy; CC8: built environment, equipment; EVD: Ebola virus disease; HAI: health care-associated infection; HIV: human immunodeficiency virus; IHR: International Health Regulations; IPC: infection prevention and control; LTCF: long-term care facilities; PHC: primary health care; PPE: personal protective equipment; TB: tuberculosis.



CHAPTER 9.

Directions and priorities for countries

Chapter 9. Directions and priorities for countries

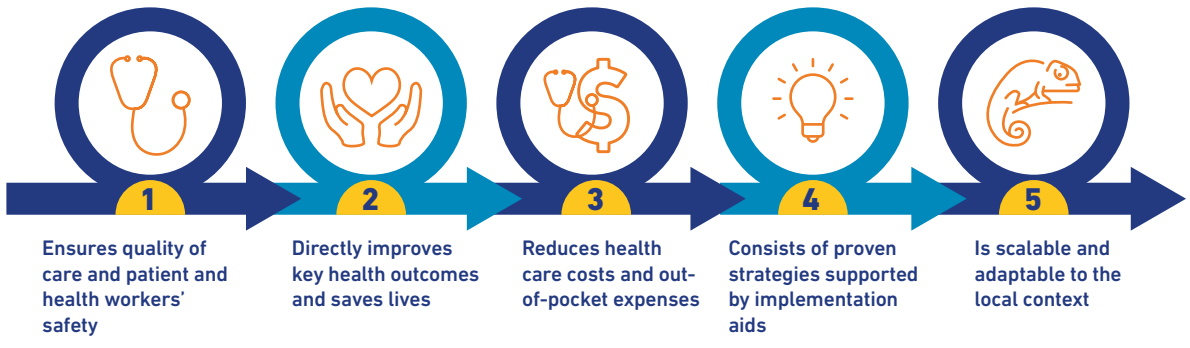
As documented in the preceding pages, weak or inappropriate IPC practices during everyday health care delivery cause harm to hundreds of millions of patients every year. Chapters 3 to 5 of this report also highlighted that, although some progress has been made (particularly in the last year), the implementation of IPC programmes is still lagging.

There is a clear dichotomy between having programmes, policies and guidelines, and the lack of consistent implementation coordinated at the national and/or subnational levels and supported by human and financial resources, a strong built environment and robust monitoring and evaluation systems. Across all data sets on IPC indicators at the national and facility level, significant and striking differences emerge in IPC capacity and progress between low- and lower-middle-income countries and the other income levels.

Furthermore, this report has shown IPC to be a tried-and-true approach that is effective and cost-saving. It has the capacity to sustain, or even enhance, successes gained through new drug development or improved antibiotic use. Country examples (see Annex 3) show that nations that treat IPC and WASH capacity building and implementation as critical health priorities, can make progress and protect their patients and health workforce. These country efforts not only benefit their own people and health systems but strongly contribute to the achievement of the health-related Sustainable Development Goals *(168)* and global health security. They also work towards the effective implementation of other major global health priorities, including the IHR *(7)*, AMR action plans, patient and health worker safety and integrated people-centred care. Further, the overarching focus on quality essential health services as part of a primary health care-driven approach to universal health coverage is well-served by strong IPC at all levels of the health service.

This report makes it clear that there are at least five main reasons for investing in IPC (Fig. 9.1) *(169)*.

Fig. 9.1. Five main reasons for investing in IPC



In the 2017 call for action by WHO and members of the WHO Global IPC Network, country priorities for the next five years were identified *(147)*. The call for action noted that there were clearly different levels of progress in IPC. Some had advanced IPC programmes, while others were just beginning to work on IPC. Recognizing this difference, the identified priorities for IPC at the country level included the following *(147)*.

Table 9.1. Country priorities for IPC as defined by the Global IPC Network in 2017

Countries where IPC has just started
• Decisive and visible political commitment, including IPC policy development and enforcement • Availability of resources (both human and infrastructure) • Establishment and execution of IPC programmes at the national and acute health facility levels to ensure advocacy, training and data for future improvement and sustainability • Action to increase availability of in-country IPC knowledge and expertise
Countries with advanced IPC programmes
• Increased accountability with IPC as a quality indicator • Development of advanced information technology tools to support IPC monitoring and implementation • Translation of information through enhanced communications to sustain awareness and engagement • Credible incentives considering the local context to increase compliance rates • Enhanced education and training to embed IPC knowledge across all disciplines

Source: adapted from *(147)*

Since this publication, some progress has been made to strengthen IPC in many parts of the world, but a number of common challenges and barriers stand in the way of accomplishing these priorities, as described in this report. There are competing political agendas, resource constraints, and the constant infodemic of health messages *(170, 171)*. Inevitably, the pace at which change is being achieved in countries varies for historical, logistical, and financial reasons.

Global public health emergencies of international concern – above all, the COVID-19 pandemic – have highlighted and further exacerbated gaps in IPC programmes everywhere, irrespective of the resources available or the national level of income. Other, less-visible health emergencies are also compelling, such as the silent endemic burden of HAIs and AMR, which cause harm to patients every day across all health care systems.

Despite the many efforts made globally to enhance IPC interventions in the past decade – and especially during the COVID-19 pandemic and other public health emergencies of international concern) – there is a risk that the momentum may not be sustained. As soon as the pandemic is over, the newly built IPC programmes and WASH infrastructures could be progressively dismantled, and the attention and resources dedicated to IPC be decreased.

Countries should continue to address IPC as a high priority for health because the implementation and monitoring of IPC programmes contribute to achieving the sustainable development goals (particularly goals 3.1–3.3, 3.8, 3.d.2, and 6) *(168)*.

Political commitment and leadership engagement can be strengthened through those responsible for IPC, WASH, patient safety and quality of care joining forces at the policy level to form a coalition. Such a coalition would result in harmonisation of effort, reduction of waste and inefficiency and ultimately reduction of the risks of HAI, including AMR and outbreaks.

It should be noted that IPC is at the core of a number of existing resolutions and action plans adopted by the World Health Assembly (Fig. 9.2). A summary list of relevant World Health Assembly resolutions and Global Action Plans is given below.

Patient safety

- Resolution WHA72.6 (Global action on patient safety) *(172)*
- Global Patient Safety Action Plan (Strategic objective 3.3 focuses on IPC) *(173)*

Antimicrobial resistance

- Resolution WHA58.27 (Improving the containment of antimicrobial resistance) *(174)*
- Global Action Plan to combat AMR (Objective 3 encompasses IPC) *(68)*

Emergency response

- Resolution WHA48.7 (Revision of the International Health Regulations) *(175)*
- Resolution WHA73.1 (COVID-19 response) *(176)*
- Resolution WHA73.8 (Strengthening preparedness for health emergencies: implementation of the International Health Regulations (2005)) *(177)*
- Resolution WHA74.7 (Strengthening WHO preparedness for and response to health emergencies) *(178)*

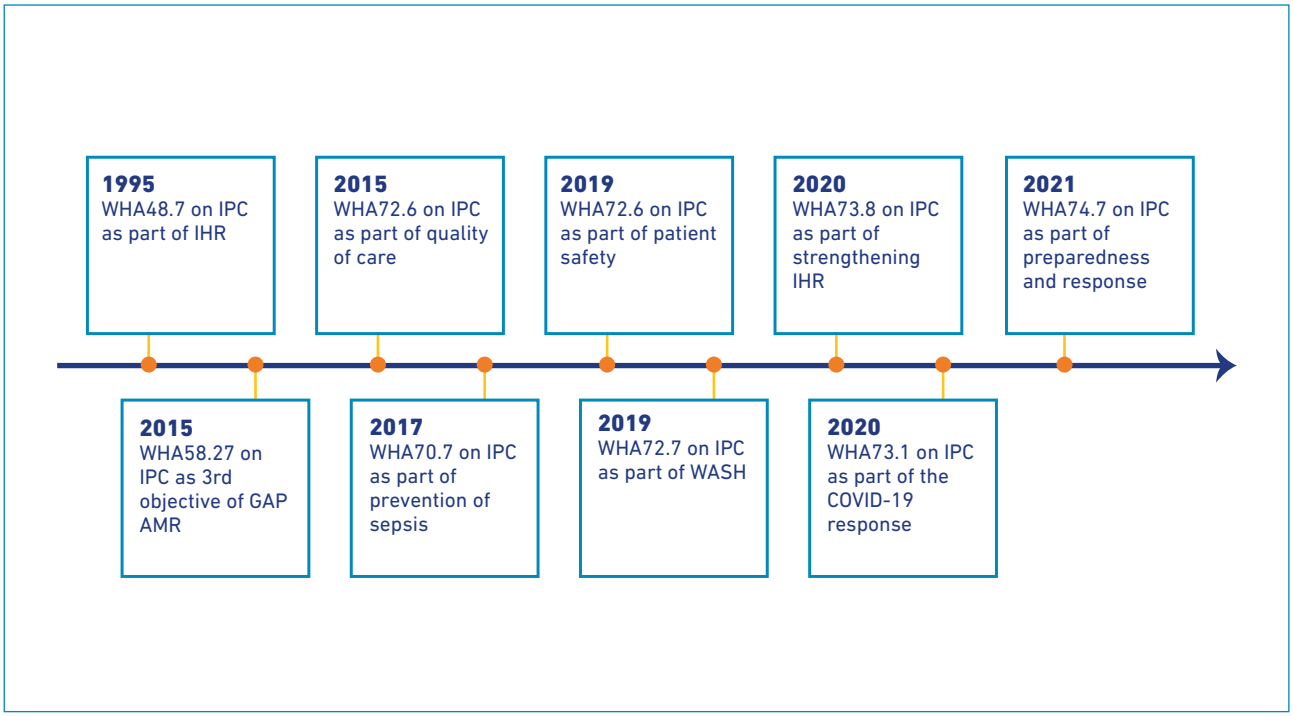
WASH

- Resolution WHA72.7 (Water, sanitation and hygiene in health care facilities) *(166)*

Sepsis

- Resolution WHA70.7 (Improving the prevention, diagnosis and clinical management of sepsis) *(179)*

Fig. 9.2. IPC as a part of other health priorities and World Health Assembly resolutions



AMR: antimicrobial resistance; COVID-19: coronavirus disease 2019; GAP: global action plan; IHR: international health regulations; IPC: infection prevention and control; WASH: water, sanitation and hygiene.

Building upon the 2017 WHO Global IPC Network Call for Action to countries *(147)*, existing resolutions, and the current situation analysis of IPC programmes and IPC implementation, and given the increasing burden of HAIs and AMR, countries should consider critical priorities and directions to address IPC in their national health agendas. International and local stakeholders should commit to support these efforts.

Key priorities for IPC at the country level

1 **Active IPC programmes.** In order to attain the SDGs and respond to the WHA resolutions cited above, all countries should ensure the existence of active IPC programmes. These programmes should have annual plans and dedicated budgets at the national and facility levels according to the WHO core components, to ensure the sustainability of IPC and WASH infrastructure and resources.

2 **IPC minimum requirements.** All countries should put in place at least the minimum requirements for IPC programmes at the national and health care facility levels. Progress in their implementation should be ascertained by monitoring key IPC and WASH indicators in the context of the IPC core components, the IHR, and the WHO/UNICEF JMP for Water Supply, Sanitation and Hygiene.

3 **Political commitment and leadership engagement.** Decisive and visible political commitment and leadership engagement at the highest levels are needed to sustain and improve implementation of functional IPC programmes at the national and facility levels. This includes the allocation of national and local health budgets. Member States, WHO and other global partners should identify targets for IPC investment. These targets could be formulated as a percentage of overall health care expenditure, establishing what is a reasonable amount to commit for the safe and clean provision of quality care. Information about progress towards achieving these targets should be publicly available.

4 **Integration and alignment with other programmes.** While it is of paramount importance to establish specific IPC programmes supported by dedicated trained IPC professionals and budget, IPC activities must be integrated and aligned with those focusing on AMR, quality of care, patient safety, WASH, occupational health and health emergencies, as well as HIV, TB, malaria, hepatitis and maternal/child health programmes. This will emphasize the cross-cutting, horizontal nature of IPC and avoid duplication of other work or vertical implementation.

5 **Embedding IPC within the patient pathway and clinical care.** In order to be practical and save lives, IPC needs to be understood and practised by all those providing services at the point of care. Tools and standard operating procedures are needed to embed IPC practices within patient pathways and adapt them within different clinical care areas, taking workflow, human factors and ergonomics into account. Efforts to improve IPC practices should also be associated with quality improvement and the spirit of the safety climate that should be fostered in all facilities.

6 **Regulations and legal frameworks.** Regulations and legal frameworks are needed to enforce IPC requirements and policies through health facility accreditation systems and other mechanisms for accountability agreed upon at international level such as IHR, and adapted locally. Among other things, these mechanisms should enforce key infrastructural minimum requirements, such as those pertaining to overcrowding, understaffing and the built environment including WASH. They should require reporting of key IPC performance indicators and targets.

7 **IPC training and education at all levels.** The IPC core components cannot be implemented without competent IPC professionals and health workers understanding IPC principles and practices. Thus, the creation and implementation of accredited IPC curricula within pre-graduate health courses and in-service continuous education is essential. Similarly, IPC postgraduate curricula and courses are needed to create local IPC expertise. The WHO IPC core competencies *(1)* can be used as a template.

8 **Human resources and career pathway for IPC.** The lack of human resources dedicated to IPC as well as inadequate health care staffing at the facility level should be urgently addressed in countries *(2, 3, 180)*. IPC professionals should be offered a recognized career pathway and empowered with a clear mandate and authority, while being held accountable for implementation and reporting impact. The inclusion of IPC professionals into the structure of hospital executive boards and senior management can ensure that IPC and WASH are prioritized.

9 **Surveillance of HAIs and AMR in health care.** Establishing the local epidemiology of HAIs and promptly detecting epidemic-/pandemic-prone and emerging antimicrobial-resistant microorganisms are critical functions to address patient harm and health worker infection risks. Thus, national IPC programmes should establish functioning and quality-controlled systems for HAI and AMR surveillance, according to the Global AMR and antimicrobial use surveillance system and other standardized HAI and AMR surveillance systems (e.g. the one coordinated by ECDC).

10 **Quality diagnostics.** Access to quality laboratory diagnostics and services is an essential component of IPC. Diagnostics enable identification of pathogens and inform the surveillance of AMR and HAIs, and permit early outbreak detection. They enable the tailoring of IPC to the modes of transmission and informing antimicrobial stewardship and appropriate clinical management.

11 **Monitoring IPC programmes.** A national monitoring and evaluation programme and system should be established to assess the extent to which IPC standards are being met and activities are being performed according to the programme's goals and objectives. IPC monitoring and evaluation should be integrated into broader national health sector planning and review processes, monitoring and evaluation frameworks and in-country information systems and monitoring tools. Detailed and multilevel assessments of IPC programmes should be undertaken regularly. The new WHO Global IPC Portal *(181)* offers the opportunity to undertake this type of monitoring in a protected confidential space and using standardized tools.

12 **Using data for action and communications.** Data collection should be used for action and to improve health outcomes. Integrating IPC monitoring and evaluation into national planning and review processes can help to ensure this happens. IPC monitoring results and surveillance data should be interpreted and used locally, sub-nationally and nationally to identify existing strengths and critical gaps so that targeted and feasible improvement plans can be collectively elaborated and implemented. Thus, evaluation feedback to all involved key players, from senior managers to all concerned staff, should be ensured, including using technologies that facilitate automatic reporting and point-of-care feedback.

Consistent communications regarding IPC matters are needed, especially during outbreaks. Communication messages and channels should be carefully tailored and adapted to different audiences, including the community, It is important that they come from authoritative sources and are based on science.

It is both possible and feasible to embrace these priorities and implement the WHO core components for IPC and WASH, and it will save lives and costs to the health system.

Several countries have done this in a successful manner, even with limited resources and constrained situations (see the country examples presented in the Annex 3). Furthermore, the biggest cost incurred owing to the lack, or inadequate implementation, of IPC is in the loss of trust that communities have in the ability of the health care system to provide safe care and protection through the clinical cycle.

In collaboration with WHO and other partners, the Africa Centres for Disease Control and Prevention (Africa CDC) has developed the first-ever IPC legal framework, which is backed by the African Union's Heads of State and Government, based on the African Common Position on AMR *(99)*. This is a tool based on the core components of IPC programmes, and it serves two purposes: first, it may be used by a Member State in reviewing existing legal instruments, so as to understand more fully its existing legal capacity to support IPC; second, it identifies ways in which a Member State's legal instruments could be amended to increase support for a national IPC programme.

No country or health system, even the most developed or sophisticated, can claim to be free of HAIs.

Equally, there is no need for anyone to be unnecessarily exposed to infection during health care delivery as a result of suboptimal IPC practices, or because of a lack of equipment or standard operating procedures.

It has never been more urgent to prevent HAIs and AMR now and in the future.

CHAPTER 10

Conclusions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Chapter 10. Conclusions

This first global report on IPC marks a critical point in time when the COVID-19 pandemic and previous large outbreaks have shown the undeniable risk of infection spreading through health care facilities and causing harm to patients, health workers and visitors. This risk was known before as the less-well-acknowledged endemic burden of infection and antimicrobial resistance, which affects millions of patients every year in all countries. The report provides the epidemiological evidence about the endemic and epidemic burden of HAIs and AMR, including the context of the COVID-19 pandemic. It makes the business case for IPC as a highly impactful and cost-effective solution, as a way both to avoid harm and save lives, and to reduce costs to the health system.

For the first time, this report collates data and new evidence from many sources to depict the global situation of IPC programmes at the national and facility levels around the world. It shows that between 33% and 45% of countries either did not have a national IPC programme at all or, if an IPC programme existed, that it was not active, according to surveys conducted in the last two years. A very recent WHO study also highlighted that only 3.8% of countries had all of the minimum requirements for IPC in place, while 77.4% met half of them. In a WHO global survey conducted in 2019, IPC programmes at the facility level around the world were classified on a scale from "inadequate" to "advanced", with an average "basic" level in LICs. This survey also showed that only 15.2% of participating facilities met all of the IPC minimum requirements, whereas 92.9% met at least half of them. Finally, despite the surge in response to the COVID-19 pandemic, it was recently found that in some countries not all the essential IPC human resources, supplies and infrastructures for COVID-19 response are available, two years into the pandemic.

These and other data show that the IPC structure is still non-existent or insufficient in a high proportion of the countries. There is a huge gap in implementation at the point of care, with IPC programmes not functioning appropriately and sustainably in an enabling environment. Furthermore, a significantly lower level of IPC progress and implementation was shown in low-income and lower middle-income countries across all studies.

Despite this bleak picture, some remarkable improvements were also reported by countries in the last year, particularly in the following areas: having an appointed IPC-trained national focal point, a budget dedicated to IPC and in-service IPC curriculum; developing national IPC guidelines and a national programme or plan for HAI surveillance; using multimodal strategies for IPC interventions; and establishing hand hygiene compliance as a key national indicator.

This demonstrates clear country engagement and progress in scaling-up actions to put in place minimum requirements and core components of IPC programmes. This is being strongly supported by WHO and other key players.

Sustaining and further expanding this progress in the long-term is a critical need that requires urgent attention and investments.

There are many opportunities to strengthen IPC which go well beyond outbreak response.

Indeed, IPC plays a central role in achieving improvements and saving lives in the context of other major global health priorities, including combating AMR, patient and health worker safety, integrated people-centred high-quality care, sepsis prevention and WASH.

Further, the overarching focus on quality essential health services as part of a primary health care-driven approach to universal health coverage is well-served by strong IPC at all levels of the health system.

Within this report, WHO provides some key directions and priorities to accelerate efforts and progress at the local, national and global levels.

These priorities can be summarized in the following main three areas:

1. **Political commitment and policies** are needed to scale up and enforce the core components of IPC programmes and the related minimum requirements, including through sustained financing, legal frameworks and accreditation systems.
2. **IPC capacity building and creation of IPC expertise** should be developed as a clinical and public health specialty, including through IPC training and continuous education across different levels and health disciplines, and career pathways for IPC professionals. Embedding IPC within all clinical pathways is critical to influence the quality of health care delivery.
3. **Systems should be developed to monitor, report, and act** on key indicator data. This should include surveillance of HAI and emerging sentinel pathogens, monitoring of a range of IPC and WASH indicators and efficient management of the supply chain.

Across these three areas, integration and alignment with other programmes, coordination among government sectors, and collaboration with the most critical stakeholders are paramount.

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Annex 1

Glossary

Antimicrobial resistance (AMR) and use: AMR threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi. AMR occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death. As a result, the medicines become ineffective and infections persist in the body, increasing the risk of spread to others. Antimicrobials - including antibiotics, antivirals, antifungals and antiparasitics - are medicines used to prevent and treat infections in humans, animals and plants. Microorganisms that develop antimicrobial resistance are sometimes referred to as "superbugs" *(1)*.

Country designations: WHO Member States are grouped into four income groups (low, lower-middle, upper-middle and high) according to the World Bank's analytical classification of economies calculated using the World Bank Atlas method and based on the gross national income (GNI) per capita of each country. For the 2022 fiscal year, low-income countries (LICs) are defined as those with a gross national income (GNI) per capita of $1045 or less in 2020; lower-middle-income countries are those with a GNI per capita between $1046 and $4095; upper-middle-income countries are those with a GNI per capita between $4096 and $12 695; and high-income countries (HICs) are those with a GNI per capita of $12 696 or more. We use low- and middle-income countries (LMICs) to refer to a grouping of the first three income levels (i.e., low-income, lower-middle-income and upper-middle-income countries) *(2)*.

Hand hygiene: A general term referring to any action of hand cleansing, that is, the action of performing hand hygiene for the purpose of physically or mechanically removing dirt, organic material, and/or microorganisms *(3)*.

Health care-associated infection (also referred to as "nosocomial" or "hospital acquired infection"): an infection acquired by a patient during the process of care (including preventive, diagnostic and treatment services) in a hospital or other health care facility, which was not present or incubating at the time of admission; HAIs can also appear after discharge. HAIs are also acquired by health workers during health care delivery, and by visitors *(4)*.

Infection prevention and control (IPC) minimum requirements: IPC standards that should be in place at both national and health facility level to provide minimum protection and safety to patients, health care workers and visitors, based on the WHO core components for IPC programmes. The existence of these requirements constitutes the initial starting point for building additional critical elements of the IPC core components according to a stepwise approach based on assessments of the local situation *(5)*.

Infodemic: An infodemic is too much information including false or misleading information in digital and physical environments during a disease outbreak *(6)*.

IPC committee: A multidisciplinary group with interested stakeholders across the facility, which interacts with and advises the IPC team. For example, the IPC committee could include senior facility leadership; senior clinical staff; leads of other relevant complementary areas, such as biosafety, pharmacy, microbiology or clinical laboratory, waste management, water, sanitation and hygiene services and quality and safety, where in place (*5*).

IPC professional: Health care professional (medical doctor, nurse, or other health-related professional) who has completed a certified postgraduate IPC training course, or a nationally or internationally recognized postgraduate course on IPC, or another core discipline including IPC as a core part of the curriculum as well as IPC practical and clinical training *(7)*.

IPC link person: Nurse or doctor (or other health professional) in a ward or within the facility (for

example, staff working in clinical services such as intensive care unit or maternal and neonatal care, or water, sanitation and hygiene or occupational health professionals) who has been trained in IPC and links to an IPC focal point/team at a higher level in the organization (for example, IPC focal point/team at the facility or district level). IPC is not the primary assignment of this professional but, among others, he/she may undertake tasks in support to IPC, including for example supporting implementation of IPC practices; providing mentorship to colleagues; monitoring activities; and alerting on possible infectious risks *(7)*.

IPC focal point: IPC professional (according to the above definition) appointed to be in charge of IPC at the national, sub-national or facility/organization level (*7*).

Multimodal strategy: A multimodal strategy comprises several components or elements (three or more, usually five) implemented in an integrated way with the aim of improving an outcome and changing behaviour. It includes tools, such as bundles and checklists, developed by multidisciplinary teams that take into account local conditions. The five most common elements include: (i) system change (availability of the appropriate infrastructure and supplies to enable infection prevention and control good practices); (ii) education and training of health care workers and key players (for example, managers); (iii) monitoring infrastructures, practices, processes, outcomes and providing data feedback; (iv) reminders in the workplace/communications; and (v) culture change within the establishment or the strengthening of a safety climate (*5*).

Personal protective equipment (PPE): Equipment and/or clothing worn by personnel to provide a barrier against biological agents, thereby minimizing the likelihood of exposure. PPE includes, but is not limited to, laboratory coats, gowns, full-body suits, gloves, protective footwear, safety glasses, safety goggles, masks and respirators *(8)*.

Point of care: The place where three elements come together: the patient, the health care worker and care or treatment involving contact with the patient or his/her surroundings (within the patient zone) (*3*).

Primary health care facilities: Facilities that provide outpatient services, family planning, antenatal care, maternal, newborn and child health services (including delivery), for example, health centres, health posts and small district hospitals *(9)*.

Universal health coverage (UHC): UHC means that all individuals and communities receive the health services they need without suffering financial hardship. It includes the full spectrum of essential, quality health services, from health promotion to prevention, treatment, rehabilitation, and palliative care across the life course *(10)*.

Annex 2: Recommendations and minimum requirements for the core components of IPC programmes, at national and health care facility level

<table>
<tr><td>Recommendations for Core Component 1: IPC programmes</td><td>National level
Active, stand-alone, national IPC programmes with clearly defined objectives, functions and activities should be established for the purpose of preventing HAI, promoting patient safety and combating AMR through IPC good practices.
National IPC programmes should be linked with other relevant national programmes and professional organizations.</td><td>Facility level
An IPC programme with a dedicated, trained team should be in place in each acute health care facility for the purpose of preventing HAI and combating AMR through IPC good practices.</td></tr>
<tr><td rowspan="3">Minimum requirements</td><td rowspan="3">A functional IPC programme should be in place, including at least:
• one full-time focal point trained in IPC; and
• a dedicated budget for implementing IPC strategies/plans.</td><td>Primary care: IPC trained health care officer
• A trained IPC link person, with dedicated (part-) time in each primary health care facility
• One IPC-trained health care officer at the next administrative level (for example, district) to supervise the IPC link professionals in primary health care facilities</td></tr>
<tr><td>Secondary care: functional IPC programme
• A trained IPC focal point (one full-time trained IPC Officer [nurse or doctor]) at the recommended ratio of 1:250 beds with dedicated time to carry out IPC activities in all facilities (for example, if the facility has 120 beds, one 50% full-time equivalent dedicated officer)
• Dedicated budget for IPC implementation</td></tr>
<tr><td>Tertiary care: functional IPC programme
• At least one full-time trained IPC officer (nurse or doctor) with dedicated time per 250 beds
• IPC programme aligned with the national programme and with a dedicated budget
• Multidisciplinary committee/team
• Access to microbiology laboratory</td></tr>
</table>

<table>
<tr><td>Recommendations for Core Component 2: National and facility level IPC guidelines</td><td colspan="2">National and facility level
Evidence-based guidelines should be developed and implemented for the purpose of reducing HAI and AMR. The education and training of relevant health care workers on the guideline recommendations and the monitoring of adherence with guideline recommendations should be undertaken to achieve successful implementation.</td></tr>
<tr><td rowspan="2">Minimum requirements</td><td rowspan="2">National IPC guidelines
• Evidence-based, ministry-approved guidelines adapted to the local context and reviewed at least every five years</td><td>Primary care: facility-adapted standard operating procedures (SOPs) and their monitoring
• Evidence-based facility-adapted SOPs based on the national IPC guidelines
• As a minimum, the facility SOPs should include:
  ○ hand hygiene;
  ○ decontamination of medical devices and patient care equipment;
  ○ environmental cleaning;
  ○ health care waste management;
  ○ injection safety;
  ○ health care worker protection (for example, at least post-exposure prophylaxis, vaccinations);
  ○ aseptic techniques;
  ○ triage of infectious patients; and
  ○ basic principles of standard and transmission-based precautions.
• Routine monitoring of the implementation of at least some of the IPC guidelines/SOPs</td></tr>
<tr><td>Secondary and tertiary care: all requirements as for the primary health care facility level, with additional SOPs on:
• standard and transmission-based precautions (for example, detailed, specific SOPs for the prevention of airborne pathogen transmission);
• septic technique for invasive procedures, including surgery;
• specific SOPs to prevent the most prevalent HAIs based on the local context/epidemiology; and
• occupational health (detailed).</td></tr>
</table>

<table>
<tr><td>Recommendations for Core Component 3: IPC education and training</td><td>National level
The national IPC programme should support education and training of the health workforce as one of its core functions.</td><td>Facility level
IPC education should be in place for all health care workers by using team- and task-based strategies that are participatory and include bedside and simulation training to reduce the risk of HAI and AMR.</td></tr>
<tr><td rowspan="3">Minimum requirements</td><td rowspan="3">National training policy and curriculum
National policy that all health care workers are trained in IPC (in-service training)
An approved IPC national curriculum aligned with national guidelines and endorsed by the appropriate body
National system and schedule of monitoring and evaluation to check on the effectiveness of IPC training and education (at least annually)</td><td>Primary care: IPC training for all front-line clinical staff and cleaners upon hire
All front-line clinical staff and cleaners must receive education and training on the facility IPC guidelines/SOPs upon employment.
All IPC link persons in primary care facilities and IPC officers at the district level (or other administrative level) need to receive specific IPC training.</td></tr>
<tr><td>Secondary care: IPC training for all front-line clinical staff and cleaners upon hire
All front-line clinical staff and cleaners must receive education and training on the facility IPC guidelines/SOPs upon employment.
All IPC staff need to receive specific IPC training.</td></tr>
<tr><td>Tertiary care: IPC training for all front-line clinical staff and cleaners upon hire and annually:
All front-line clinical staff and cleaners must receive education and training on the facility IPC guidelines/SOPs upon employment and annually.
All IPC staff need to receive specific IPC training.</td></tr>
</table>

<table>
<tr><td>Recommendations for Core Component 4: HAI surveillance</td><td>National level
National HAI surveillance programmes and networks that include mechanisms for timely data feedback and with the potential to be used for benchmarking purposes should be established to reduce HAI and AMR.</td><td>Facility level
Facility-based HAI surveillance should be performed to guide IPC interventions and detect outbreaks, including AMR surveillance, with timely feedback of results to health care workers and stakeholders and through national networks.</td></tr>
<tr><td rowspan="3">Minimum requirements</td><td rowspan="3">IPC surveillance and a monitoring technical group
• Establishment by the national IPC focal point of a technical group for HAI surveillance and IPC monitoring that:
  ○ is multidisciplinary; and
  ○ develops a national strategic plan for HAI surveillance (with a focus on priority infections based on the local context) and IPC monitoring.</td><td>Primary care
• HAI surveillance is not required as a minimum requirement at the primary facility level, but should follow national or sub-national plans, if available (for example, detection and reporting of outbreaks affecting the community is usually included in national plans).</td></tr>
<tr><td>Secondary care
• HAI surveillance should follow national or subnational plans.</td></tr>
<tr><td>Tertiary care: functional HAI surveillance
• Active HAI surveillance should be conducted and include information on AMR:
  ○ enabling structures and supporting resources need to be in place (for example, dependable laboratories, medical records, trained staff), directed by an appropriate method of surveillance; and
  ○ the method of surveillance should be directed by the priorities/plans of the facility and/or country.
• Timely and regular feedback needs to be provided to key stakeholders in order to lead to appropriate action, in particular to the hospital administration.</td></tr>
</table>

<table>
<tr><td>Recommendations for Core Component 5: Multimodal improvement strategies for implementing IPC activities</td><td>National level
National IPC programmes should coordinate and facilitate the implementation of IPC activities through multimodal strategies on a nationwide or subnational level.</td><td>Facility level
IPC activities using multimodal strategies should be implemented to improve practices and reduce HAI and AMR.</td></tr>
<tr><td rowspan="3">Minimum requirements</td><td rowspan="3">Multimodal improvement strategies for IPC interventions
• Multimodal strategies should be used to implement IPC interventions according to national guidelines/SOPs under the coordination of the national IPC focal point (or team, if existing).</td><td>Primary care: multimodal strategies for priority IPC interventions
• Use of multimodal strategies – at the very least to implement interventions to improve hand hygiene, safe injection practices, decontamination of medical instruments and devices and environmental cleaning.</td></tr>
<tr><td>Secondary care: multimodal strategies for priority IPC interventions
• Use of multimodal strategies – at the very least to implement interventions to improve each one of the standard and transmission-based precautions, and triage.</td></tr>
<tr><td>Tertiary care: multimodal strategies for all IPC interventions
• Use of multimodal strategies to implement interventions to improve each one of the standard and transmission-based precautions, triage, and those targeted at the reduction of specific infections (for example, surgical site infections or catheter-associated infections) in high-risk areas/patient groups, in line with local priorities.</td></tr>
</table>

<table>
<tr><td>Recommendations for Core Component 6: IPC monitoring, evaluation and feedback</td><td>National level
A national IPC monitoring and evaluation programme should be established to assess the extent to which standards are being met and activities are being performed according to the programme's goals and objectives. Hand hygiene monitoring with feedback should be considered as a key performance indicator at the national level.
Presence and adequacy of national IPC policies and strategies should be monitored regularly using an integrated Governance and Policies Progress Matrix tool.</td><td>Facility level
Regular monitoring/audit and timely feedback of health care practices according to IPC standards should be performed to prevent and control HAI and AMR at the health care facility level. Feedback should be provided to all audited persons and relevant staff.
Routine monitoring of adherence to IPC standards at facility level should be done through integrated health service delivery assessments.</td></tr>
<tr><td rowspan="2">Minimum requirements</td><td rowspan="2">IPC surveillance and a monitoring technical group
• Establishment by the national IPC focal point of a technical group for HAI surveillance and IPC monitoring that:
  ○ is multidisciplinary;
  ○ develops a national strategic plan for HAI surveillance and IPC monitoring;
  ○ develops an integrated system for the collection and analysis of data (for example, protocols and tools);
  ○ provides training at the facility level to collect and analyse these data; and
  ○ develops recommendations for minimum indicators (for example, hand hygiene).</td><td>Primary care
• Monitoring of IPC structural and process indicators should be put in place at primary care level, based on IPC priorities identified in the other components. This requires decisions at the national level and implementation support at the subnational level.</td></tr>
<tr><td>Secondary and tertiary care
• There should be a person responsible for the conduct of the periodic or continuous monitoring of selected indicators for process and structure, informed by the priorities of the facility or the country.
• Hand hygiene is an essential process indicator to be monitored.
• Timely and regular feedback needs to be provided to key stakeholders in order to lead to appropriate action, particularly to the hospital administration.</td></tr>
</table>

Recommendations for Core Component 7: Workload, staffing and bed occupancy at the facility level	**Facility level[a]** The following elements should be adhered to, in order to reduce the risk of HAI and the spread of AMR: (1) bed occupancy should not exceed the standard capacity of the facility; (2) health care worker staffing levels should be assigned according to patient workload.
Minimum requirements	**Primary care** • To reduce overcrowding: a system for patient flow, a triage system (including referral system) and a system for the management of consultations should be established according to existing guidelines, if available. • To optimize staffing levels: assess whether staffing levels are appropriate, depending on the categories identified when using WHO/national tools (national norms on patient/staff ratio), and develop an appropriate plan.

	Secondary and tertiary care
	• To standardize bed occupancy:
	  ○ establish a system to manage the use of space in the facility and to establish the standard bed capacity for the facility;
	  ○ ensure hospital administration enforcement of the system developed;
	  ○ ensure no more than one patient per bed;
	  ○ provide spacing at least one metre between the edges of beds; and
	  ○ ensure overall occupancy does not exceed the designed total bed capacity of the facility.
	• To reduce overcrowding and optimizing staffing levels: apply the same minimum requirements as for primary health care.

Recommendations for Core Component 8: Built environment, materials and equipment for infection	**Facility level[a]** Patient care activities should be undertaken in a clean and hygienic environment that facilitates practices related to the prevention and control of HAI, as well as AMR, including all elements around WASH infrastructure and services and the availability of appropriate IPC materials and equipment. Materials and equipment to perform appropriate hand hygiene should be readily available at each point of care.
Minimum requirements	**Primary care** • Water should always be available from a source on the premises (such as a deep borehole or a treated, safely managed piped water supply) to perform basic IPC measures, including hand hygiene, environmental cleaning, laundry, decontamination of medical devices and health care waste management according to national guidelines. • A minimum of two functional, improved sanitation facilities should be available on-site, one for patients and the other for staff; both should be equipped with menstrual hygiene facilities. • Functional hand hygiene facilities should always be available at points of care/toilets and include soap, water and single-use towels (or if unavailable, clean reusable towels) or ABHR at points of care and soap, water and single-use towels (or if unavailable, clean reusable towels) within five metres of toilets. • Sufficient and appropriately labelled bins to allow for health care waste segregation should be available and used (less than five metres from point of generation); waste should be treated and disposed of safely via autoclaving, high-temperature incineration, and/or buried in a lined, protected pit. • The facility layout should allow adequate natural ventilation, decontamination of reusable medical devices, triage and space for temporary cohorting/isolation/physical separation if necessary. • Sufficient and appropriate IPC supplies and equipment (for example, mops, detergent, disinfectant, personal protective equipment and sterilization) and power/energy (for example, fuel) should be available for performing all basic IPC measures according to minimum requirements/SOPs, including all standard precautions, as applicable; lighting should be available during working hours for providing care.

[a]Core components 7 and 8 apply only to the facility level.
ABHR: alcohol-based handrub; AMR: antimicrobial resistance; HAI: health care-acquired infection; IPC: infection prevention and control; SOPs: standard operating procedures; WASH: water, sanitation and hygiene.
Source: *(3)*.

Annex 3: Country examples of implementation and progress in achieving the WHO core components for IPC

Bangladesh – Turning the COVID-19 crisis into an opportunity for stronger national and health care facility preparedness in IPC

Summary

Bangladesh – *Turning the COVID-19 crisis into an opportunity for stronger national and health care facility preparedness in IPC*

Key players

- Directorate General of Health Services of the Ministry of Health and Family Welfare
- Key partners: WHO, Save the Children, UNICEF, and United Nations Population Fund United Nations Population Fund (UNFPA)

Main steps

- There was multisectoral and multi-stakeholder cooperation to rapidly scale up implementation of IPC and tackle the threatening situation of the COVID-19 epidemic in the country.
- IPC committees were established at both district and facility levels.
- A "Master Training and Education in IPC" programme for HCWs and a "Master Training Programme for Monitoring and Auditing of IPC Activities and HAIs" were conducted at the national level and then cascaded to district hospitals.
- The infrastructure was improved to provide a clean and hygienic environment. This was prioritized by the Government of Bangladesh.
- Assessment tools, checklists and a score card were developed to monitor IPC standards, identify gaps in adherence to guidelines, and implement the necessary interventions developed by the government health sector.
- Since 2020, the Government of Bangladesh, working with WHO and partners, has created and implemented a model IPC programme in the Cox's Bazar District.

Key results of the IPC programme in the country and in the Cox's Bazar District

- IPC training was provided to 64 doctors and nurses, then cascaded to train a total of 12 733 doctors, nurses and support staff in health care facilities.
- Some 300 nurses and 300 doctors from district-level health care facilities were trained to monitor adherence to IPC practice.
- An IPC manual for health workers in the community was developed. All IPC focal persons in the Rohingya camps received IPC training from WHO.
- A four-day training course was delivered in health care facilities in the Rohingya camps. 43 doctors and nurses attended, and then cascaded their training to train more than 3600 HCWs in the camps and in health care facilities in the community.

Success factors

- There was continued political and leadership commitment.
- The approach used: cutting across the health system, involving staff at national, district and facility level, and including community health workers.
- The adaptation of IPC programme principles to the reality of health care in refugee camps.

Progress in IPC implementation based on the IPC core components at national level

The COVID-19 global pandemic provided a strong impetus to the development of the "National Preparedness and Response Plan for COVID-19", as well as a national guideline on IPC for both private and public health care facilities. Since 2020, multisectoral and multi-stakeholder cooperation rapidly scaled up the implementation of IPC and tackled the threatening situation of the COVID-19 pandemic in the country.

The capacity building of health care workers was prioritized through the development and launch of a programme providing "Master Training and Education in IPC", to further strengthen the ability of the country's health workforce to detect and respond to the pandemic.

Furthermore, a four-day comprehensive "Master Training Programme for Monitoring and Auditing of IPC Activities and HAIs" was launched for doctors, nurses and support staff. Training was then cascaded by master trainers to district-level hospitals, in collaboration with government bodies and other partners. The training consisted of theoretical and practical sessions on donning and doffing procedures for personal protective equipment and IPC practices aimed at preventing transmission of infection.

The government of Bangladesh prioritized the improvement of the infrastructure to provide a clean and hygienic environment. It also ensured the availability of appropriate IPC materials and equipment – establishing functional hand hygiene stations with clean running water, soap and alcohol-based handrub for all health care facilities, and escalating the provision of personal protective equipment.

District-level implementation

In Cox's Bazar District, efforts that began before the COVID-19 pandemic led to the establishment of a model IPC programme, created by the Government of Bangladesh working with WHO and partners. In May 2020, the Directorate of Health established an authoritative IPC National Technical Working Group, which is mandated to guide IPC implementation in healthcare facilities in the Rohingya refugee camps. The IPC focal persons are currently implementing IPC activities in their respective facilities with the support of their committees. IPC committees have been established at district and upazila level with defined objectives and workplans aimed at overseeing IPC performance in all district health care facilities (HCFs) and supporting the Rohingya refugee camps.

Regular meetings of the Cox's Bazar District IPC Committee are held with Government authorities and key partners to guide IPC implementation in the district, and to organize IPC structures. WHO and the Cox's Bazar Medical College are developing a curriculum to teach undergraduate medical students and in-service health workers about IPC.

An IPC manual was developed for health workers in the community. All IPC focal persons in the Rohingya camps received IPC training from WHO. Community facilities will receive training by 2022.

Monitoring, audit and feedback

The government health sector, together with WHO, has developed assessment tools and checklists to monitor IPC standards, identify gaps in adherence to guidelines and to implement the necessary interventions, in the areas of environmental cleaning, training, use of personal protective equipment (PPE), waste management, hand hygiene, occupational health status health and other aspects. A monthly scorecard enables the visualization of IPC implementation by each health care facility

Leadership and key stakeholders

The Directorate General of Health Services of the Ministry of Health and Family Welfare, supported by numerous partners, including Save the Children, UNICEF, UNFPA, and WHO, prioritized the importance of IPC, responding to the COVID-19 pandemic by developing IPC national guidelines and capacity training programme for the health care workforce. MOHFW aims to sustain and extend the programme further through many activities ongoing in the country.

WHO has supported the Government of Bangladesh, initially to establish IPC committees both at district and upazila level. These committees worked with defined objectives and workplans to oversee IPC performance in all the health care facilities across the district. Local and national

nongovernmental organizations have focused on building IPC capacity by appointing IPC focal points who are accountable for IPC in all facilities run by the respective organizations. The focal points represent the IPC agenda at a high level in the respective organizations.

Results

Initially, train-the-trainer sessions provided IPC training to 64 doctors and nurses. This training was then cascaded at subnational level hospitals to train a total of 12 733 doctors, nurses and support staff from health care facilities. Some 300 nurses and 300 doctors from district-level health care facilities were trained to monitor adherence to IPC practices.

First piloted in Cox's Bazar, this programme has led to improvements in 120 health care facilities, which were assessed regarding their IPC preparedness and readiness. Findings were shared at policy level and reviewed for further improvement. According to the use of an IPC scorecard, significant improvements were recorded in the following areas: IPC personnel (from 8% to 100%), training (from 22% to 100%), monitoring (from 18% to 70%).

A successful COVID-19 IPC master training effort has been delivered in health care facilities in the Rohingya camps. Initially 43 doctors and nurses received a four-day training course in May 2020, and then this was ultimately rolled out further to provide training to more than 3600 health care workers in the camps and in health care facilities in the community.

The monthly scorecards displayed in health care facilities have been an incentive in promoting accountability and tracking progress of IPC measures. WHO, together with other health sector partners, have been working on developing a central dashboard for the visualization of IPC in health care facilities in the Rohingya camps, which could be accessed globally.

Among the remaining challenges are to sustain the IPC work that has been achieved so far. There is a need for a national IPC programme, with dedicated human resources and a specific budget allocated for IPC work.

Chile – The critical role of leadership and political commitment in advancing infection prevention and control since 1982

Summary

Chile – *The critical role of leadership and political commitment in advancing IPC since 1982*

Key players

- Ministry of Health and other government bodies
- Chilean Society for Infection Control and Hospital Epidemiology

Main steps

- The National IPC programme was created in 1982.
- There has been progressive implementation of the core components of IPC since 2009, using a stepwise approach.
- IPC was strategically embedded within the AMR National Action Plan and other programmes.
- The National IPC strategy was launched in 1982, The strategy included: training and education of health care workers, epidemiological surveillance and periodic feedback; technical guidelines implemented at all levels of health care facilities; individual health care facility monitoring and periodic external evaluation of hospitals; and local action to implement and sustain IPC multimodal strategies for continuous improvement.
- A national education and training strategy was adopted.
- A surveillance system was established and adopted.
- A training programme was developed for IPC doctors, administrators and clinical directors of hospitals in epidemiology, outbreak management and performing cost assessments.
- Periodic external evaluations were carried out of the hospitals.
- The IPC programme has been mandatory for every facility since 2010, according to the law that regulates patient's rights and to national principles and instructions.
- A range of administrative and evidence-based guidelines was produced.

Key results of the IPC programme

- In 2020, 94.3% of 174 public hospitals reported that they had established an IPC programme.
- Between 2000 and 2019, the National IPC programme documented an 80% reduction in the incidence rate of HAIs that are being monitored/surveyed in the country.
- In 2012, 80% of Chilean hospitals achieved around 90% of conformity with the core components of the IPC programme.
- In 2012, the law that regulates patients' rights made it mandatory for every facility to carry out infection prevention and control according to the national principles and instructions.
- Between 2014 and 2018, 70 medical doctors were trained in outbreak preparedness and management.
- Since 2013, more than 140 000 health care workers have been trained nationwide on standard precautions, HAIs, surveillance, assessment of compliance of practices.

Success factors

- Continued political and leadership commitment.
- Leadership and finances invested to develop the National IPC.
- Coordinated action of the National IPC programme from central government to local health care facility levels, strategically driven by evidence-based IPC interventions.

Key players

Chile has made remarkable progress in IPC as a result of continued political and leadership commitment from the Ministry of Health and other government bodies. The Chilean Society for Infection Control and Hospital Epidemiology has also played an important role in the advancement of the IPC programme, contributing to the promotion and diffusion of good IPC practices based on research and evidence-based practice.

Chile has long recognized the need to take the problem of health care-associated infections HAIs seriously. The National IPC programme was created in 1982 with 12 hospitals, no appointed staff (other than one nurse per hospital), and one five-day training course on surveillance. The programme developed over time with the progressive inclusion of more facilities. The initial passive surveillance system was gradually developed further, and it has been sustained along the years. This was the approach that shaped the country's IPC achievements: coordinated action from central government to local health care facility levels, strategically driven by evidence-based IPC interventions.

Pioneering the implementation of the IPC core components

Using a stepwise approach, the core components of IPC have been progressively implemented since 2009, including the surveillance of HAIs and implementation of IPC multimodal improvement strategies (system change, training and education, monitoring and feedback, reminders and communication, and culture change). In addition, IPC has been strategically embedded within the AMR National Action Plan and other programmes, including those on Quality of Care, Patient Safety, and Preparedness and Response to Outbreaks and Emerging Viral Diseases.

Leadership and budget allocation

The Ministry of Health has invested leadership and finances to develop the National IPC programme. A National IPC strategy was developed in 2001 and implemented. This included five elements adapted from the WHO-recommended core components of IPC programmes: (i) training and education of health care workers; (ii) epidemiological surveillance and periodic feedback to the authorities and working teams; (iii) technical guidelines implemented at all levels of health care facilities, (iv) individual health care facility monitoring, periodic external evaluation of hospitals regarding prevention as an overarching central component; and (v) local action to implement and sustain IPC multimodal strategies for continuous improvement.

Education and training strategy

At the heart of Chile's IPC programme is an education and training strategy. This includes training for all IPC professionals in HAI prevention, surveillance, auditing and compliance with IPC best practices. E-learning is freely available to all health care workers in core subjects, such as standard precautions – with hand hygiene as a fundamental component – principles of disinfection and sterilization, and HAI surveillance.

Monitoring HAIs and IPC indicators nation-wide

Equally important has been the establishment and development of a surveillance system, which enables problem-solving using local data, and then applying evidence-based interventions according to the local situation and documenting results. A programme of training IPC doctors, administrators and clinical directors of hospitals in epidemiology, outbreak management and cost assessments was established.

The persistent monitoring and evaluation of the programme enables the recognition of challenges and components that require further improvement. The reinforcement and increase in training of specialists and auditors are key factors driving improvement and sustainability of the programme. The Ministry of Health initiated a process of periodic external evaluations of the hospitals, and this contributed to monitoring and documenting progress with IPC. The persistent monitoring and re-evaluation of the programme, including the detection of hospitals with prolonged outbreaks or with high HAI rates, has been a key enabler in the recognition of weaknesses and aspects that could be improved in the process.

Legislation

In 2010, the law that regulates patient's rights made it mandatory for every facility to have infection control according to national principles and instructions, and for these to comply with all the measures approved by the Ministry of Health for preventing HAIs.

Guidelines

The Ministry of Health also issued a series of related administrative and evidence-based guidelines. These included guidelines on the organization of IPC, surveillance, sterilization, isolation and precautions. These were followed by specific HAI guidelines on the prevention of device-associated infections, the management of multidrug-resistant organisms, and outbreak management.

Results of the IPC programme

- In 2020, 94.3% of 174 public hospitals reported that they had established an IPC programme.
- Between 2000 and 2019, the National IPC programme documented an 80% reduction in the incidence rate of infections that are being monitored/surveyed in the country.
- In 2012, 80% of Chilean hospitals achieved around 90% of conformity with the core components of the IPC programme. In 2012, the law that regulates patient's rights made it mandatory for every facility to carry out infection control according to national principles and instructions.
- Between 2014 and 2018, 70 medical doctors were trained in outbreak preparedness and management.
- Since 2013, more than 140 000 health care workers have been trained nationwide on standard precautions, HAIs, surveillance, and compliance assessment.

Ghana – Streamlining IPC and WASH through national quality efforts and a costed national strategy

Summary

Ghana – *Streamlining IPC/WASH through national quality efforts and a costed national strategy*

Key players

- Ministry of Health, Ghana Health Service and other national and district government bodies, District Health Information Management System (DHIMS-2)
- Key partners: Ghana Water Company, universities and other training entities, WHO, Africa CDC, WaterAid, UNICEF

Main steps

- A national joint IPC and WASH Taskforce was created in 2016.
- A national technical guide was developed, with standards, operation and maintenance procedures, and environmental cleaning protocols.
- IPC/WASH standards were included in the National Healthcare Quality Strategy (2017–2021), national AMR strategy, national guidelines on supportive supervision, waste-management policy, health facility regulator policy, and occupational health and safety guidance.
- Hospital construction and infrastructure development policies explicitly require new health facilities to have health care waste-management systems/equipment.
- A national, costed strategy on WASH in health care facilities was published in 2020. This included the legal and regulatory framework needed, and a blueprint for coordination and implementation.
- 80% of the projected costs for IPC/WASH infrastructure were financed from domestic resources.
- IPC/WASH indicators were included in regular health systems monitoring through the Ghana DHIMS-2
- IPC/WASH content was included in the pre-service curricula and within regular in-service training for facilities.
- IPC focal persons were appointed in all regions and facilities.

Key results of the IPC programme

- In April 2020, a cross-sectional assessment (including WASH/IPC indicators) of facility preparedness for COVID-19 identified priority facilities for improving WASH/IPC services and training.
- An improvement of some IPC indicators was observed in 2020 and 2021 (mainly related to human resources, concerning the total number of IPC focal points in health care facilities).
- Indicator assessing the percentage of health care facilities with availability of hygiene services:
  - 2018: 91.4%
  - 2021: 92.6%
- Indicator assessing the percentage of health care facilities with availability of WASH-IPC action plan:
  - 2018: 34.1%
  - 2021: 49.7%
- Indicator assessing the percentage of WASH/IPC focal persons who were trained:
  - 2018: 45% (*n*=635)
  - 2021: 66% (*n*=1020)
- Water availability remains at 100% across the years.
- Regional focal persons were trained in all 16 regions and selected private facilities in Ghana in 2020.
- Compliance assessment was carried out among health care workers in designated COVID-19 treatment centres.
- A behaviour-change led approach was adopted for the first time in collaboration with USAID support, using the Water and Sanitation for Health Facility Improvement Tool (WASH FIT).

Success factors

- Continued political and leadership commitment
- Leadership and finances invested to support IPC/WASH in health care facilities
- Supportive supervision as an effective way to bring together quality efforts, WASH and IPC

Prioritizing Core Component 8

The Ghana Health Service, Ministry of Health and Partners recognized that there was a need to address IPC Core Component 8 on "the built environment, materials and equipment for IPC at the facility level", with a specific goal to ensure that patient care activities are undertaken in a clean and/or hygienic environment, which would facilitate the prevention and control of HAIs and AMR.

National joint IPC and WASH Taskforce

Accordingly, a national joint IPC and WASH Taskforce was established in 2016 to provide greater leadership and a clearer strategic direction on IPC/WASH in health care facilities. The Taskforce led the development of a national technical guide, with standards, operation and maintenance procedures, and environmental cleaning protocols.

The Taskforce adapted and implemented WASH FIT and worked to include IPC/WASH standards in the National Healthcare Quality Strategy (2017–2021), the national AMR strategy, the national guidelines on supportive supervision, waste management policy, health facility regulator policy and the occupational health and safety guidance. In 2021, the Ghana Health Service, Ministry of Health and partners began the review of both national WASH and IPC policies with the aim to merge them together. They also updated the indicator set in the DHIMS-2 Monitoring & Evaluation Database to include indicators on urban/rural distribution, gender, environmental cleaning and financing in WASH, HAIs, and AMR, among others.

Hospital construction and infrastructure development policies

Thanks to these efforts, hospital construction and infrastructure development policies explicitly require new health facilities to have health care waste-management systems/equipment. They should also have a main and back-up supply of water, including possibly a reservoir, borehole, or rain gutter system to harvest rainfall, and piped water supply from Ghana Water Company.

Linkage to the Ghana National Health Care Quality Strategy

The Ghana National Health Care Quality Strategy (2017–2022), calls for putting in place the fundamentals of WASH infrastructure, as well as ensuring the availability of IPC materials and equipment to perform appropriate hand hygiene (for example, alcohol-based handrubs, soap and water and PPE).

National, costed strategy on WASH in healthcare facilities

To support these efforts, a national, costed strategy on WASH in health care facilities, with a comprehensive blueprint for coordination and implementation, was published in 2020. This strategy lays out the legal and regulatory framework needed, including quality, IPC, WASH and health care waste standards. It also links WASH in health care facilities to national activities to reduce maternal mortality, and specifically, the work of the Quality of Care Network, which aims to improve quality of care for mothers and newborns in selected districts. Costs for IPC/WASH infrastructure are set out in the strategy, with 80% of the projected costs financed from domestic resources.

This is reflected in incorporating WASH into health care facility budgets. In Bongo and Kassena Nankana West districts, the district assemblies worked to develop a strategy to achieve universal WASH access, and to secure the costing data to maintain this. District officials worked with WaterAid to develop integrated WASH and health budgets. A life-cycle costing analysis was conducted to estimate how much would be required to provide, operate and maintain WASH and waste management up to 2030 (including capital maintenance expenditure). The analysis also included identifying the different financing sources (both domestic and external) mandated and/or needed to help meet these costs.

IPC/WASH standards included in District Health Information Management System

IPC/WASH standards have been included in regular health systems monitoring in the Ghana DHIMS-2 by the Ghana Health Service. The DHIMS-2 database is a platform for routine data collection on all service delivery indicators. In 2021, these indicators were revised and aligned with global WASH indicators to enable facilities become classified as "basic", "limited" and "no services", using primary data. Compliance is overseen by the Quality and Safety Management of the Ghana Health Service.

IPC/WASH training and supportive supervision

Pre-service curricula have been reviewed to include IPC/WASH. This helps to create and develop a culture and institutionalize issues regarding WASH/ IPC. Regular in-service training for facility staff on WASH, IPC, health care waste management, safe burial practices, contact tracing and surveillance has also been enforced.

Additionally, regular supportive supervision and annual peer review systems have been introduced and have strengthened the observance of standards, including environmental or climate-smart WASH solutions. IPC focal persons have been appointed in all regions and facilities. This has contributed to the continued introduction of new IPC/WASH programmes and quality improvement in existing ones.

Local action driven at district level

Ensuring an adequate clean and hygienic environment has been the responsibility of senior facility and national Ghanaian authorities. The establishment of the built environment and the necessary national IPC/WASH infrastructure has been driven locally by the Ghana Health Service in collaboration with key stakeholders: DHIMS-2, Ghana Water Company, universities and other training entities, Africa CDC, partners such as WaterAid, UNICEF, and WHO, among other partners and sectors.

Results

- In April 2020, a cross-sectional assessment of facility preparedness for COVID-19 was conducted using the WASH FIT tool in major designated COVID-19 facilities. This identified priority facilities with poor WASH/IPC services and where rapid installation of hand hygiene facilities and WASH/IPC training were needed, resulting in their provision by partners.
- WASH/IPC indicators are monitored quarterly through assessments of routine WASH database in DHIMS-2. There has been an increase in the performance of IPC indicators in 2020 and 2021 (mainly related to human resources, concerning the total number of IPC focal points in health care facilities, and proportion of healthcare facilities with basic WASH services). This may be a response to the COVID-19 pandemic, or a result of general efforts to improve IPC and WASH in health care facilities.
- Ghana has made improvements across all WASH/IPC domains for example, from the report of December 2021 analysis of WASH database in DHIMS-2 with (*N*=2438), proportion of health care facilities with basic water services improved from 48% in 2018 to 55% in 2021, while the proportion of health care facilities with basic sanitation increased from 38% from 2018 to 50% in 2021.
- Africa CDC supported the training of regional IPC/WASH focal persons in all 16 regions and selected private facilities in Ghana in three batches in 2020 during the COVID-19 response.
- WHO, UNICEF, the Korea Foundation for International Healthcare, World Vision and other partners supported step-down training of IPC/WASH focal persons at facility level across the 16 regions. They also instituted WASH improvement teams. More than 20 partners now collaborate within the National WASH/IPC programme and space, supporting various capacity building activities.
- Compliance assessments among HCWs in designated COVID-19 treatment centres have been conducted.
- Using WASH FIT, a behaviour-change led approach is being adopted for the first time, in collaboration with USAID Breakthrough ACTION support.
- IPC/WASH policies have been reviewed: these are now merged into a single policy document and a single programme with explicit linkages between IPC and related concepts such as AMR, patient safety, health worker safety and HAI.

Kazakhstan – Infection prevention and control at the national level: turning challenges into an opportunity

Summary

Kazakhstan – *Infection prevention and control at the national level: turning challenges into an opportunity*

Key players

- Ministry of Health and other national government bodies
- Key partners: UNICEF, UNFPA and CDC

Main steps

- Important changes were introduced into the normative IPC frameworks in 2015, following recommendations made during a WHO Europe AMR country mission.
- IPC focal points were appointed by the Ministry of Health at the sanitary-epidemiological service. A voluntary national expert group on IPC and AMR was created to provide technical IPC advice.
- Several Ministerial decrees were issued on IPC programmes, HAIs and AMR surveillance, accreditation standards for health care facilities, standards on workload, staffing, and bed occupancy, and on WASH, as well as physical infrastructure.
- Since 2019, an annual budget is being allocated to strengthen the national IPC programme. Facility level budgets are also being allocated, as an accreditation standard.
- During the pandemic, there was extensive IPC training of front-line health workers on a routine basis.
- IPC capacities at facility level were further strengthened as an outcome of regular training, assessment, monitoring and feedback.
- IPC is a component of the second direction of the national "Healthy Nation" strategic programme.

Key results of the IPC programme

- A functional National IPC programme with a funded action plan was put in place.
- National IPC manual updated and ready for implementation.
- The national IPC training curriculum has been revised.
- There is commitment to conduct a national point prevalence survey on HAI and antimicrobial use.

Success factors

- Continued political and leadership commitment.
- Leadership and finances were invested to support IPC/WASH in health care facilities.
- There was commitment to patient safety at the health care facility level.

Key players

In 2015, the Ministry of Health of Kazakhstan hosted the first in-country AMR mission by a team from the WHO Regional Office for Europe. A set of policy-level recommendations provided by WHO to the Ministry of Health triggered important changes in the normative IPC frameworks.

Legislation: standards and guidelines

Several Ministry of Health decrees were issued. These have covered:

- establishing facility-level IPC programmes;
- updating national guidance for surveillance of HAIs;
- creating accreditation standards for health care facilities, including mechanisms for monitoring and audit;
- developing standards on workload, staffing, and bed occupancy for health care facilities; and
- developing standards for water, sanitation and hygiene as well as physical infrastructure.

Advice and assessment

In the years following the mission, the Ministry of Health appointed IPC focal points at the sanitary-epidemiological service and created a voluntary national expert group on IPC and AMR to provide technical IPC advice to the Ministry of Health. In 2019, the national expert group requested the WHO Regional Office for Europe to support the self-assessment of the national IPC programme, as well the assessment of the IPC programme in six facilities using WHO assessment tools.

Financial resources

As of 2019, the Ministry of Health allocates an annual budget to strengthen the national IPC programme. As defined in the accreditation standards, dedicated funds are available at health care facility level to support the implementation of facility-level IPC programmes. These cover salaries of hospital epidemiologists and IPC nurses, training of the medical personnel on IPC, laboratory services for HAI surveillance and outbreak investigation, procurement of IPC supplies, and improvement of health care facility infrastructure.

COVID-19 response

During the COVID-19 pandemic, the National IPC programme supported the national COVID-19 task force by ensuring alignment of national IPC measures with international recommendations. Kazakhstan was among the first countries in the region of WHO to conduct comprehensive revision of the national IPC guidance for COVID-19 response and took action to strengthen adherence of the national policies to the WHO's evidence-based recommendations. IPC measures have been applied using a multimodal strategy (system change, training and education, monitoring and feedback, reminders and communication, and culture change). IPC training of front-line health workers was extensively and routinely conducted, and IPC capacities at health care facility level were further strengthened as an outcome of regular assessment, monitoring and feedback.

Results

Based on the lessons identified during the COVID-19 readiness, preparedness and response activities, the following IPC initiatives were implemented for difference core components (CCs):

1. **CC1 – IPC programmes:** A national IPC programme, including a funded national IPC action plan, was developed taking into consideration the findings and recommendations of previous assessments. The National IPC committee has been recently established. IPC practitioners from internationally accredited health care facilities with robust IPC programme are members of the National IPC committee to ensure that best practices are shared within the country.
2. **CC2 – IPC guidelines:** The national IPC manual was updated incorporating relevant evidence-based recommendations. The manual will extend the existing Ministry of Health decrees and provide practical steps on IPC for implementation.
3. **CC3 – IPC education and training:** Kazakhstan expanded its use of the IPC courses on the OpenWHO platform for on-the-job training. In addition, a pool of national IPC experts received international training, and in-country IPC experience exchange is in place aiming to share best IPC practices within HCF IPC programmes. The current national IPC training curriculum was revised in line with the WHO guidance on core competencies for IPC professionals. A competency-based training curriculum for IPC professionals and the general health care workforce is under revision, and will incorporate identified best IPC training practices.

4. **CC4 – Surveillance:** Kazakhstan piloted the ECDC PPS on health care-associated infection and antimicrobial use. The results will be used for the revision of the national HAI surveillance guidance and development of the strategic HAI surveillance plan.
5. **CC6 – Monitoring and evaluation and feedback:** WHO assessment tools were implemented in several health facilities and National level. Results of the assessments were used to develop a national monitoring strategy of IPC practices.

IPC has been included as part of the second direction of the national "Healthy Nation" strategic programme, which will be implemented by the Government during the next five years. Kazakhstan is committed to strengthening IPC in the health care sector and communities. The Government is demonstrating its commitment by supporting the improvement of IPC during the COVID-19 response and working to build robust and sustainable solutions.

Oman – National action on antimicrobial resistance as the entry point for strengthening infection prevention and control

Summary

Oman – *National action on antimicrobial Resistance (AMR) as the entry point for strengthening IPC*

Key players

- Ministry of Health and other national government bodies
- Key partners: professional associations and civil society organizations

Main steps

- The Central Department of Infection Control was established at the Ministry of Health in 2015 with the mandate to lead the national IPC programme.
- A National Policy and Action Plan on AMR was launched in May 2016 and a national AMR committee was established.
- National guidelines on appropriate antimicrobial use were issued in 2016.
- A national campaign called "Oman fights AMR" was launched in May 2016, with an emphasis on engaging the community.
- Multisectoral collaboration was established in all provinces to achieve engagement between communities academic institutions, the agriculture, fishery and other sectors, in both private and governmental settings.
- Antibiotic stewardship programmes have been implemented in tertiary and secondary care hospitals since 2017.
- A national system for AMR surveillance (the Oman Antimicrobial Surveillance System (OMASS)) was activated in 2017.
- An OMASS report has been produced annually by the national IPC programme.

Key results

- The involvement of IPC in the national AMR action plan has strengthened and empowered the capacities of the programmes.
- The most recent achievements of the AMR and HAI surveillance system are:
  - a report documenting that overall, around 46% of multidrug-resistant organisms (MDRO) bloodstream infections were acquired in health care, with an increase to 73% with carbapenem-resistant Enterobacteriaceae (CRE) and a related mortality rate of 62%;
  - screening for MDRO set up for high-risk patients and/or units; and
  - a system for the early identification, investigation and management of health care-associated infection outbreaks.
- The AMR data reinforced the importance of strengthening IPC training for all health care workers and establishing training for IPC specialists.

Success factors

- Continued political and leadership commitment
- Creation of a strong IPC national programme and structure across the health system
- Creation of local IPC expertise and ensuring basic IPC knowledge among all health workers
- Community engagement
- Integration between HAI and AMR surveillance, antimicrobial stewardship and IPC activities

Building national capacity to combat AMR

Oman launched its National Policy and Action Plan on AMR in May 2016. In addition to its core role in strengthening IPC practices, the national IPC programme had also been the coordinating body for the implementation of this plan with the other stakeholders through the established National AMR committee.

The Central Department of Infection Control at Ministry of Health was established in 2015 to act as the national programme for IPC. The mandate was to align the structure and function of IPC services at national, regional, and facility level and to coordinate implementation of national policies and guidelines. The implementation of the national AMR action plan was one of the main functions of the new department, which included working on the following fronts: AMR surveillance in health care; boosting awareness of AMR; stressing the importance of hand hygiene in stopping AMR; and advocating for rational use of antimicrobials.

National guidelines on appropriate antimicrobial use were made available in 2016. Antibiotic stewardship programmes have been implemented in tertiary and secondary care hospitals since 2017, and work is being done to rationalize the use of antibiotics across health care facilities, including surgical antimicrobial prophylaxis.

Promotional activities and raising awareness on AMR

In May 2016, Oman launched a large national campaign called "Oman fights AMR", with a particular emphasis on engaging the community. Multisectoral collaboration was then established in all provinces in Oman to achieve engagement between community, academic institutions, the agriculture, fishery and other sectors, in both private and governmental settings. Since this campaign, the hand hygiene awareness activities in health care and the community (including schools, public areas, and the pilgrimage mission) focused on impact of hand hygiene for the prevention and control of AMR.

The central role of AMR surveillance

A national system for AMR surveillance (OMASS) was activated in 2017 and participates in the WHO Global Antimicrobial Resistance Surveillance System. This system was set up to support IPC screening and identification of health care-associated infections and outbreaks.

The IPC national programme produces the annual OMASS report and provides AMR data and feedback to all involved facilities, governorates, and higher authorities including the national AMR committee, with information on:

- Rates of different MDRO bacterial pathogens nationally and for individual surveillance sites indicating the proportion of community vs HAI.
- Data on the national use of antibiotics, segregated into adult and paediatric populations, for both in-patients' and out-patients' services.
- Annual national antibiogram as constructed by the enrolled laboratories.
- Emerging antimicrobial-resistant pathogens detected through the system which helps to identify outbreaks (e.g: *Candida auris*).

These data inform action by the health care authorities, enabling them to target antibiotic overuse and to inform IPC interventions. This has immediate and longer-term savings on health care costs. Having an ongoing surveillance system also helps to monitor closely the progress and impact of the actions taken. The involvement of IPC in the national AMR action plan strengthened and empowered the capacities of the programmes.

Results

- A Code of Practice for IPC was signed by the Minister of Health in 2015, with clear roles and responsibilities for all health care providers (including IPC practitioners). This instituted a system for the evaluation, monitoring and governance of infection prevention measures.
- In addition to existing IPC programmes at facility and national levels, an IPC structure was established at regional level in all 11 governorates to guide and oversee implementation, including at primary care level.
- A multimodal environmental decontamination programme was established in all health care facilities.

- The leadership was involved in hand hygiene advocacy and implementation of its multimodal programme at all levels of all health care (role model in HH project).
- There was an increase in diagnostic capacity, including molecular diagnostic, accuracy and turnover of results for timely IPC management of outbreaks (e.g. *Candida auris*).
- The most recent achievements of the AMR and HAI surveillance system are:
  - A report documenting that overall, around 46% of MDRO bloodstream infections were acquired in health care, with an increase to 73% with carbapenem-resistant Enterobacteriaceae and a related mortality rate of 62%;
  - Screening for MDRO was set up for high-risk patients and/or units; and
  - A system was established for the early identification, investigation and management of health care-associated infection outbreaks.
- The AMR data reinforced the importance of strengthening IPC training for all health care workers and of establishing training for IPC specialists, in particular:
  - a ministerial decree in 2020 mandated that all health care workers and students should be trained and certified in basic IPC to work in clinical areas;
  - a national Diploma in IPC was established for training nurses and is currently being adapted for physicians and public health specialists; and
  - a national diploma for medical and surgical instruments sterilization specialists is under development.

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Viet Nam – Infection prevention and control at the point of care to prevent health care-associated neonatal sepsis

Summary

Vietnam – *Infection prevention and control at the point of care to prevent health care-associated neonatal sepsis*

Key players

- Ministry of Health and other national government bodies
- Key partners: professional associations and civil society organizations

Main steps

- The Action Plan for Healthy Newborn Infants in the Western Pacific Region was endorsed including the early essential newborn care (EENC) approach for caesarean section births with the aim of eliminating preventable newborn sepsis and mortality.
- IPC is being implemented as a basic requirement and part of a comprehensive package of measures within EENC.
- The main focus for IPC is prioritising the national IPC programme, providing IPC guidance and training, good practices in hand hygiene, observation and attention to the built environment, in the context of improving the quality of skilled delivery and post-delivery care.
- The Viet Nam Ministry of Health took the lead in endorsing the Action Plan for Vietnamese hospitals and initially introduced EENC in three national and regional teaching hospitals in 2014, including Da Nang Hospital for Women and Children.
- EENC was introduced over six months through staff coaching, quality improvement assessments, and changes in hospital protocols and environments.

Key results

- Over the study period, 27 381 live births were registered at Da Nang Hospital for Women and Children in the hospital. Of these, 61.8% were delivered by caesarean section.
- Total admissions to the Neonatal Intensive Care Unit (NICU) of babies born normally or by caesarean section decreased after the introduction of EENC.
- Cases of probable and proved neonatal sepsis decreased by three quarters.
- EENC has already substantially improved newborn outcomes and reduced unnecessary infant formula use and NICU admissions.
- EENC was proven as a feasible approach also during the pandemic.

Success factors

- Continued political and leadership commitment
- Having champions at hospitals, including ones within the senior hospital management
- Establishing multi-disciplinary hospital quality improvement teams.

Improving maternal and neonatal health in the Western Pacific Region

Viet Nam has been a champion country in the adoption of the Action Plan for Healthy Newborn Infants in the Western Pacific Region launched in 2014 in the Western Pacific Region and aimed at improving maternal and neonatal outcomes, in particular in eliminating preventable newborn sepsis and mortality by providing universal access to high-quality care. To achieve this, it applies the early essential newborn care (EENC) approach for caesarean-section births.

The EENC approach and IPC

The EENC approach comprises important measures where IPC is a basic requirement and part of a comprehensive package. For infection prevention, the emphasis is on highlighting the importance of IPC, based on its core components and prioritising the national IPC programme, IPC guidance and training, good practices in hand hygiene, observation of and attention to the built environment. Improving the quality of skilled delivery and post-delivery care, while also improving access to facility-based services for mothers and newborns is fundamental to EENC.

Leadership and key stakeholders

The Viet Nam Ministry of Health aligned itself with other regional Member States in endorsing the Action Plan for Vietnamese hospitals. In consultation with the Ministry of Health, WHO introduced coaching followed by planning, hospital quality improvement and an annual implementation review.

The Ministry rapidly scaled this approach and measures up by incorporating them into standards and into provincial monitoring mechanisms. It also engaged professional associations and civil society organizations in building community acceptance and for further scale-up.

EENC was first introduced in 2014 in three national and regional teaching hospitals, including Da Nang Hospital for Women and Children, which had a catchment population of 10 million people and approximately 15 000 births/year.

EENC was introduced over six months through staff coaching, quality improvement assessments, and changes in hospital protocols and environments. IPC interventions included: reducing exposure of babies and mothers to contaminated hands, surfaces and equipment; health workers education on appropriate hand hygiene technique by using fluorescent lotion on hands, improving hand drying, post-coaching assessments of practices. At Da Nang Hospital for Women and Children, a pre-intervention and post-intervention tool was used to review Neonatal Intensive Care Unit (NICU) admissions, adverse outcomes on admission, and care practices for babies born by caesarean section before and after the introduction of EENC.

Results

Neonatal mortality declined from 24 to 11 per 1000 live births between 1990 and 2018 in Viet Nam. It now represents around 52% of under-5 deaths. Efforts to introduce and ensure the routine practice of EENC have been complicated in Viet Nam by an accelerating caesarean-section rate, with rates in some cities above 50%.

Over the study period, 27 381 live births were registered at Da Nang Hospital for Women and Children. Of these, 61.8% were delivered by caesarean section. Total NICU admissions of babies born normally or by caesarean section decreased after introduction of EENC, while significant declines were seen in term and normal birthweight babies.

Compared with the pre-EENC period, during the post-EENC period the number of babies born by caesarean section with hypothermia on admission to the NICU declined. Cases of probable and proved sepsis also decreased by three quarters.

In 2014, most of the staff in Da Nang Hospital for Women and Children who were involved in deliveries had been coached in EENC. During the implementation period (2014–2020), trained hospital staff trained in turn and hosted study visits to demonstrate EENC application in the clinical environment.

In August 2020, the EENC national guideline was applied in the first case of an infant born to a woman with COVID-19 in Viet Nam.

EENC has substantially improved new-born outcomes and reduced unnecessary infant formula use and NICU admissions. It remains a feasible approach during the pandemic and should be prioritised by policy-makers and programme managers.

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