
Infection prevention and control

Report by the Director-General

BACKGROUND

1. This report outlines the impact caused by the spread of infection and antimicrobial resistance acquired in health care facilities, the global situation of infection prevention and control programmes at the national and facility levels, as well as gaps and challenges in implementation of infection prevention and control. It also provides an overview of WHO's recent activities on infection prevention and control and proposes some priorities and actions aimed at improving implementation of infection prevention and control programmes.

BURDEN AND IMPACT OF INFECTIONS, SEPSIS AND ANTIMICROBIAL RESISTANCE ACQUIRED IN HEALTH CARE

2. Over the past decade, the Secretariat and other agencies have demonstrated the significant global burden of health care-associated infections, many of which are caused by multidrug-resistant organisms and/or can cause outbreaks in health care facilities and in community settings. In acute care hospitals, out of every 100 patients, 7 in high-income countries and 15 in low- and middle-income countries will acquire at least one health care-associated infection during their hospital stay. Among intensive care patients, the incidence of health care-associated infections is 2 to 20 times higher in low- and middle-income countries than in high-income countries. Although no precise analysis is possible due to lack of comprehensive data, WHO has estimated that hundreds of millions of patients are affected by health care-associated infections leading to death in 1 in 10 infected patients every year. The coronavirus disease (COVID-19) pandemic has demonstrated how critical infection prevention and control is to maintaining essential health services and ensuring patient and health worker safety.

3. In most cases, both health care-associated infections and the spread of antimicrobial resistance in health care settings are a consequence of poor-quality care delivery and inadequate health infrastructure combined with inexistent or defective infection prevention and control programmes. In particular, key determinants are low compliance with hand hygiene and aseptic technique practices, contaminated medical equipment and supplies, inadequate environmental cleaning, lack of trained infection prevention and control professionals and limited opportunities for staff training, exceeded bed occupancy, understaffing and limited or suboptimal infrastructure for patient isolation.

4. In the European Union and European Economic Area, up to 8.9 million health care-associated infections occur every year in acute and long-term care facilities; a population-based modelling study estimated that the six most common health care-associated infections generate almost twice the total burden of disability-adjusted life years of all other 32 communicable diseases combined. In the European Union and European Economic Area, antibiotic-resistant microorganisms are responsible for most

infections and 75% of disability-adjusted life years attributable to antimicrobial resistance are due to health care-associated infections.

5. Obstetric infections are the third most frequent cause of maternal sepsis, which is responsible for 10.7% of maternal deaths. Almost all maternal deaths due to obstetric infections occur in low- and middle-income countries. Caesarean section is the single most important risk factor for maternal infection after childbirth.

6. Severe neonatal infections, including neonatal sepsis, represent a significant cause of neonatal mortality and long-term morbidity. The highest neonatal sepsis incidence rates are in low- and middle-income countries, particularly in the WHO African Region. The survival of preterm, small (low birthweight) and sick infants has improved over time. However, such infants often require hospital care, which exposes them to the risk of hospital-acquired infections and late-onset sepsis. Newborns in developing countries are at higher risk of acquiring health care-associated infections, with infection rates 3 to 20 times higher than in high-income countries.

7. Several studies during the continuing COVID-19 pandemic have reported severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infections acquired by patients in health care settings, ranging from 0% to 41% of inpatients. Among health workers, the prevalence of SARS-CoV-2 seropositivity has ranged between 0.3% and 39.6% and the incidence of infection has varied from 0.4% to 49.6%; however, huge variations over time and by 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 WHO coronavirus (COVID-19) dashboard), COVID-19 cases among health workers slightly exceeded 10% in the first wave of the pandemic in March 2020, decreased to less than 5% by early June 2020 and further decreased to 2.5% by September 2020, suggesting that improvements in implementation of infection prevention and control made after the initial spread of the virus may have contributed to reducing health workers' exposure.

OPPORTUNITIES: HOW INFECTION PREVENTION AND CONTROL CAN CONTRIBUTE TO ACHIEVING SAFE CARE DELIVERY AND HEALTH SECURITY

8. Infection prevention and control is a clinical and public health specialty that is based on a scientific approach, providing practical solutions grounded in infectious diseases, epidemiology, social and implementation science, and health systems strengthening. It is designed to prevent harm due to infection to patients, health workers and visitors in health care settings.

9. Infection prevention and control programmes at national, subnational and facility levels are essential to oversee the correct, evidence-based implementation of infection prevention and control and the resources and material support (such as, personal protective equipment) required. It should be noted, however, that correct use of personal protective equipment is just one small component of a comprehensive package of infection prevention and control measures and within an overall infection prevention and control programme responsible for training, oversight and monitoring to prevent the transmission of infectious agents in health care settings.

10. The COVID-19 pandemic, as well as other large-scale health emergencies, have demonstrated that infection prevention and control, together with other core capacities required by the International Health Regulations (2005), plays a critical role in detecting, assessing, notifying and reporting events, and responding to public health risks and emergencies of national and international concern. The pandemic has also demonstrated the critical role of health system resiliency in providing essential health

services and maintaining health systems functioning. The cornerstone of health system resiliency is keeping health workers, patients and visitors safe through a series of measures, including infection prevention and control best practices.

11. Evidence-based infection prevention and control interventions have been shown to be effective in preventing 35–70% of health care-associated infections, and having an active infection prevention and control programme can reduce health care-associated infections by 30%. Whether implemented as a standalone intervention or integrated into multifaceted interventions, hand hygiene has been highlighted as the most critical and proven measure in reducing transmission of microorganisms and lowering the incidence of health care-associated infections in health care settings.

12. A report by OECD showed that the most cost-saving interventions to limit the spread of antimicrobial resistance in health care were those aimed at improving hospital hygiene and antimicrobial stewardship, with the potential to prevent three out of four attributable deaths.¹ It also showed that the increasing availability of infection prevention and control equipment and infrastructure (such as alcohol-based handrubs) at the point of care and isolation beds are associated with a proportionate reduction of the most common patterns of antimicrobial resistance that are associated with health care.

13. Implementation and monitoring of infection prevention and control programmes contribute to meeting targets of the Sustainable Development Goals (3.1, 3.2, 3.3 and 3.8, and those of Goal 6), as well as to reducing the indicator 3.d.2 concerning antimicrobial resistance. Infection prevention and control is also recommended as critical interventions in several Health Assembly resolutions. Infection prevention and control is a practical and evidence-based approach with demonstrated impact on quality of care and patient safety across all levels of the health system: it is therefore paramount to achieve quality care for all (resolution WHA69.1 (2016)). Furthermore, strategy 3.3 of the global patient safety action plan 2021–2030 focuses on infection prevention and control (resolution WHA72.6 (2019)). Infection prevention and control is also at the core of objective 3 of the global action plan on antimicrobial resistance because it reduces both the spread of antimicrobial-resistant organisms and the occurrence of infection and thus the need for antimicrobials use, which then has an impact on the emergence of antimicrobial resistance (resolution WHA58.27 (2005)). The existence of strong infection prevention and control programmes and capacity constitutes the foundation of adequate preparedness and response to outbreaks, and thus is key for the prevention of health emergencies, including fulfilment of the International Health Regulations (2005) (resolutions WHA48.7 (1995), WHA73.1 (2020), WHA73.8 (2020), WHA74.7 (2021)). Infection prevention and control is complementary to water, sanitation and hygiene efforts (resolution WHA72.7 (2019)) and provides implementation approaches for achieving behavioural change among health workers and people in the community. Lastly, embedding infection prevention and control practices within maternal and neonatal care pathways contributes to improving maternal and neonatal health given that sepsis is a major cause of morbidity and mortality (including health care-associated morbidity and mortality) in these fragile populations (resolution WHA70.7 (2017)).

14. On the basis of scientific evidence, expert consensus and country experience, and with the support of many international partners, in 2016 WHO issued recommendations on the core components of effective infection prevention and control programmes for the national and acute care health facility

¹ Stemming the superbug tide: just a few dollars more. Paris: Organisation for Economic Co-operation and Development; 2018 (<https://doi.org/10.1787/9789264307599-en>, accessed 23 November 2021).

levels.¹ A comprehensive package of implementation and monitoring resources accompanied the issue of these WHO guidelines. In 2019, WHO further specified the minimum requirements for infection prevention and control programmes, with the aim of supporting stepwise implementation towards full achievement of the requirements of the infection prevention and control core components.²

15. WHO regional offices have set up cross-cutting teams to support implementation of infection prevention and control programmes and contribute to a number of health priorities in an integrated manner. Country offices make considerable efforts to provide support for infection prevention and control; however, this is often hampered by the burden of other competing priorities and the availability of human resources and limited technical expertise.

CHALLENGES IN IMPLEMENTATION OF INFECTION PREVENTION AND CONTROL

16. Despite the demonstrated impact of infection prevention and control, countries struggle to prioritize, invest in, establish and implement the core components of infection prevention and control programmes, even their minimum requirements.

17. Indeed, according to the annual tripartite antimicrobial resistance country self-assessment survey in 2020–2021, 33% of countries surveyed reported having no national infection prevention and control programme or the programme had not been implemented. Conversely, in only 37% of countries had infection prevention and control programmes been correctly implemented and monitored in health care facilities nationwide. Compared with low-income countries, high-income countries were 8.29 times more likely to have a more advanced infection prevention and control implementation status. According to a WHO global survey carried out in 2019, only 15.7% of health care facilities met all WHO infection prevention and control minimum requirements, ranging from 0% in low-income countries to 27.4% of primary and 10.7% of secondary and tertiary health care facilities in high-income countries. Although high-income countries have better established infection prevention and control programmes, the COVID-19 pandemic has shown that even the wealthiest countries have to build more resilient health care systems with effective infection prevention and control to avoid or mitigate the impact of outbreaks.

18. A significant gap in implementation is the critical problem. A WHO global survey in 2018 at the national level demonstrated that while national guidelines on infection prevention and control practices existed in 50% of low-income countries and 69–77% of middle- and high-income countries, only 20% of low-income countries and 29–57% of middle- and high-income countries had implementation plans and strategies. Overall, only 22% of all countries monitored implementation roll-out and impact. In this survey, only 26% of countries reported having a dedicated budget for infection prevention and control supported by the national authorities; of these, most were high-income countries (65%); only one was a low-income country.

19. At the facility level, a WHO global survey in 2019 showed that the core components related to the built environment, materials and equipment for infection prevention and control and guidelines on infection prevention and control were best implemented, whereas those related to workload, staffing and bed occupancy, and infection prevention and control education and training, were the most defective.

¹ Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016 (<https://apps.who.int/iris/handle/10665/251730>, accessed 24 November 2021).

² Minimum requirements for infection prevention and control programmes. Geneva: World Health Organization; 2019 (<https://apps.who.int/iris/handle/10665/330080>, accessed 24 November 2021).

Among low-income countries, surveillance and monitoring of health care-associated infections, and audit of infection prevention and control practices and feedback, were the least implemented. Similar results have been reported recently by WHO regional offices with the exception that countries are progressing in establishing infection prevention and control programmes and developing national infection prevention and control guidelines.

20. Low-income countries in particular struggle to have an appropriate built environment to support infection prevention and control programmes and clean care delivery. In 2020, WHO reported that one in four health care facilities worldwide do not have basic water services and one in three lack hand hygiene supplies at the point of care, with alcohol-based handrubs continuously available in 75% of facilities in high-income countries, but in only 17% of facilities in low-income countries.

21. Over the past year, much progress has been made by building infection prevention and control minimum requirements and improving practices to fight against COVID-19; however, in a WHO pulse survey in 2020 on the impact of the COVID-19 pandemic on essential health services in low- and middle-income countries, lack of infection prevention and control supplies and best practices was identified as a major reason for service disruption (for example, interruption of routine vaccination programmes) by 44% of countries.

PRIORITIES TO ADDRESS INFECTION PREVENTION AND CONTROL IN NATIONAL AND INTERNATIONAL HEALTH AGENDAS

22. All countries should acknowledge that clean, high-quality, safe care should be universally available to every person worldwide. No one, health workers in particular, should be unnecessarily exposed to infection during health care delivery due to suboptimal infection prevention and control practices, or lack of personal protective equipment or of available vaccines.

23. The COVID-19 pandemic and the recent large outbreaks of Ebola virus disease in West Africa and the Democratic Republic of the Congo have shown the devastating consequences of a lack of preparedness and defective infection prevention and control programmes, even in high-income countries, and have brought infection prevention and control to the forefront. Infection prevention and control should be a central component of pandemic and global health security planning in all countries.

24. In order to achieve the Sustainable Development Goals and implement the Health Assembly resolutions cited in paragraph 13, countries should ensure that functional infection prevention and control programmes exist at the national and facility levels, according to the WHO core components of such programmes,¹ and that sustainable infection prevention and control and water, sanitation and hygiene infrastructures and resources are in place in all health care facilities, including in primary care. Despite the huge efforts made globally to enhance infection prevention and control interventions in the past decade, and especially during the COVID-19 pandemic, sustainability is at risk as the newly built infection prevention and control programmes and water, sanitation and hygiene infrastructures could be progressively dismantled, and the attention and resources dedicated to infection prevention and control are likely to decrease as soon as the pandemic is over.

25. At least the minimum requirements for infection prevention and control programmes at the national and health care facility level should be in place in all countries, and their implementation

¹ Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva: World Health Organization; 2016 (<https://apps.who.int/iris/handle/10665/251730>, accessed 24 November 2021).

demonstrated by monitoring key indicators for infection prevention and control and water, sanitation and hygiene in the context of the infection prevention and control core components, the International Health Regulations (2005) and the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. It should be noted that fulfilling the minimum requirements for infection prevention and control has become an essential parameter to be met within the 2021 edition of the State Party self-assessment annual reporting and the joint external evaluation tools.

26. While the existence of specific infection prevention and control programmes supported by dedicated trained infection prevention and control professionals is paramount, infection prevention and control activities must be integrated and aligned with those related to antimicrobial resistance, quality of care, patient safety, water, sanitation and hygiene, and health emergencies programmes, as well as HIV, tuberculosis, malaria, and maternal and child health, and other programmes, in order to emphasize the horizontal nature of infection prevention and control and to avoid duplication or vertical implementation. In particular, efforts to improve infection prevention and control practices should be contextualized within quality improvement and the spirit of the safety climate by which all facilities should be pervaded.

27. Decisive and visible political commitment and leadership engagement at the highest levels are needed to sustain and improve implementation of functional infection prevention and control programmes at the national and facility levels, including considering infection prevention and control as a priority for allocation of national and local health budgets. Member States, the Secretariat and global partners should identify targets for infection prevention and control investment, based on a percentage of overall health care expenditure, that is a reasonable amount to commit for safe and clean provision of care. Progress made towards achieving these targets should be publicly available.

28. Regulations and legal frameworks are needed to enforce infection prevention and control requirements and policies through systems for accrediting health facilities and other mechanisms for accountability agreed on at international level and adapted locally. These mechanisms should enforce, among other things, key infrastructural minimum requirements such as those pertaining to overcrowding, understaffing and the built environment including water, sanitation and hygiene.

29. The infection prevention and control core components cannot be implemented without competent infection prevention and control professionals and frontline health workers understanding infection prevention and control principles and practices. Thus, creation and implementation of accredited infection prevention and control curricula within pre-graduate health courses and in-service continuous education is essential. Similarly, infection prevention and control post-graduate curricula and courses are needed to create local infection prevention and control expertise; the WHO infection prevention and control core competencies can be used as a template.¹ Furthermore, the lack of human resources dedicated to infection prevention and control as well as adequate health care staffing at the facility level should be urgently tackled in countries, given that their adequate numbers and ratios with patient beds have been demonstrated to correlate with prevention of health care-associated infections and spread of antimicrobial resistance, in particular during outbreaks. Infection prevention and control professionals should be offered a recognized career pathway and empowered with a clear mandate and authority, while being held accountable for implementation and reporting the impact of infection prevention and control programmes. Inclusion of infection prevention and control professionals into the structure of executive

¹ Core competencies for infection prevention and control professionals. Geneva: World Health Organization; 2020 (<https://apps.who.int/iris/handle/10665/335821>, accessed 24 November 2021).

hospital boards and senior management will ensure that infection prevention and control and water, sanitation and hygiene are prioritized.

30. Establishing the local epidemiology of health care-associated infections and promptly detecting epidemic- and pandemic-prone and emerging antimicrobial-resistant microorganisms are critical functions to tackle patient harm and health worker infection risks. Thus, functioning and quality-controlled systems for surveillance of health care-associated infections and antimicrobial resistance should be established, in line with the Global Antimicrobial Resistance and Use Surveillance System and other standardized surveillance systems for health care-associated infections and antimicrobial resistance (such as the ones coordinated by the European Centre for Disease Prevention and Control). Good-quality laboratory diagnostics and services are critical to enable identification of pathogens and inform surveillance of antimicrobial resistance, health care-associated infections and early detection of outbreaks.

31. High-level data on infection prevention and control (such as the existence of an infection prevention and control programme) are monitored by most countries through regular surveys coordinated by WHO and partners. However, they often do not reflect actual functioning, implementation and impact of infection prevention and control programmes. Thus, more detailed and multilevel assessments of such programmes should be undertaken regularly. The new WHO global infection prevention and control portal¹ offers the opportunity to undertake this type of monitoring, in a protected confidential space, using standardized tools.

32. Data collection must be used for action and improving outcomes. Infection prevention and control monitoring results and surveillance data should be streamlined and used locally to identify the 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 frontline staff – should be ensured, including using modern technologies that facilitate automatic reporting and point-of-care feedback.

ACTION BY THE EXECUTIVE BOARD

33. The Board is invited to note the report and provide further guidance on action that could be taken by the Organization in response to the burden of infections and antimicrobial resistance acquired in health care.

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¹ <https://ipcportal.who.int/>, accessed 11 December 2021.