Global report on infection prevention and control

Executive summary

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The central role of 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 care interaction.

In the last decade, large Ebola virus disease outbreaks, the Middle East respiratory syndrome epidemic, and the COVID-19 pandemic, have demonstrated some of the dramatic consequences of epidemic-prone pathogens often spreading through health care settings.

The global report highlights the burden of infection and AMR and the related harm caused to patients and health workers, and provides for the first time a global situation analysis of the implementation of IPC and an overview of available strategies and resources to improve the situation. It also provides demonstration of the impact and cost-effectiveness of IPC interventions. Considering the gaps identified, the report indicates some priorities and directions for implementing IPC at country and global level, including highlighting the importance of integration and alignment of IPC and water, sanitation and hygiene (WASH) within wider efforts on AMR, health emergencies, quality and safety and beyond. 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.

The report is the result of a cross-cutting and multidisciplinary effort, involving several WHO teams at headquarters, regional and country offices, and some key partners in the field of IPC. It collates information and data from many sources, including the scientific literature, WHO global databases, WHO surveys using standardized tools, published WHO reports and reports by other institutions. 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.

The problem of unsafe care resulting from health care-associated infections and antimicrobial resistance

No country or health system, however sophisticated, can claim to be free of health care-associated infections (HAIs).

HAIs are among the most frequent adverse events occurring during health service delivery. These infections, 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.

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, on average (2, 3). 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 (3, 4).

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 (5, 6).**

Based on 2016-2017 data, 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 European Union and European Economic Area (EU/EEA) countries (7).** 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 an HAI (8). The problem of infection and AMR spread does not spare long-term care facilities where ECDC estimated 4.4 million episodes of HAIs occur every year in EU/EEA countries (7). Similarly, USCDC estimated that, on any given day, one in in 43 nursing home residents has an HAI (8).

SARS-CoV-2 transmission in health care settings has been a major issue throughout the COVID-19 pandemic, especially during the first waves in 2020. Among hospitalised confirmed COVID-19 patients, up to 41% were infected in health care settings, according to different studies (9). The prevalence of infection among health workers varied from 0.3% to 43.3% (10).

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

In EU/EEA countries, the burden of the six most frequent HAIs in terms of disability and premature mortality accounts for twice the burden of 32 other infectious diseases combined (11).

Mortality among patients affected by health care-associated sepsis was 24.4%, increasing to 52.3% among patients treated in an intensive care unit (5, 6).

Mortality among patients infected with resistant microorganisms is at least two to three times higher than among those infected with sensitive microorganisms (3, 12-17).

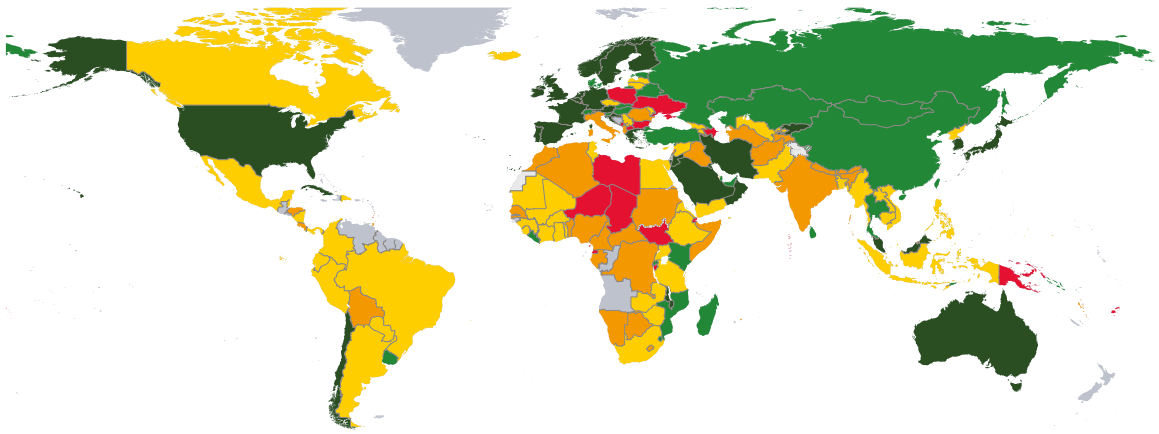
In EU/EEA countries the three most impactful antibiotic-resistant microorganisms, determining 70% of the burden of AMR (in terms of disability and premature mortality) are typically acquired during health care (18, 19).

WHO estimated that between 80 000 and 180 000 health care workers lost their lives to COVID-19 globally since the beginning of the pandemic up to May 2021 (20).

Infection prevention and control implementation at the national level

2020-21 – 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 (TrACSS)), in 2020-21, **11% of countries still did not have an IPC programme or an operational plan** (Figure 1, 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 (Figure 1, B and C). **Only 34% reported having an IPC programme implemented nationwide** (Figure 1, D and E), **and only 19% of these had a system to monitor its effectiveness and compliance** (Figure 1, E) (21).

Figure 1. Country map according to 2020-21 TrACSS (Indicator 8.1, IPC in human health care) results



- 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.

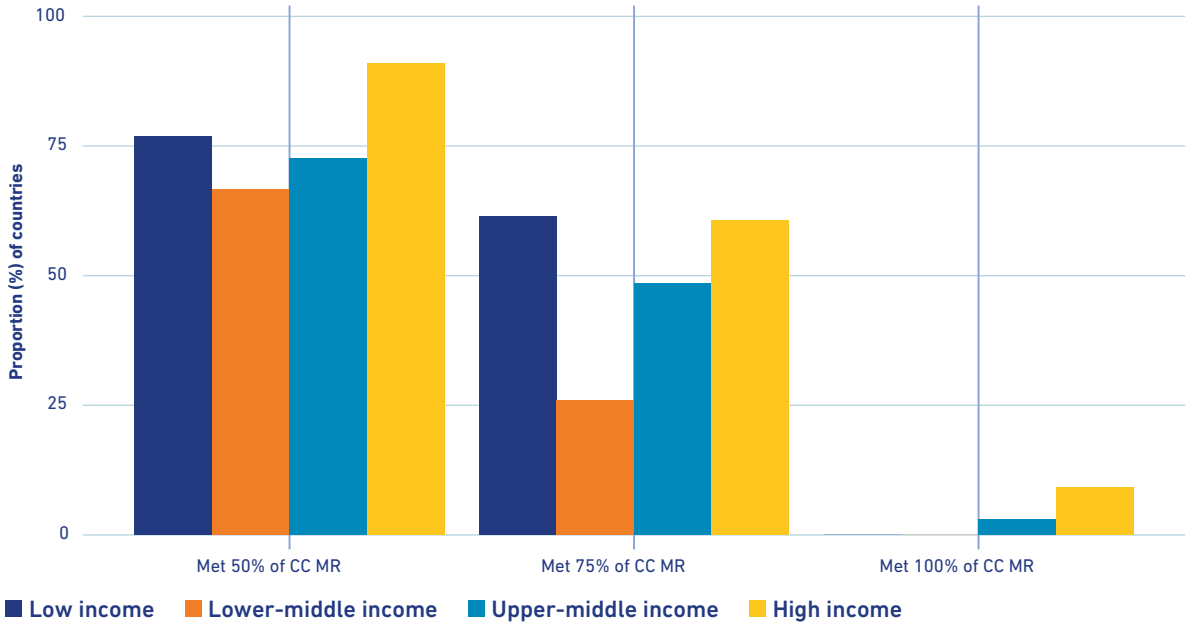
Source: Tripartite Antimicrobial Resistance Country Self-assessment Survey 2020-21.

2021-22 – A detailed global survey on the minimum requirements for national IPC programmes carried out by WHO (22, 23) showed that **an active IPC programme (a functioning programme with annual work plans and budget) existed in 54.7% (58/106) of countries. However, only four out of 106 participating countries (3.8%) met all minimum requirements for IPC (24).** According to this survey, **relevant gaps were limited availability of a budget specifically dedicated to IPC, support by the national level for IPC training roll-out and monitoring of its effectiveness, and expertise to conduct IPC monitoring.**

Conversely, a **high percentage of countries (75%) reported that multimodal improvement strategies, which are considered the gold standard, 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 (24).

Across all surveys and data sets mentioned in the 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 Figure 2 related to the findings of the 2021-22 WHO global survey on national IPC programmes (24).

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



Note: CC MR, core components minimum requirements.
Source: 2021-22 WHO global survey on national infection prevention and control programmes (WHO unpublished data).

Comparing data on IPC implementation at the national level across years

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.** 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 (Figure 3).

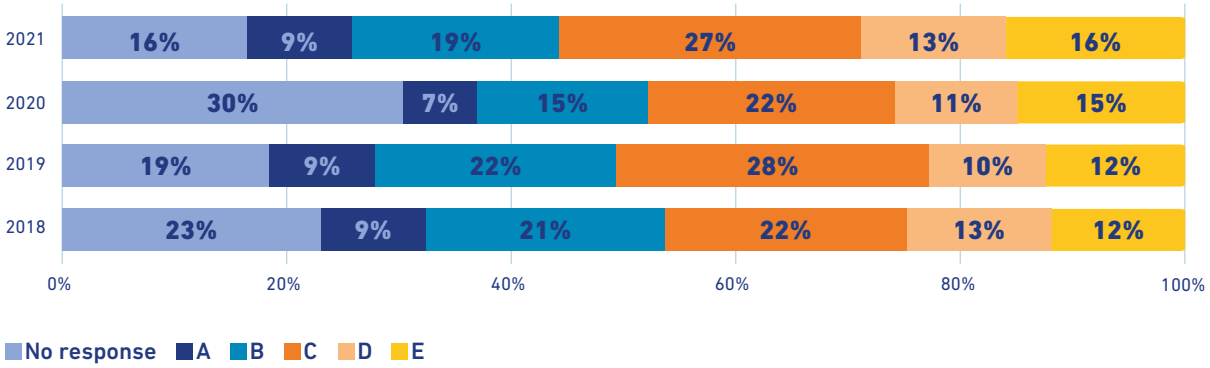
Compared to low income countries (LICs), HICs were more than eight times more likely to have a more advanced IPC implementation status; compared to upper middle-income countries, they were some five times more likely to have a more advanced IPC implementation status (WHO unpublished data).

Comparing data from WHO national IPC global survey on national IPC programmes conducted in 62 countries in 2017-18 (25) and then again in 2021-22[2] (24), the following key findings emerge (WHO unpublished data):

- **The percentage of countries having a national IPC programme remained relatively stable** between 2017-18 (64.5%) and 2021-22 (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).

[2] Countries which enrolled in both national surveys (in alphabetical order): 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.

Figure 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 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.

Source: Tripartite AMR Country Self-assessment Survey 2018-2021.

- There was a **significant increase in the proportion of countries having a dedicated budget for IPC** between 2017-18 (25.8%) and 2021-22 (48.4%, p=0.02), even if this still requires urgent improvement.
- The percentage of countries having an in-service IPC curriculum significantly increased, from 58.1% to 85.5% (p=0.003). However, in 2021-22 **only 41.5% of the countries reported that the national IPC programme was able to provide support for these training activities.**

Infection prevention and control implementation at the health care facility level

2019 – According to a voluntary WHO global survey carried out in 2019 of 4 440 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", with an average "basic" level in LICs** (Figure 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 low income and lower-middle income countries compared to HICs.

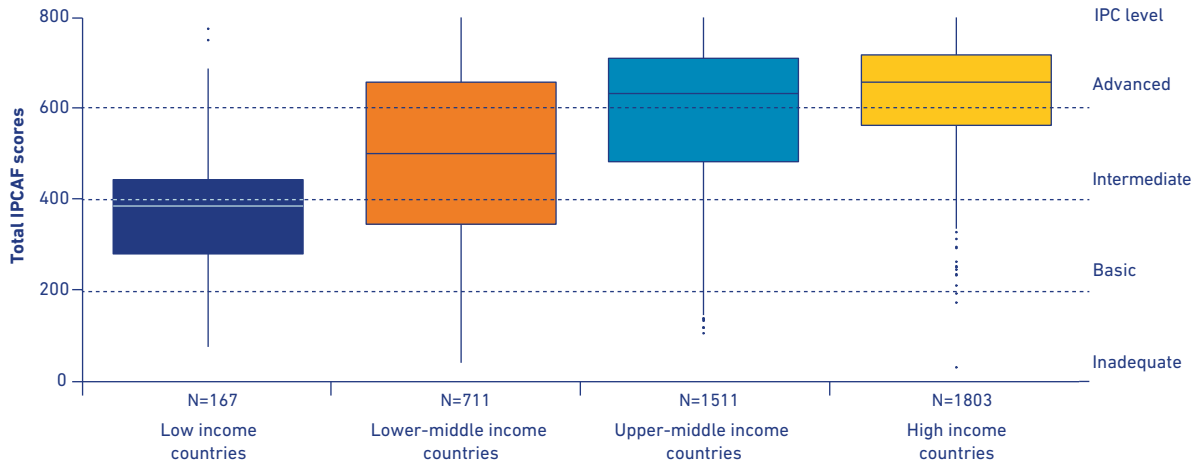
LICs scored at a "basic" level of IPC implementation on average. HICs had more-developed IPC in place for all core components, while lower income countries had notably poor implementation of IPC guidelines, training and education, monitoring, audit, feedback and HAI surveillance (Figure 5) (26).

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 (22). 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.

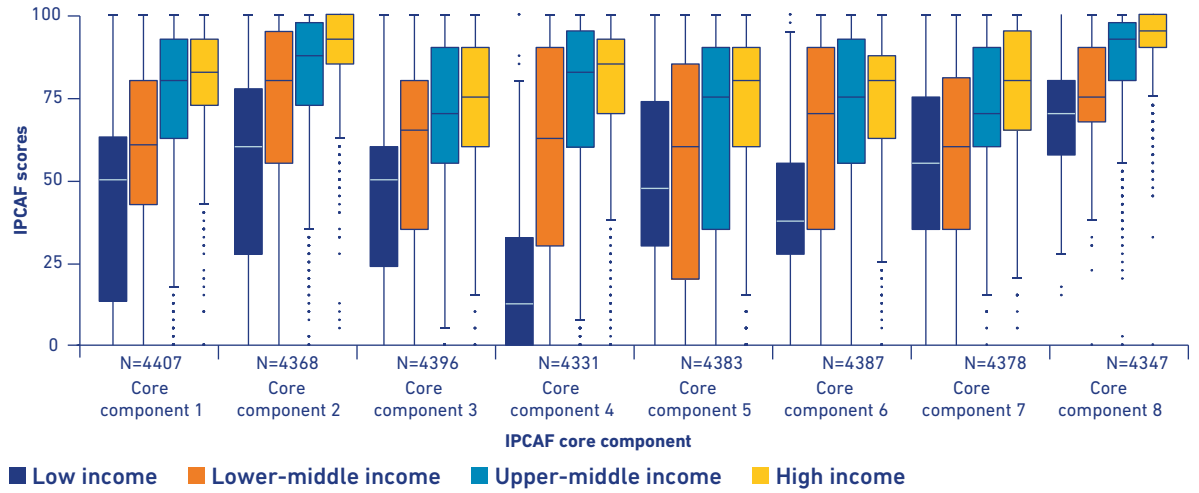
No facility in any LIC had all the IPC minimum requirements in place, and only 18.9% of tertiary specialized health care facilities in HICs had implemented all of them (26).

Figure 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



Note: IPCAF=infection prevention and control assessment framework; IPC=infection prevention and control.
Source: 2019 WHO global survey on IPC programmes at the facility level.

Figure 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



Note: CC1: Infection prevention and control (IPC) programme; CC2: IPC guidelines; CC3: IPC education & training; CC4: HAI surveillance; CC5: multimodal strategies; CC6: monitoring, audit of IPC practices and feedback; CC7: workload, staffing and bed occupancy; and CC8: built environment, materials and equipment for IPC; IPCAF=IPC assessment framework.
Source: 2019 WHO global survey on IPC programmes at the facility level.

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).

2020 – 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 would require relatively modest investments (USD 6.5 to USD 9.6 billion until 2030) (27, 28).

2020-21 – 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. Lack, or limited availability, of personal protective equipment (PPE) was reported in three 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. In the least developed countries, the situation is 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 (29).

2021 – Among COVID-19 facilities assessed by WHO in 10 countries of the African Region[3] 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%) (30).

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. Additionally, implementation of a COVID-19-safe environment (i.e., a dedicated entrance for screening, a separate room for a suspected COVID-19 patient, etc.) is 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 stimulus of the pandemic, and that there are major gaps in IPC in primary care. These 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. It is effective in preventing infections, generates economic savings and is an IPC minimum requirement in all health care facilities.

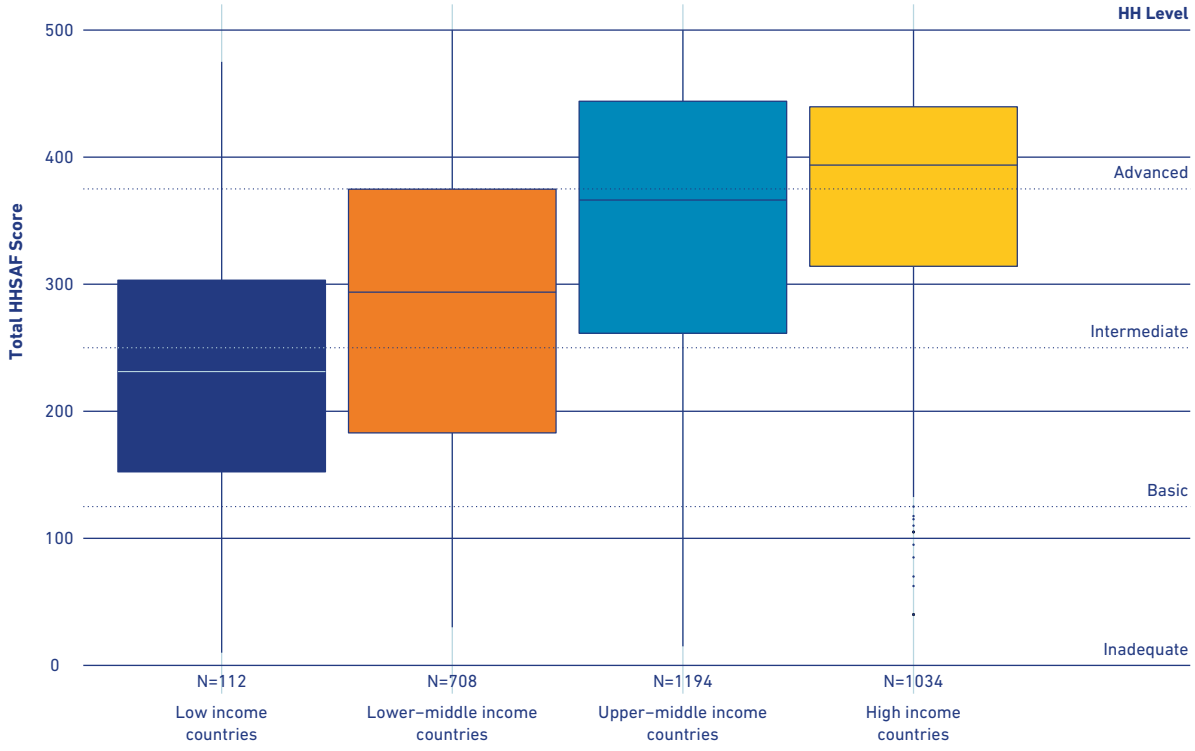
Yet, available evidence showed that compliance with hand hygiene recommendations during health care delivery remains suboptimal around the world, with an average of 59.6% compliance levels in intensive care units up to 2018, and extreme differences between HICs and LICs (64.5% vs 9.1%) (31). In studies 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. In the absence of interventions, compliance with appropriate hand hygiene guidelines averages 40% to 50%, but was seen to be as low as 20%, even in HICs (32, 33).

2019 – The most recent WHO global survey on hand hygiene programmes in 3 206 health care facilities in 90 countries showed an **intermediate implementation level** (350/500 points), overall, with significant differences according to income level of participating countries ("advanced" in HICs

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

and "basic" in LICs) (Figure 6), showing a disparity between hand hygiene practice implementation in resource-rich and resource-poor settings (34).

Figure 6. Overall hand hygiene scores, by country and World Bank income levels



Note: HHSAF=hand hygiene self-assessment framework.
Source: 2019 WHO global survey on hand hygiene at the facility level.

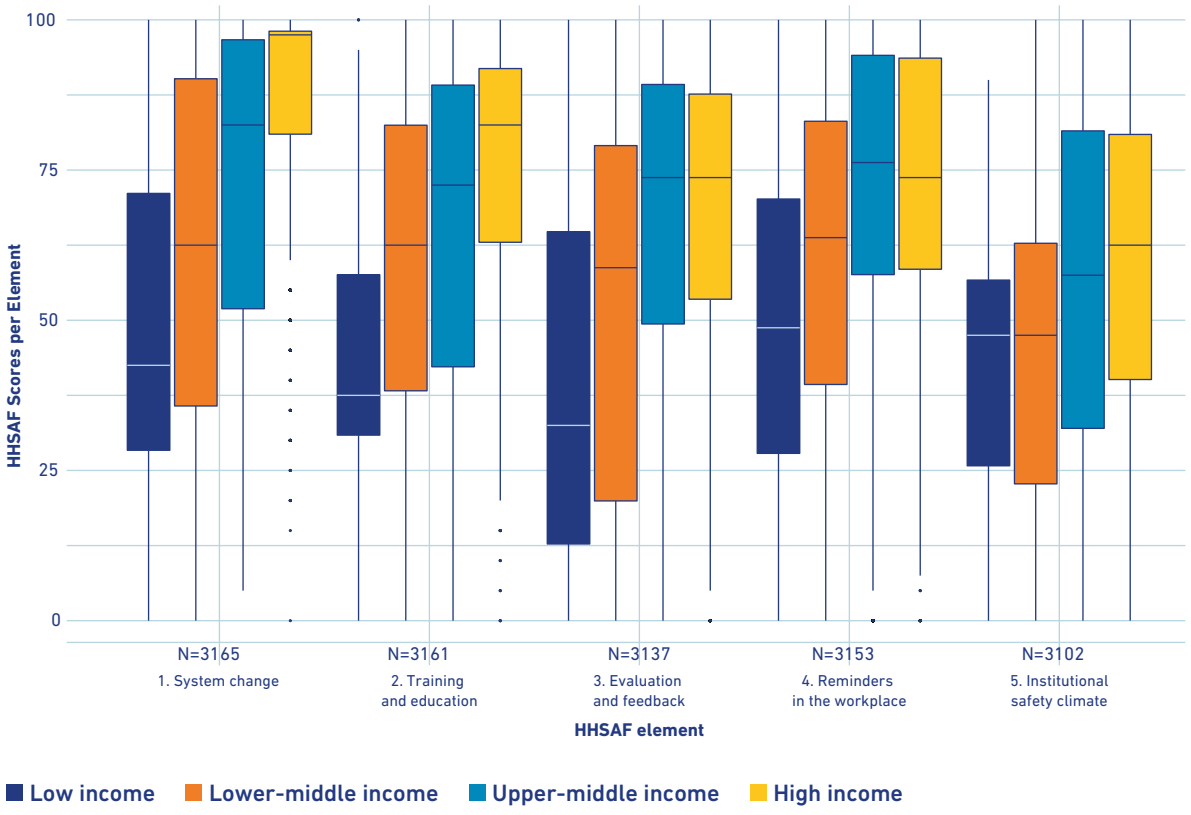
Alcohol-based handrub products, the most efficient means to achieve appropriate hand hygiene, were reported to be available in only 17% of facilities in LICs (vs 75% of facilities in HICs) and the recommended consumption of at least 20 litres of handrub per 1000 patient-days was only achieved in 9% of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

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 (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 (Figure 7) (34).

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 & education". "Evaluation and feedback" in LICs was the lowest-scoring element across the survey (Figure 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).

Figure 7. Element-specific scores for the five elements of the WHO multimodal hand hygiene improvement strategy



Note: HHSAF=hand hygiene self-assessment framework.
Source: 2019 WHO global survey on hand hygiene at the facility level.

Situation and challenges in implementing the minimum requirements for infection prevention and control programmes in WHO regions

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.

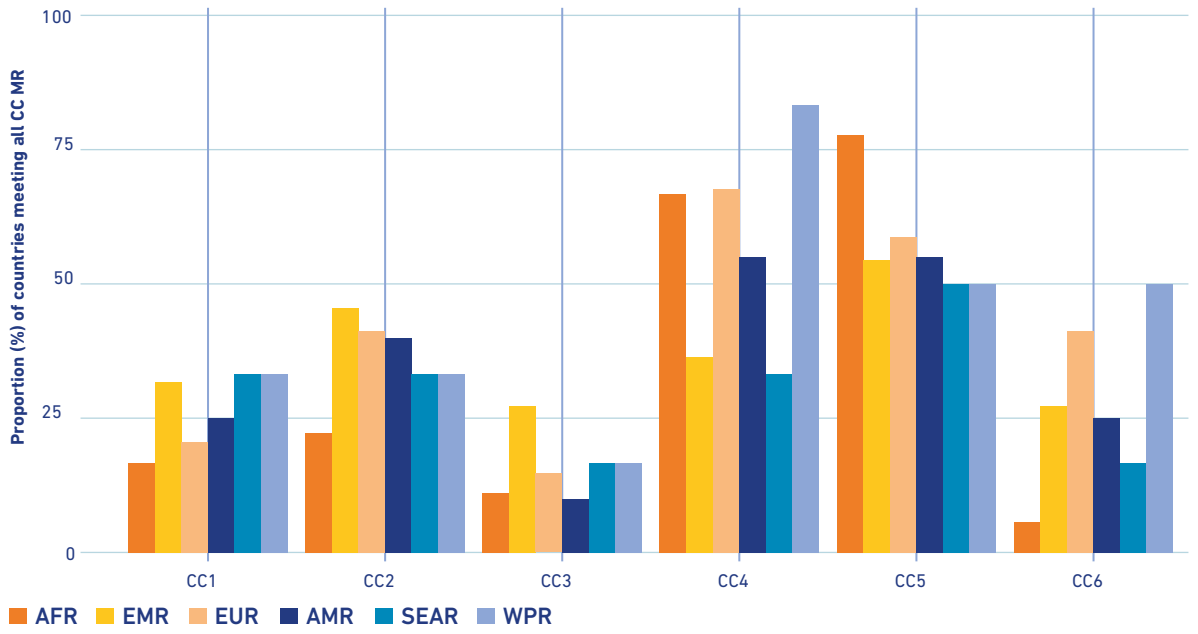
2021-22 – The 2021-22 WHO global survey on national IPC programmes revealed remarkable differences in the implementation of the IPC core components minimum requirements across WHO regions (Figure 8) (24).

The 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 2021-22 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 (24).

However, compared to previous surveys improvements 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 an HAI surveillance; using multimodal strategies for IPC interventions; and establishing hand hygiene compliance as a key national indicator.

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



Note: CC MR=core components minimum requirements; AFR=WHO African Region; AMR=WHO Region for the Americas; EMR=WHO Eastern Mediterranean Region; EUR=WHO European Region; SEAR=WHO South-East Asia Region; WPR=WHO Western Pacific Region.
Source: 2021-22 WHO global survey on national infection prevention and control programmes (WHO unpublished data).

Table 1. IPC implementation challenges and gaps

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
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

Note: 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 at long-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 on the long-term is a critical need that requires urgent attention and investments.

The impact and economic side of infection prevention and control

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 (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 into appropriate IPC implementation and enforcement, 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 (40).**

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 16.5 USD in reduced health care expenditure for every USD 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 (41).

More research is needed to identify evidence on the cost-effectiveness of IPC interventions, particularly 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 infection prevention and control

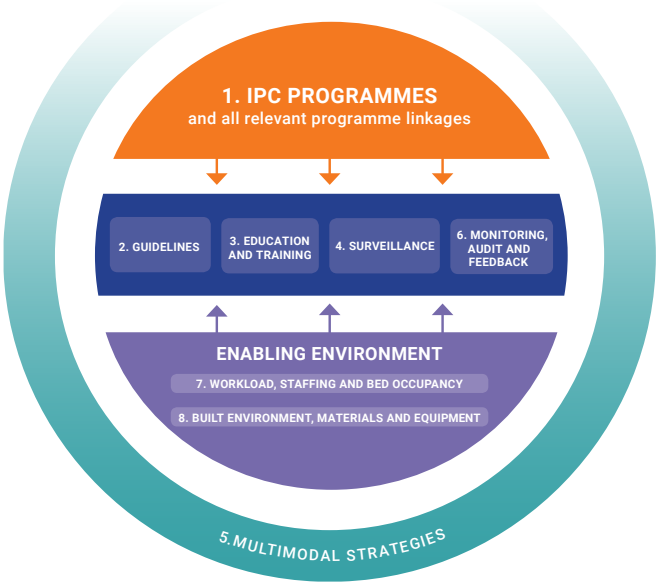
IPC is a tried-and-true approach that is effective and cost-saving, and it ensures patient and health workers' protection and high-quality care. This is why, over the last 20 years, WHO has invested in developing policies, recommendations and implementation strategies and tools to support IPC improvement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

The WHO work initially focused on developing programmes related to hand hygiene, injection safety, blood safety, health care waste management and WASH.

In the aftermath of the devastating Ebola outbreak in west Africa, 2016 represented a turning point in the history of IPC with the issue of **comprehensive, evidence-based and consensus-based WHO guidelines on the core components of effective IPC programmes (42),** which benefited from the input of many IPC stakeholders and field implementers.

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) are implemented at the facility level (Figure 9).

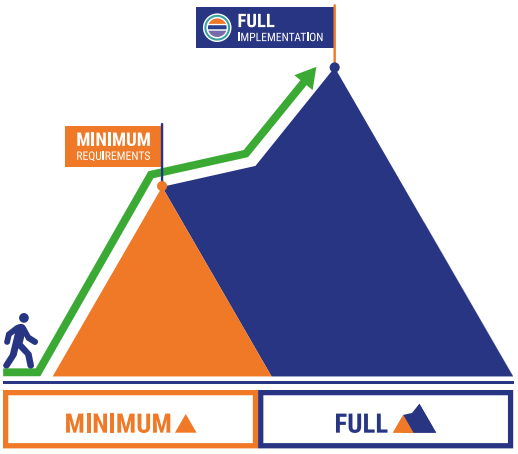
Figure 9. The eight core components of IPC programmes



Note: IPC=infection prevention and control.

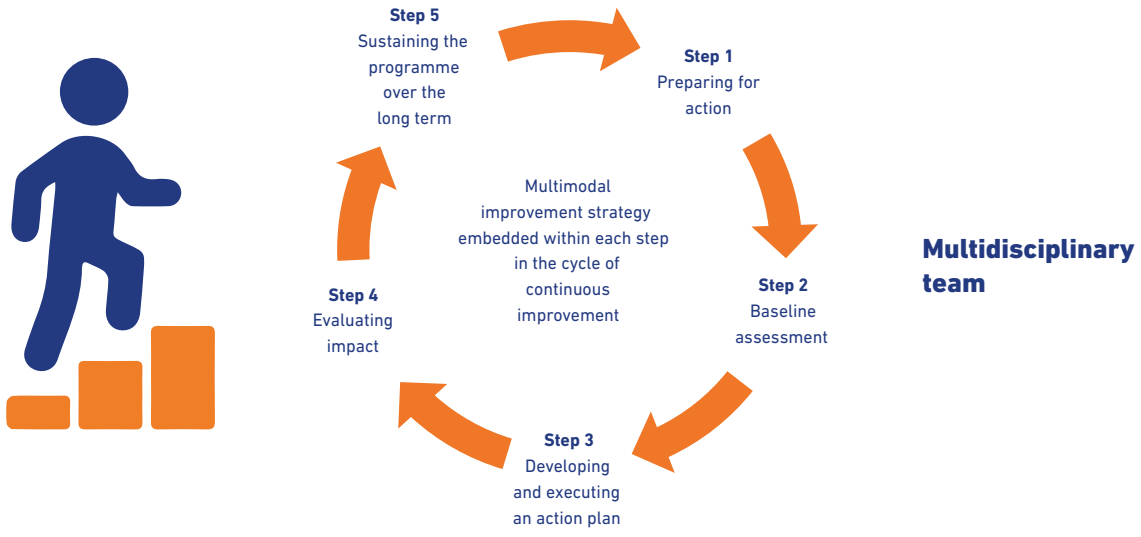
Recognising that the fulfilment of all IPC core components takes time and that countries may be at different stages of progress, with different capacities, available opportunities and resources, in 2019 WHO identified the **IPC "minimum requirements"** which represent the starting point for undertaking the journey to build strong and effective IPC programmes at the national and facility level (Figure 10) (22). 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.

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



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 (Figure 11) to support any IPC improvement intervention or programme, based on implementation and quality improvement science (43, 44).

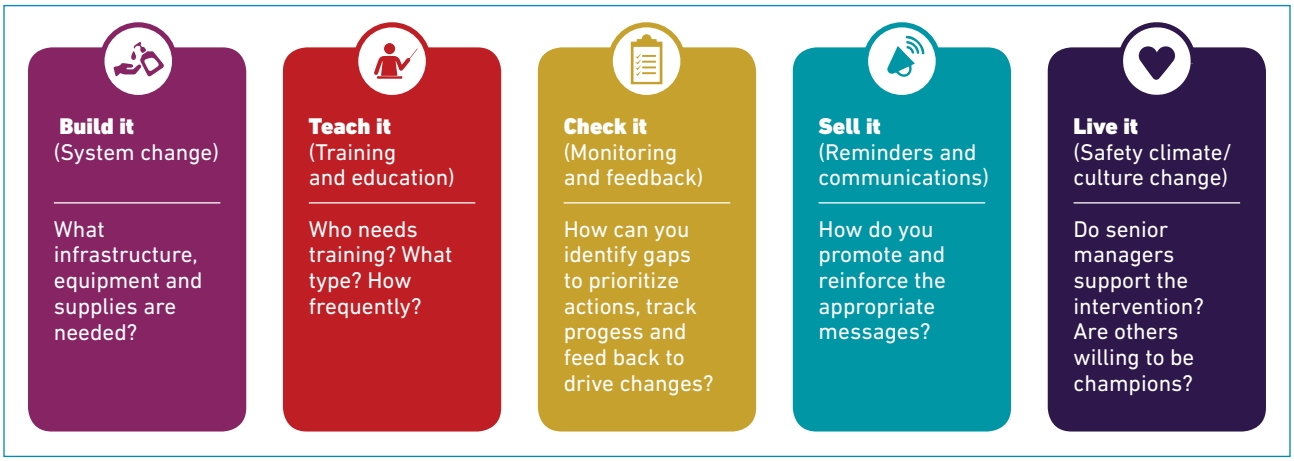
Figure 11. The WHO five-step implementation cycle to IPC improvement



Based on compelling evidence and its own research especially in the field of hand hygiene, WHO recognized that multimodal improvement strategies (MMIS) are the gold standard approach to implementing IPC interventions in the field (45, 46).

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. The WHO MMIS for IPC comprises the following five elements commonly referred to as: 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 (Figure 12).

Figure 12. WHO multimodal improvement strategy



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 infections (47, 48), and the prevention and control of carbapenem-resistant organisms (49, 50).

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 (51, 52). These strategies represent another excellent example of MMIS and a step-wise approach perfectly aligned with those of WHO for IPC (Figure 13) (53).

Figure 13. Eight practical steps for WASH improvement

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 (Figure 14) (54). This framework provides a stepwise approach to IPC outbreak management, and is accompanied by a toolkit providing helpful resources.

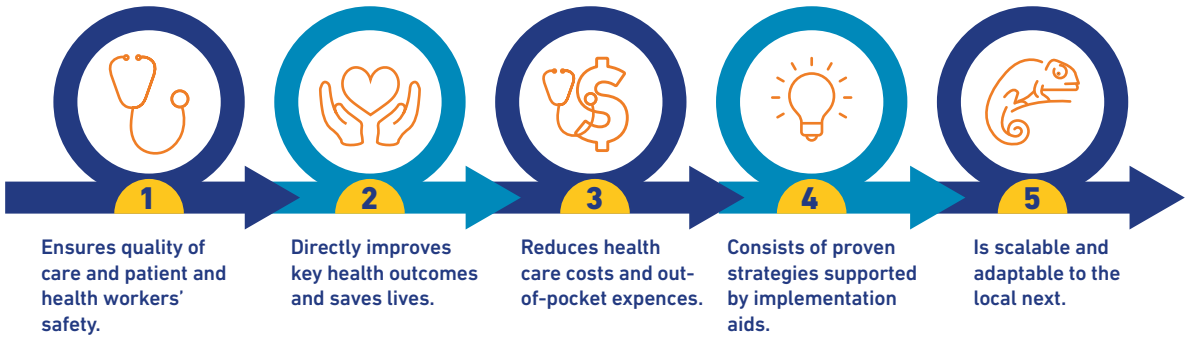
Figure 14. IPC at the core of outbreak preparedness, readiness and response

Note: IPC=infection prevention and control.

Directions and priorities for countries

This report provides a situation analysis of the status of IPC programmes worldwide and highlights that, although some progress has been made (in particular in the last year), the implementation of IPC programmes is still lagging.

This report makes it clear that there are at least five main reasons for investing in IPC (56). These are that IPC:



IPC is indeed at the core of a number of other major global health priorities, including health emergencies and the International Health Regulations, AMR action plans, 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.

IPC is indeed at the core of 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 (particularly goals 3.1-3.3, 3.8, 3.d.2, and 6).**

Within this report, WHO provides some key directions and priorities to accelerate efforts and progress at the local, national and global levels (Figure 15).

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.

Figure 15. 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	• Connected with existing platforms (e.g. GLASS) • Existing standardized surveillance protocols (e.g. ECDC PPS) • Data must be used locally for action
10 Monitoring IPC programmes	• Using standard M&E approaches • Regular assessments and feedback to health workers • Data must be used locally for action • WHO Global IPC Portal is a protected and confidential solution
11 IPC and communications	• Tailored & consistent communications • Authoritative source, based on science • Multiple target audiences

Note: 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.

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.

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