

Draft National Infection Prevention and Control Strategic Framework

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Foreword



Many medical practices and risks associated with health care are emerging as major challenges for patient safety and contribute significantly to the burden of harm due to unsafe care. Health care-associated infections (HAIs) are one of the frequently encountered patient safety incidents in care delivery and poses major public health challenge impacting on morbidity, mortality and quality of life. The prevalence of HAIs in mixed patient populations in low- and middle-income countries (LMICs) is approximately twice that of high-income countries.

These infections also present a significant economic burden at the societal and health facility level. Effective infection prevention and control (IPC) programmes have been proven to be one of the cornerstones for combating HAIs and antimicrobial resistance (AMR).

There was therefore a need to align the National IPC Policy and Strategy (2007) to the World Health Organization's (WHO) core components for IPC (2016). With the recent promulgation of the Regulations for Norms and Standards applicable to different categories of health establishments (2018), which include standards for IPC, a policy document is no longer required to ensure that IPC principles are adhered to. Therefore, this strategic framework gives guidance to public and private health facilities and health workers on compliance with standards relating to IPC practices. To further assist health facilities to implement this IPC strategic framework, a practical implementation manual has been developed in parallel to accompany this document.

I believe and trust that this strategic framework and the practical manual for implementation of the strategic framework will strengthen evidence-based IPC practices at national, provincial, district and health facility levels towards: combating threats posed by epidemics, pandemics and AMR; and achieving the WHO Sustainable Development Goals 3 and 6 in compliance with the International Health Regulations.

A handwritten signature in black ink, appearing to read 'T. Pillay', written in a cursive style.

Dr T Pillay
Acting Director-General: Health

Date: 26/03/2020

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My sincere gratitude to the chairperson of the technical working group, Prof. Shaheen Mehtar, who led the development of the IPC strategic framework and practical implementation manual. Her dedication throughout the development of the document is highly commendable. I sincerely thank the members of the technical working group- Ms Ronel Steinhöbel (co-chair), Ms Yolanda van Zyl, Ms Briëtte du Toit, Ms Belinda Makhafola and Dr. Shaidah Asmall- for their invaluable expertise.

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Abbreviations

AMR	Antimicrobial resistance
CDC	Centers for Disease Control and Prevention
CPE	Carbapenemase-producing Enterobacteriaceae
SSD	Sterile Services Department
EMS	Emergency medical services
ESBL	Extended-spectrum beta-lactamase
ESKAPE	<i>Enterococcus faecium</i> , <i>Staphylococcus aureus</i> , <i>Klebsiella pneumoniae</i> , <i>Acinetobacter baumannii</i> , <i>Pseudomonas aeruginosa</i> , and <i>Enterobacter</i> species
GLASS	Global Antimicrobial Resistance Surveillance System
HAIs	Healthcare-associated infections
IHR	International Health Regulations
IPC	Infection prevention and control
IPCAF	Infection prevention and control assessment framework
JEE	Joint External Evaluation
MAC	Ministerial Advisory Committee
MDROs	Multi drug resistant organisms
OH	Occupational health
QI	Quality improvement
PHC	Primary health care
QA	Quality Assurance
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
UHC	Universal Health Coverage

Definitions of key terms

Antibiotic: Any class of organic or synthetic molecule that inhibits or kills microbes by specific interactions with bacterial targets, without any consideration of the source of the particular compound or class

Antimicrobial: A general term referring to a group of drugs, that includes antibiotics, antifungals, antiprotozoal drugs and antivirals that inhibits the growth of micro-organisms

Antimicrobial resistance (AMR): One or more changes occurring in a microbe that renders an antimicrobial used to treat or prevent infections caused by it, ineffective. It is sometimes used interchangeably with the more focused term, *antibiotic* resistance.

Emergency Medical Services (EMS): An organisation or body that is dedicated, staffed and equipped to operate an ambulance, medical rescue vehicle or medical response vehicle in order to offer emergency care.

Healthcare-associated infections (HAIs): Infections occur as a result of receiving healthcare, whether in a hospital or an out-of-hospital setting and not present or incubating at the time of admission. Generally, they do not manifest before the first 48 hours after contact with healthcare services. Some surgical site infections may only occur after discharge, 30 to 90 days post-operatively depending on the type of surgery. Occupational-related infection and iatrogenic infections are also classified as HAI

Healthcare area (zone): Refers to all regions outside of the patient zone also referred to as the “patient surroundings”, i.e. other patients and their patient zones and the wider health-care environment. This includes the curtains, partitions and doors between separate patient areas. The healthcare zone can include shared patient areas. Organisms found within the healthcare zone are foreign to the patients and potentially harmful to all patients. For EMS the health care area could include the front cab of the ambulance including door handles any clean or sterile supplies located in the ambulance compartments including, PPE, clean linen, the EMS bag and portable oxygen bag, portable radios and crew phones.

Health care professional: A person providing health services in terms of any law, including in terms of the:

- (a) Allied Health Professions Act, 1982 (Act No. 63 of 1982);
- (b) Health Professions Act, 1974 (Act No. 56 of 1974);
- (c) Nursing Act, 1978 (Act No. 50 of 1978);

- (d) Pharmacy Act, 1974 (Act No. 53 of 1974); and
- (e) Dental Technicians Act, 1979 (Act No. 19 of 1979).

Health worker: Any person who delivers health care and services (directly or indirectly) in a health facility to users. It includes health care professionals and support staff (cleaners, food service workers, laundry staff, administrative staff etc.).

Health facility (establishment): The whole, or part, of a public or private health institution, facility, building or place, whether for profit or not, that is operated or designed to provide treatment; diagnostic or therapeutic interventions, nursing, rehabilitative, palliative, convalescent, preventative or other health services such as emergency medical services (EMS).

Infection prevention and control: Is a scientific evidence-based approach and practical solution designed to prevent harm caused by infection to patients and health workers. It is grounded in infectious diseases, epidemiology, social science and health system strengthening.

Infection prevention and control (IPC) practitioner: Health worker that has a qualification equivalent to the minimum of Fundamental or Post graduate diploma/degree in IPC.

Multimodal improvement strategies: Comprises of several elements or components (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. WHO identified five components: (i) system change (availability of the appropriate infrastructure and supplies to enable IPC good practices); (ii) education and training of healthcare 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 health facility or the strengthening of a safety climate.

Patient safety: The reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum

Patient zone: Includes the patient and the patient's immediate surroundings. The patient zone is the area that is temporarily and exclusively dedicated to an individual patient for their care. This typically includes the patient and all inanimate surfaces that are touched by or in direct physical contact with the patient such as the bed rails, bedside table, bed linen, infusion tubing and other medical equipment. It further contains surfaces frequently touched by health workers while caring

for the patient, such as monitors, knobs and buttons, and other touch surfaces. Since the patient's flora rapidly contaminates the entire patient zone, it should be thoroughly cleaned after one patient leaves, before the next patient arrives. Within the patient zone there are two critical set of sites, a) clean sites (e.g. intravenous/ IV access point) that need to be protected against microorganisms, and b) body fluid sites (e.g. indwelling urinary catheter) that may lead to exposure to body fluids. Point-of-care products should be accessible without having to leave the patient zone. For emergency medical service (EMS) the patient zone (in an ambulance) is the entire area where the patient is housed and transported including the stretcher with a patient on it, linen, patient care equipment including monitor patient belongings, paper/electronic patient care report and transfer documents, contact surfaces in the ambulance during patient transport, and door internal handles.

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

1. Introduction

Current threats posed by epidemics such as Ebola and cholera, pandemics like influenza, and antimicrobial resistance (AMR) in bacteria have become increasingly evident as ongoing universal challenges to public health. These challenges have been given top priority for action on the global health agenda along with patient safety and Water, Sanitation and Hygiene (WASH) in health facilities. The 72nd World Health Assembly (WHA) held in May 2019, adopted two resolutions in this regard, i.e. to make patient safety a global priority (WHA72.6) and to highlight the need to ensure WASH infrastructure, empower cleaners and address the spread of AMR through WASH in health facilities (WHA72.7).¹

Effective infection prevention and control (IPC) programmes are the cornerstone for combating healthcare-associated infections (HAIs) and AMR.² IPC is unique in the field of patient safety and quality universal health coverage (UHC) since it affects the safety of health workers and patients.³ IPC programmes are therefore a fundamental element for safe, high quality, people-centred and integrated care.

The United Nations Sustainable Development Goals (SDGs)⁴ came into effect in January 2016. SDG 3 (good health and wellbeing, in particular SDG 3.8) and SDG 6 (clean water and sanitation) reinforce the importance of IPC as a contributor to safe, effective high-quality health service delivery, in particular those related to WASH, quality of care and UHC. There is also a renewed focus on the International Health Regulations (IHR)⁵ positioning IPC as a pivotal strategy for dealing with public health threats of international concern. In South Africa, the National Health Act of 2003 prescribes that everyone must have access to the best possible health services in an equitable manner.⁶ The amended Act of 2013 makes provision for the prescribing of Norms and Standards applicable to different categories of health facilities. Section seven, eight and nine of the Norms and Standards Regulations applicable to different categories of health facilities, as under scribed by the Act, describes IPC standards applicable in health facilities.⁷

¹ World Health Organization. Patient Safety and WASH. Global Action on Patient Safety and WASH. Director General Report for the 72nd World Health Assembly. WHO 2019.

² Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from <https://www.who.int/infection-prevention/publications/core-components/en/>

³ World Health Organization [Internet]. Clean Care is Safer Care: Infection Prevention and Control. [updated 2017; cited 2019 May 29]. Available from: <https://www.who.int/gpsc/ipc/en/>

⁴ United Nations. Global Sustainable Development Report , 2015 edition; 2015

⁵World Health Organization. International health regulations (2005), second edition. Geneva: WHO; 2008

⁶ Republic of South Africa. National Health Act 2003. Pretoria: Government Gazette; 2003

⁷ Republic of South Africa. Norms and Standards Regulations applicable to different categories of health establishments. Pretoria: Government Gazette; Feb 2018

An expert group convened by WHO first identified core components for IPC in 2009. Subsequently, these were redefined through WHO evidence-based guidelines in 2016 to strengthen evidence-based IPC practices at national and health facility levels towards combating threats posed by epidemics, pandemics and AMR; and also as imperative for achieving SDG Goal 3 and Goal 6, and compliance with the IHRs.⁸ South Africa's first National IPC Policy and Strategy (2007) pre-dated these 2016 WHO guidelines and therefore required revision to align that policy with current WHO guidance.

With the recent promulgation of the Regulations for Norms and Standards applicable to different categories of health establishments (2018),⁹ and which include standards for IPC based on the WHO Core Components, a policy document is no longer required to ensure that IPC principles are adhered to. Therefore, this strategic framework (2019) gives guidance to public and private health facilities and health workers on **how** to comply with standards relating to IPC practices.

While the 2016 WHO core components are based on systematic reviews and robust evidence gleaned mainly from high-income countries, these core components apply equally to low to middle-income countries including South Africa. WHO defines eight core components for IPC, the first six are specifically aimed at national level IPC programmes and last two are health facility level specific. The South African IPC strategic framework is structured around these 8 WHO IPC core components:

- National IPC programmes;
- National and health facility level IPC guidelines;
- IPC education and training;
- HAI surveillance;
- Multimodal improvement strategies (MMIS) for implementing IPC activities;
- Monitoring, evaluation and feedback;
- Workload, staffing and bed occupancy at the health facility level; and
- Built environment, materials and equipment for IPC at the health facility level.

The first draft of this document was developed by the IPC technical working group and presented at various National committees, i.e. National District Health Systems Committee, National Hospital Coordinating Committee and the Ministerial Advisory Committee for Antimicrobial Resistance. Inputs from these committees were incorporated into Draft Two. Draft Two was presented at a National IPC consultative workshop. The following stakeholders attended the workshop: representatives from the private and public health sector and clusters within the National Department of Health (Primary Health

⁸ Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from <https://www.who.int/infection-prevention/publications/core-components/en/>

⁹ Republic of South Africa. Norms and Standards Regulations applicable to different categories of health establishments. Pretoria: Government Gazette; Feb 2018

Care (PHC) and Hospital systems, HIV, Maternal health, tuberculosis (TB)), academic institutions, professional bodies, the National Institute for Communicable Diseases (NICD) and the National Health Laboratory Services (NHLS). Valuable inputs were received during the workshop which was used to refine the final document.

Facility level implementation guidance of the strategic framework is presented in the Practical Manual for implementation of the National IPC Strategic Framework, which accompanies this document.¹⁰

2. Purpose and Objectives

The purpose of this document is to outline the strategic framework to prevent, reduce and control the development of HAIs and AMR, ultimately improving patient safety and health outcomes. This document is aligned to the *Guidelines for the Prevention and Containment of AMR in South African Hospitals* (2018)¹¹ produced by the Ministerial Advisory Committee on AMR.

The objectives of the strategic framework are to:

- Establish and strengthen IPC programmes at national, provincial, district and health facility level including emergency medical services (EMS).
- Prescribe the development and implementation of national IPC guidelines.
- Ensure that the IPC programmes are led by IPC-trained professionals.
- Ensure that health workers are trained on IPC.
- Improve HAI surveillance as required by the national DOH.
- Adopt multimodal improvement strategies for implementation of the strategic framework.
- Monitor and evaluate the implementation of the strategic framework.
- Provide regular feedback as part of quality improvement.
- Optimise the built environment and ensure the continuous availability of essential materials and equipment needed to support implementation of effective IPC measures towards improving patient safety and health outcomes.

3. Scope

This strategic framework will be applicable to all provincial and district managers responsible for health service delivery including for infection prevention and control health facility staff and health workers in both the public and private health sector.

¹⁰ National Department of Health. Practical Manual for implementation of the National Infection Prevention and Control Strategic Framework. Pretoria. 2020

¹¹ Guidelines for the Prevention and Containment of Antimicrobial Resistance in South African Hospitals; Supporting the Antimicrobial Resistance Strategy Framework and the Guidelines on implementation of the Antimicrobial strategy in South Africa. One health approach and governance 2018. Department of Health Pretoria. Republic of South Africa 2018

4. Legislative and strategic mandates

The legislative and strategic mandates that bear relevance to the development and implementation of this strategic framework are set out in **Table 1**.

Table 1: Legislative and strategic mandates

INTERNATIONAL	
Sustainable Development Goals	SDG 3 (good health and wellbeing) and SDG 6 (clean water and sanitation) reinforce the importance of IPC as a contributor to safe, effective high quality health service delivery.
International Health Regulations, 2005, third edition (published 2016)	The purpose of the IHR is to protect against the international spread of disease. The National Department of Health (NDoH) must oversee the implementation of the IHR. Health facilities are in the front-line of containment and response strategies that requires facilities to have IPC systems in place.
NATIONAL: LEGISLATIVE MANDATES	
National Health Act of 2003, Act No 61 of 2003	The Act stipulates that a national health system must provide, in an equitable manner, the population of the Republic with the best possible health services that available resources can afford.
Norms and Standards Regulations applicable to different categories of health establishments, 2 February 2018	The regulations were published in accordance with Section 78 of the National Health Act 2003; Section 8 of the Regulations sets the standards for IPC programmes and Section 9 the standards for waste management.
Occupational Health and Safety Act of 1993, Act No 85 of 1993 [Section 8(1)]	According to Section 8 (1) of the Act the general duties of employers to their employees include that every employer provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of his employees.
Water Services Act of 1997, Act No. 108 of 1997	One of the objectives of the Act is to provide for right of access to basic water supply and the right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health or well-being.
National Environmental Management Act: Waste Management of 2008, Act No 59 of 2008	In general, the purpose of the Act is to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being. One of the objectives of the Act that relates specifically to IPC is the treatment and safe disposal of waste.
National Environmental Health Norms and Standards for premises and acceptable Monitoring Standards for Environmental Health Practitioners, 24 December 2015	These Norms and Standards are premised on the fact that government recognises the importance of disease prevention across all levels of health care. Standards are set for the monitoring of health surveillance of premises, rodent/pest control, environmental pollution, waste management on premises, water quality and hazardous substance control.

Regulations for Hazardous Biological Agents, 27 December 2001	Regulations 10 (1)(b), 15 (2) and 16(a), (b) and (c) describes precautions to be taken in the workplace which includes administrative controls and precautionary measures.
Regulations Relating to the Hazard Analysis Critical Control Point System, 2003 (amended, 14 June 2018)	The Hazard Analysis Critical Control Point (HACCP) system, which is science based and systematic, identifies specific hazards and measures for their control to ensure the safety of food. HACCP is a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end product testing.
The Foodstuffs, Cosmetic and Disinfectants Act of 1972, Act No 54 of 1972.	The Act controls the sale, manufacture and importation of foodstuffs, cosmetics and disinfectants.
Medicines and Related Substances Act, 1965, Act No. 101 of 1965	The Act provides for the registration of medicines intended for human and for animal use, for the registration of medical devices, for the establishment of a Medicines Control Council.
Emergency medical services regulations, 1 December 2017	The regulations make provisions for the inspection and licensing processes of EMS providers. The regulations also stipulate the minimum requirements for EMS providers.
National Patient's Right Charter	The Charter creates a framework for promoting and defending patients' rights. Every patient has the right to amongst others to have access to safe healthcare.
National IPC Policy and Strategy (2007)	The purpose of the policy is to set minimum national standards for the effective prevention and management of HAIs, so that hazards associated with biological agents are minimized for patients, visitors and health care personnel in health facility.
NATIONAL: STRATEGIC MANDATES	
The AMR National Strategic Framework, 2014-2024	The AMR Strategy Framework consists of five interconnected strategic objectives to address AMR. IPC is included as one of the five strategic objectives.

5. Situational analysis

At a national level, findings of the 2017 Joint External Evaluation (JEE) of IHR Core Capacities of the Republic of South Africa Report highlighted that the country has achieved fairly high scores for the majority of the technical areas. However, there were some areas that scored poorly including the indicator for HAIs prevention and control programmes, which obtained a score of one (no capacity) out of five (sustainable capacity). It was recommended that HAI programmes be strengthened by implementing a robust IPC national plan covering all areas of activity that would be consulted on,

communicated, implemented and monitored nationally and within each province as outlined in the WHO Core Component Guidelines.¹²

The NDoH's Ideal Clinic Facility Framework were used to measure the current state of IPC practices at public PHC facilities.¹³ To assess IPC programmes in public and private hospitals, interim results from the WHO IPC Global Survey (2019) were used.^{14,15} The Ideal Health Facility Framework consists of 10 components and 32 sub-components. Sub-component 10 and 18 describe the measures for IPC hygiene and cleanliness respectively. **Table 2** sets out the average percentage obtained for each sub-component and measure as assessed by the district teams for Ideal Clinic Realisation and Maintenance. A total of 3 467 facilities were assessed across all nine provinces in the 2018/19 financial year using the version 18 of the Ideal Clinic Framework.

Table 2: Ideal Health Facility data: Results for IPC and Hygiene and Cleanliness

Measure	Average %
Sub component 10: Infection Prevention and Control	84
National Policy on IPC is available	91
Facility has a designated staff member who is responsible for IPC	94
Standard operating procedure on infection control is available	92
All staff have received in-service training in the past two years on infection control standard precautions that is in line with the standard operating procedure	71
Poster on hand hygiene is displayed above the hand wash basin in every consulting room	97
Awareness day on hand hygiene is held annually	77
Poster on cough etiquette is displayed in every waiting area	97
Staff wear appropriate protective clothing	86
The linen in use is clean, appropriately used and not torn	96
Sharps are disposed of appropriately	92
An annual risk assessment for IPC compliance is undertaken by the staff member assigned to IPC	69
All staff are made aware of the provincial letter/memo/circular that inform staff of the procedure to follow for prophylactic immunisations	46
Sub-component 18: Hygiene and Cleanliness	69
All cleaners have been trained on cleaning procedures	78

¹²Joint External Evaluation of International Health Regulations Core Capacities of Capacities of the Republic of South Africa. Mission Report: 27 November to 1 December 2017. WHO. 2017

¹³National Department of Health. Ideal Clinic Framework. Version 18. 2018/19

¹⁴Hand Hygiene Self-Assessment Framework. WHO 2010

¹⁵IPC assessment framework at facility level. WHO 2018

Measure	Average %
Cleaning schedules are available for all areas in the facility	81
Disinfectant, cleaning materials and equipment are available	32
All work completed is signed off by cleaners and verified by the manager or delegated staff member	73
All service areas are clean	81
Hand hygiene and sanitary facilities are available	56
Standard operating procedure for managing general and health care risk waste is available	88
Healthcare waste is managed appropriately	71
Storage area for healthcare waste is appropriate	36
All toilets are clean, intact and functional	53
Exterior of the facility is clean and well maintained	81
A signed waste removal service level agreement between the health department and the service provider is available	93
Waste is removed in line with the contract	91
Records show that pest control is done according to schedule	54

An average percentage of 84% was obtained for the sub-component on IPC and 69% for hygiene and cleanliness. The following scored less than 60%:

- Disinfectant, cleaning materials and equipment are available (32%);
- Storage area for healthcare waste is appropriate (36%);
- Staff is aware of a provincial communication regarding prophylactic immunisations procedures (46%);
- All toilets are clean, intact and functional (53%);
- Records show that pest control is carried out according to schedule (54%); and
- Hand hygiene and sanitary facilities are available (56%).

Although the average percentage for the sub-components was above 80%, measures that related mainly to the built environment (Core Component 8) scored very low. An adequate built environment (including the necessary infrastructure, materials and equipment) and staffing (Core Component 7; including appropriate bed occupancy, human resources and workload) are two of the prerequisites for the implementation of all other IPC core components and the achievement of safe practices.

To assess the current state of IPC practices at private and public hospitals, results from the 2019 WHO IPC assessment framework (IPCAF) at facility level were analysed.¹⁶ The IPCAF comprises of eight WHO IPC core components (CC) with 81 indicators. The results are shown in **Table 3 and Figure 1. Table 4** outlines the interpretation of the score ranges. A total of 456 hospitals completed the IPCAF of which 313 and 143 represented public and private hospitals respectively. Out of a maximum score of 800, the overall national average was 612.5 (intermediate level) with private hospitals scoring 722.5 (advanced level) compared with 567.5 (intermediate) for public hospitals. A maximum of 100 was allocated per CC; private hospitals ranged from 85 to 100 per CC, as opposed to a range from 60 to 85 in public hospitals. Public institutions scored lowest for CC7 on workload, staffing and bed occupancy at the health facility level (mean score=60), followed by core components for training (CC3), HAI surveillance (CC4) and MMS (CC5) (mean score = 70).

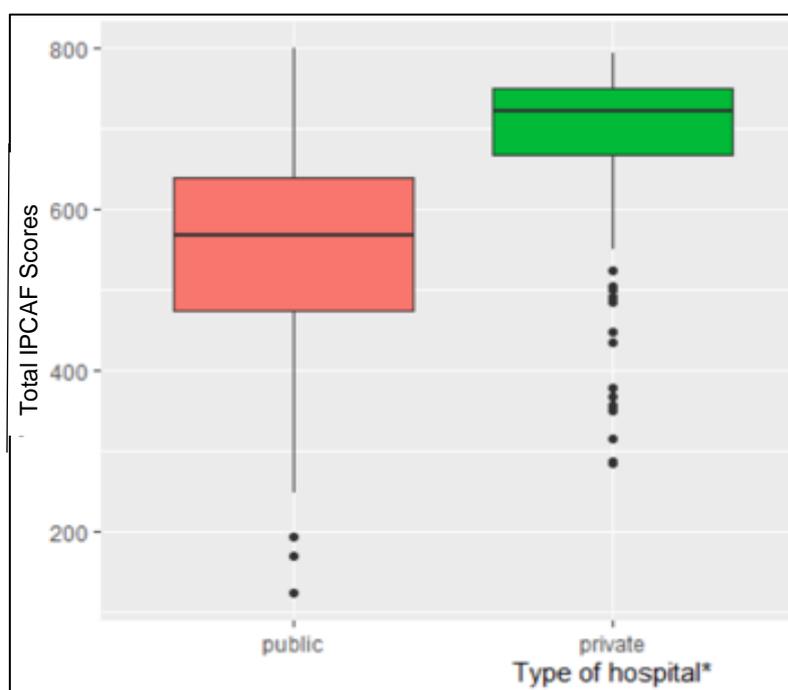
Table 3: Results from the WHO Global IPC Assessment Framework

Measure	All	Public hospital	Private hospital
IPC Assessment Framework (IPCAF)	Median (interquartile range (IQR))		
1. IPC programmes	80.0 (60.0, 90.0)	75.0 (57.5, 90.0)	85.0 (75.0, 95.0)
2. National and health facility level IPC guidelines	90.0 (72.5, 100)	85.0 (70.0, 97.5)	100.0 (90.0, 100.0)
3. IPC education and training	75.0 (60.0, 90.0)	70.0 (55.0, 85.0)	85.0 (70.0, 90.0)
4. Health care-associated infection surveillance	80.0 (55.0, 95.0)	70.0 (45.0, 85.0)	95.0 (85.0, 100.0)
5. Multimodal improvement strategies for implementing IPC activities	75.0 (55.0, 90.0)	70.0 (50.0, 80.0)	90.0 (75.0, 95.0)
6. Monitoring, evaluation and feedback	82.5 (65.0, 90.0)	77.5 (62.5, 87.5)	87.5 (80.0, 92.5)
7. Workload, staffing and bed occupancy at the health facility level	70.0 (50.0, 87.5)	60.0 (45.0, 75.0)	95.0 (80.0, 100.0)
8. Built environment, materials and equipment for IPC at the health facility level	87.5 (75.0, 95.0)	80.0 (70.0, 90.0)	97.5 (92.5, 100.0)
TOTAL	612.5 (503.8, 706.3)	567.5 (475.0, 640.0)	722.5 (668.8, 750.0)

¹⁶IPC assessment framework at facility level. WHO 2018

Table 4: Interpretation of score ranges for IPCAF

Total score (range)	IPC level
0 – 200	Inadequate: IPC core components implementation is deficient. Significant improvement is required.
201 – 400	Basic: Some aspects of the IPC core components are in place, but not sufficiently implemented. Further improvement is required.
401 – 600	Intermediate: Most aspects of the IPC core components are appropriately implemented. The facility should continue to improve the scope and quality of implementation and focus on the development of long-term plans to sustain and further promote the existing IPC programme activities
601 – 800	Advanced: The IPC core components are fully implemented according to the WHO recommendations and appropriate to the needs of the facility



* Box-whisker plot displays median, interquartile range and range of each score

Figure 1: Overall IPCAF scores for private and public sector hospitals

The AMR Strategic Framework requires IPC interventions to prevent and control the spread of resistant microbes in humans and health institutions. Since 2016, South Africa has been a part of the Global Antimicrobial Resistance Surveillance System (GLASS), which is being developed based on the WHO Global Action Plan on AMR. *“The aim of GLASS is to support global surveillance and research in order to strengthen the evidence base on AMR and to help informing decision-making and drive national, regional and global action.”*

The South African national AMR surveillance network falls under the GERMS-SA surveillance network and is coordinated by the National Institute of Communicable Diseases (NICD). In a recent publication, the number of cases for each ESKAPE pathogens (*Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* species) isolated from blood cultures in 2016 were analysed as the most common organism responsible for HAI. These results indicated that 53% and 35% of isolates the *K. pneumoniae* and *E. coli* respectively and these isolates were reported from all 16 sentinel hospitals. Of concern was that 65% and 30% of *K. pneumoniae* and *E. coli* respectively were resistant to β -lactam antibiotics through production of extended-spectrum beta-lactamase (ESBL). Many of these isolates were also resistant to ciprofloxacin, piperacillin/ tazobactam and gentamicin. These resistance rates were higher in 2016 than in the previous year. Carbapenemase-producing Enterobacteriaceae (CPE) were predominately by *K pneumoniae* (72%), and the most dominant gene was *blaOXA-48*. According to Perovic et al, 80% of *Acinetobacter baumannii* and 72% of *Pseudomonas aeruginosa* isolates were not susceptible to carbapenems and gentamicin. Implementation of similar surveillance programs for HAIs can assist IPC programmes to reduce transmission and thereby reduce the rate of AMR.¹⁷

Another important role of IPC is to support communicable disease units to prevent and contain outbreaks of communicable diseases such as influenza, cholera or a Viral Hemorrhagic Fever such as Ebola¹⁸ in the community. The lack of IPC knowledge was highlighted recently during the Ebola outbreak in West Africa¹⁹ and the Democratic Republic of the Congo. It is also noteworthy that during a global survey of countries on Ebola preparedness, Africa, including South Africa was found to be woefully inadequate.²⁰

6. Principles of the strategic framework

The following guiding principles apply:

- IPC implementation is relevant to health system strengthening and patient safety.
- Implementation of this strategic framework will have a direct impact on the burden of HAIs and AMR, including outbreaks of highly transmissible diseases.

¹⁷ O Perovic, H Ismail & E Van Schalkwyk (2018) Antimicrobial resistance surveillance in the South African public sector, *Southern African Journal of Infectious Diseases*, 33:4, 118-129, DOI: 10.1080/23120053.2018.1469851

¹⁸ National Department of Health. National Guidelines for Recognition and Management of Viral Haemorrhagic Fevers 2015. NDOH.

¹⁹ S Mehtar. The impact of education on reducing Ebola virus disease transmission in healthcare facilities; *International Journal of Infectious Diseases* 45 S (2016) 1–477 Available from <http://dx.doi.org/10.1016/j.ijid.2016.02.193>

²⁰ E Tartari, B Allegranzi, B Ang, N Calleja, P Collignon, J Hopman, L Lang, LC Lee, ML Ling, S Mehtar, PA. Tambyah, A Widmer and AVoss. Preparedness of institutions around the world for managing patients with Ebola virus disease: an infection control readiness checklist. *Antimicrobial Resistance and Infection Control* (2015) 4:22 DOI 10.1186/s13756-015-0061-8

- Access to health care services which are designed and managed to minimize the risks of avoidable HAIs for patients and health workers is a basic human right.
- Effective and integrated IPC is a public health issue and contributes significantly to strengthening core capacities and health service resilience within the context of the IHR.
- The prevention and control of HAIs is a significant contributor to the achievement of the SDGs.
- Effective IPC is a key determinant of the quality of health service delivery to achieving people-centered, integrated UHC.

Adherence to the core components of IPC programmes described within this strategic framework is a mechanism to apply these guiding principles.

7. Core components for infection prevention and control programmes

The eight WHO core components are not listed in order of importance, as all components should be deemed equally important for the functioning and sustainability of robust IPC programmes. There are, however, two essential prerequisites, an established and functioning National IPC programme and adequately maintained built environment (including) appropriate workload and bed occupancy, adequate human resources (staffing levels) as well as the necessary infrastructure, materials and equipment for IPC practices ,) that must be in place for implementation of all other core components and the achievement of safe practices. Together, these essential elements support the effective implementation of IPC guidelines, training and education, monitoring, audit, feedback and surveillance. Implementation success in each of these areas also depends on the adoption of a multimodal approach. See **Figure 2**.²¹

²¹ Improving infection prevention and control at the health facility: Interim practical manual supporting implementation of the WHO Guidelines on Core Components of Infection Prevention and Control Programmes. Geneva: World Health Organization; 2017 (WHO/HIS/SDS/2018.10). Licence: CC BY-NC-SA 3.0 IGO. Cataloguing-in-Publication (CIP) data. CIP data are available at <http://apps.who.int/iris>.

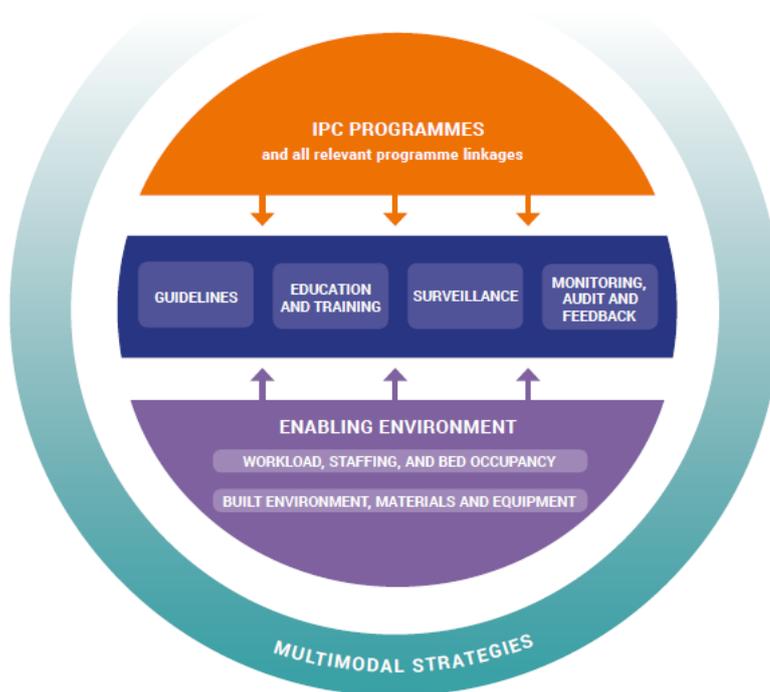


Figure 2: Visual representation of the core components of IPC programmes¹⁷

7.1 Core component 1: Infection prevention and control programmes

The first core component in the WHO guidelines addresses the establishment of a sustainable IPC programme at different levels in the health system, in the public and private sector, including all types of healthcare service delivery. This document provides the framework to develop and support a national IPC programme at all levels of health care delivery in the public and private sector, encompassing the essential IPC core components.

7.1.1 National Level

The WHO recommends “an active, stand-alone National IPC programme with clearly defined objectives and functions to be established for the purpose of preventing HAI and combating AMR through evidence-based IPC practices. National IPC programmes should be linked with other relevant national programmes and professional organisations”.²² The South African National IPC programme should be led by a fully trained and experienced (at least 5 years in a dedicated IPC post) IPC practitioner who is aware of the IPC priorities and needs of the country. The national IPC practitioner

²²Improving infection prevention and control at the health facility: Interim practical manual supporting implementation of the WHO Guidelines on Core Components of Infection Prevention and Control Programmes. Geneva: World Health Organization; 2017 (WHO/HIS/SDS/2018.10). Licence: CC BY-NC-SA 3.0 IGO. Cataloguing-in-Publication (CIP) data. CIP data are available at <http://apps.who.int/iris>.

will be supported by a National Quality committee consisting of the various directorates from within the NDoH that are responsible for specific areas of the National IPC programme. This committee will meet quarterly, IPC will be a standing agenda point. These directorates should include but are not limited to the following: Quality Assurance (QA), Affordable Medicines, Communicable Diseases, EMS and Disaster Medicine, Environmental Health, Hospital Management, PHC, District Health Services and Infrastructure. **Figure 3** illustrates the relationship between the National IPC committee and the other stakeholders as recommended by WHO.

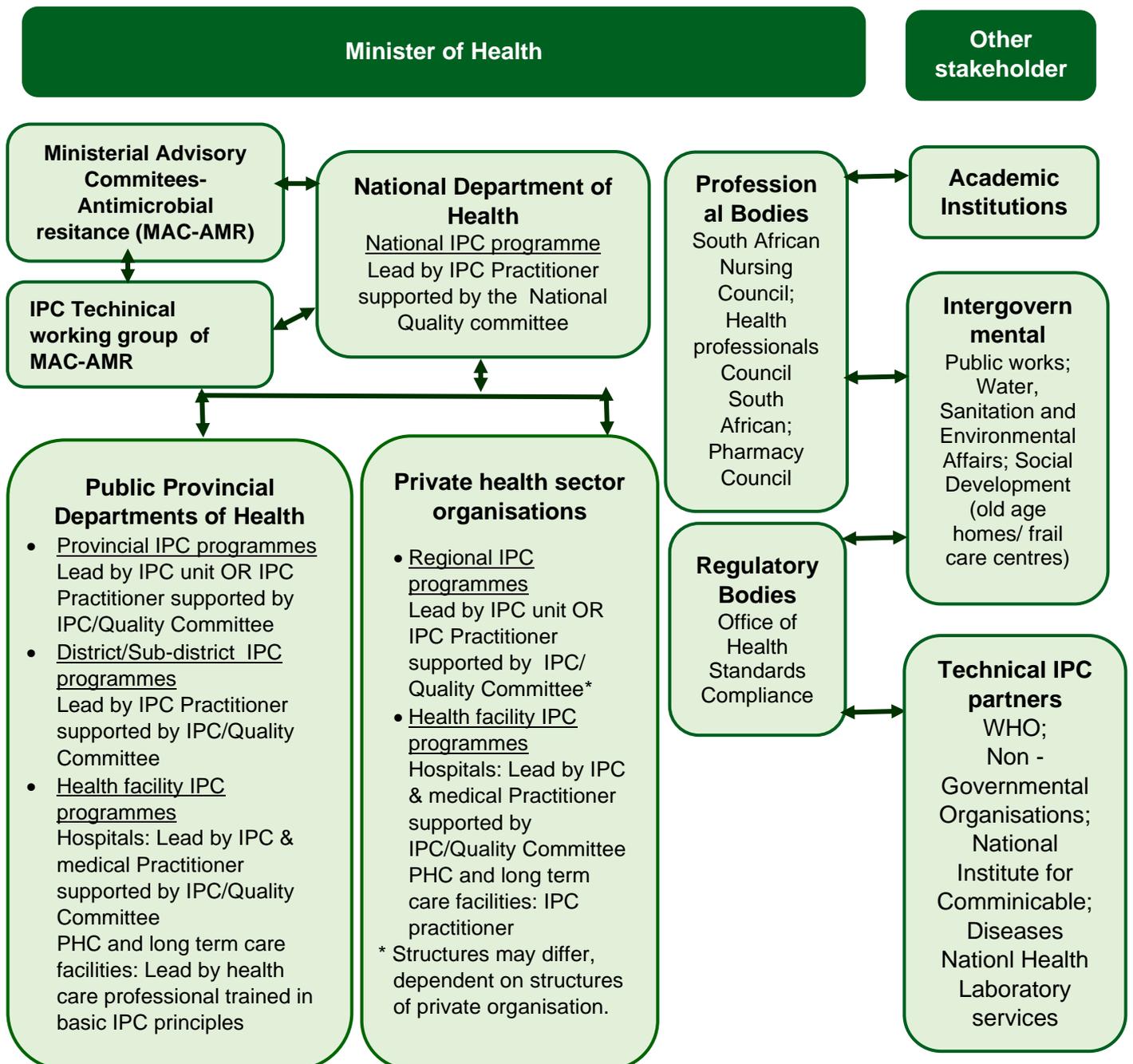


Figure 3: Relationship between the IPC programmes and other stakeholders

Functions of the National IPC Programme is to:

- Develop a sustainable and realistic national plan in line with the 2016 WHO guidelines on IPC including:²³
 - National plan for preventing or containing HAIs and supporting AMR activities of MAC;
 - Develop and strengthen national policies, guidelines and standards of practice regarding IPC activities in health care facilities;
 - Set up monitoring of implementation and adherence to the national policies and standards.
- Provide technical input and advice on specification of IPC equipment, materials and the built environment.
- Links with the National Health Laboratory Services and the Surveillance Technical Working Group of the Ministerial Advisory Committee (MAC) AMR towards establishing an active and reliable surveillance of HAIs and AMR.
- Monitor, analyse and provide feedback on HAI data submitted by provinces.
- Provide input into funding needs and budgets for IPC activities.
- Setting achievable goals for HAI and outbreak containment.
- Giving technical support to communicable disease containment.
- Advice on the development of a national IPC curriculum.

The MAC-AMR has four technical working groups (TWG) reporting to MAC-AMR. Currently IPC is one of the four TWG, made up of trained IPC experts who can advise and support the National IPC programme (**Figure 4**). The group will provide technical support to the National IPC programme, and should be empowered to make recommendations and influence implementation towards preventing HAIs and AMR. The Education Technical Group of the MAC-AMR should establish a structured career path and curriculum in IPC for healthcare professionals.

²³ Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from <https://www.who.int/infection-prevention/publications/core-components/en/>

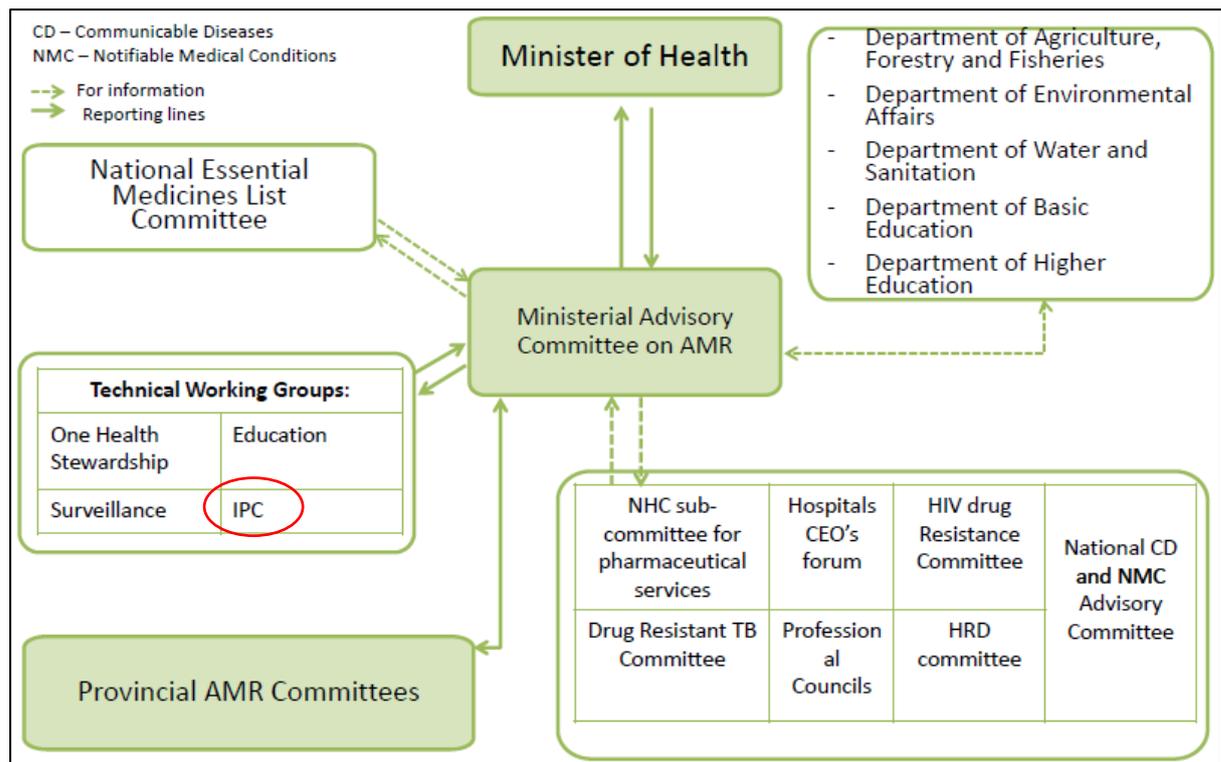


Figure 4: Reporting lines between MAC-AMR and other committees

7.1.2 Provincial Level

It is recommended that a Provincial IPC Unit or at the very least an IPC/Quality Committee be established. Amongst other members the unit or committee should include a fully trained and experienced IPC practitioner with the knowledge and confidence to manage IPC matters. The IPC Committee may form part of other committees and therefore does not necessarily need to be a stand-alone committee. However, if it is part of a larger committee, standing items relating to IPC must be agreed and adhered to. The terms of reference of the committee must be clearly outlined, including accountability. The Provincial IPC Committee should meet four times per year or sooner if necessary.

Functions of the Provincial IPC programme is to:

- Provide strategic direction to districts/health facilities to ensure implementation of the National Strategic Framework.
- Provide technical support and mentorship to the district structures.
- Provide technical input on specification for IPC equipment and materials to districts/health facilities
- Plan and coordinate IPC training for districts/health facilities.
- Develop locally relevant IPC policies/guidelines/standard operating procedures.

- Give guidance to facilities/districts regarding the allocation of funds required to support the implementation of effective IPC activities.
- Review the data on HAIs towards strengthening implementation strategies.
- Submit quarterly HAI surveillance report to the NDoH.
- Provide feedback to the Districts from the National IPC structures.
- Report and share IPC relevant information with the National IPC structures.
- Request technical support from the national technical advisory group on IPC if required.
- Have mechanisms in place to set up alert systems and identify outbreaks in the facility.
- Support provincial CDC units and local government to:
 - Develop provincial preparedness plans to respond to facility outbreaks timeously.
 - Develop locally relevant guidelines in times of crisis or outbreaks specific to the province;
- Establish and maintain relationships with other departments at the provincial level e.g. Engineering, Public Works, WASH, Environmental Health, academic institutions and EMS.
- Continuously monitor and evaluate IPC programmes.

7.1.3 District level

- IPC committees should be established at sub-district/district level for PHC facilities and EMS. The IPC/Quality Committee may form part of other committees and therefore does not necessarily need to be a stand-alone committee. However, if it is part of a larger committee, standing items relating to IPC must be agreed and adhered to. The District IPC Committee should meet four times per year or sooner if necessary.

Functions of the District IPC programme is to:

- Provide technical support and mentorship to health facilities.
- Ensure that budgets are established to support the implementation of IPC activities.
- Monitor that IPC equipment and materials are available at health facilities.
- Plan and coordinate IPC training for staff at health facilities according to the national curriculum.
- Provide guidance with development and review of facility IPC guidelines and policies.
- Provide input within the district on the surveillance, prevention, investigation and control of infectious disease in the community.
- Assist with the containment of community outbreaks to prevent further transmission where possible.

- Review the data on HAIs towards strengthening implementation strategies.
- Submit quarterly HAI surveillance reports to the provincial office.
- Ensure that mechanisms is in place to identify outbreaks and set up alert systems in health facilities.
- Provide input towards the development of district preparedness plans and guidelines to respond to outbreaks timeously.
- Monitor and audit IPC standards and practices in health facilities.

7.1.4 Health Facility Level

The WHO further recommends “*that an IPC programme with a dedicated, trained team should be in place in each acute health facility for the purposes of preventing HAI and combating AMR through IPC good practice*”.

In hospitals the IPC team should consist of at least one medical practitioner and fully trained IPC practitioner as per WHO recommendations. It is recommended that the number of fully trained IPC practitioner on the team should ideally be one IPC practitioner per 200²⁴ to 250²⁵ acute patient bed taking into account workload, the number of intensive care units and high-care beds. Expert opinion in the WHO guidelines suggests a lower ratio may be better given increasing acuity (i.e. 1: 100).²⁶

a. Hospitals

Each hospital should establish a multidisciplinary IPC/Quality Committee which should be attended by all relevant stakeholders depending on the type and level of hospital. The Committee does not need to be a stand-alone committee, it can form part of other committees, (e.g. Quality Assurance committees, Safety committees) as long as pertinent IPC matters are standing items on the agenda, so as to be discussed with decisions taken. The minimum core membership should include:

- Facility administrator/manager/chief executive office
- Heads of clinical teams
- IPC team or practitioner
- Microbiologist
- Housekeeping supervisor
- Pharmacist
- Environmental health practitioner

²⁴ National Department of Health. National Infection Prevention and Control Policy and Strategy. 2007

²⁵ Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from <https://www.who.int/infection-prevention/publications/core-components/en/>

- Nursing manager
- Maintenance/Infrastructure
- Other members can be co-opted as necessary.

b. PHC facilities and long term care facilities

All PHC facilities and long term care facilities should have a delegated health care professional overseeing IPC practices. The health care professional should be trained on basic IPC principles.

The functions of the IPC programme at facility level is to:

- Coordinate and chair the IPC Committee and report on recent IPC events and key performance indicators*.
- Liaise with teams in order to prevent, control and reduce HAIs:
 - write IPC standard operating procedures that is evidence based and inline with provincial/district guidelines/policies to prevent transmission of HAIs*;
 - provide input into funding needs and budgets for IPC activities;
 - ensure that equipment and materials for IPC are available;
 - train and teach clinical and non-clinical teams in evidence-based IPC practices;
 - attend clinical ward rounds and advise on IPC matters*;
 - write reports for relevant stakeholders to inform them of IPC challenges and successes;
 - provide relevant HAIs data on pathogens and resistant profiles in antimicrobial stewardship meetings*;
 - submit quarterly HAIs data to the provincial/district office*;
 - ensure that notifiable medical conditions (NMC) are reported timeously; and
 - ensure that appropriate measures are in place and adhered to, to prevent the transmission of HAIs .
- Support the monitoring and evaluation of procedures and practices in the health facility:
 - conduct regular IPC audits (e.g. hand hygiene, environmental cleaning, compliance to transmission-based precautions and bundle compliance; and
 - Identify gaps and develop and implement continuous quality improvement plans.
- Improve self-knowledge and keep abreast of new evidence in IPC.

*** Functions marked with an asterisk (*) are only applicable to hospitals.**

7.2 Core component 2: National and health facility level infection prevention and control guidelines

One of the functions of the National IPC programme is to oversee the development and implementation of evidence-based National IPC Guidelines for the purpose of reducing HAIs and AMR. The availability of technical guidelines on IPC programme organisation and key IPC practices are usually a prerequisite for rolling out IPC education and training, including IPC monitoring and evaluation, and these should adhere to IPC principles and standards referred to in the National IPC guidelines. The following guidelines should be available/developed as a minimum:

- Standard precautions:
 - ✓ hand hygiene;
 - ✓ appropriate use of personal protective equipment;
 - ✓ patient placement;
 - ✓ appropriate use of antiseptics, disinfectants and detergents;
 - ✓ decontamination of medical devices;
 - ✓ safe handling of linen and laundry;
 - ✓ health care waste management;
 - ✓ respiratory hygiene and cough etiquette;
 - ✓ environmental cleaning;
 - ✓ principles of asepsis;
 - ✓ injection safety, prevention of injuries from sharp instruments, post-exposure prophylaxis and medical surveillance;
- Transmission-based precautions;
- Built environment and infrastructure for IPC;
- Surveillance of HAIs;
- Antimicrobial stewardship;
- Outbreak response;
- Reporting of notifiable medical conditions;
- Education and training of staff and IPC staff;
- Monitoring and evaluation.

Where required, provincial, district and health facilities IPC Committees should adapt these guidelines to their local context and level of care provided.

7.3 Core component 3: Infection prevention and control education and training

The South African AMR Strategy Framework includes a key strategic enabler 'to build expertise in AMR through education, continuous training and building resource capacity for AMR through

workforce development²⁶. The strategy envisages a new focus on interventions to build expertise in AMR, requiring greater emphasis on AMR in the undergraduate and postgraduate healthcare professional curricula. This emphasis applies to the medical, nursing, allied health professionals and pharmaceutical curricula as well as with the veterinary and para-veterinary professionals.

Training is one of the key functions of the national IPC programme to ensure that health workers are well versed in evidence-based IPC systems, thus giving them the confidence to execute their duties without fear of intimidation either by their work environment or the patients they serve. Sound IPC knowledge will result in improved patient safety and care, fewer HAIs, reduced cost associated with wastage and high infection rates, and appropriate maintenance of the infrastructure (WASH) and the built healthcare environment. A well-trained healthcare workforce is essential to deliver a high standard and quality of health to both patients attending a health facility and the community. This is particularly relevant to South Africa where there is a shortage of staff compounded by a high clinical workload.

The career structure in IPC should be approved by national professional bodies such as Federation of Infectious Diseases Societies of Southern Africa (FIDSSA) and Infection Control Society of Southern Africa (ICSSA) and accredited by statutory structures such as the Health Professional Council of South Africa (HPCSA), South African Pharmacy Council (SAPC) and the South African Nursing Council (SANC).

The national IPC curriculum is designed to progressively increase the knowledge of the IPC practitioners and the healthcare workforce, in a stepwise manner as part of quality improvement. IPC education and training should be included in the undergraduate postgraduate curriculum as well as in-service training. IPC is linked closely to clinical practices and therefore the IPC practitioner must be trained and knowledgeable with all clinical practices that take place in a healthcare environment to enable the IPC practitioner to develop effective MMS. It is imperative to institutionalise supportive supervision mechanisms to help staff improve knowledge and skills.

IPC practitioners must be familiar with modes of transmission of microbes, interruption of transmission within the health facility, MMS for implementing essential IPC practices, and should undertake a leadership role, including ethics as part of IPC practices and patient safety. The national IPC curriculum in South Africa should consist of a curriculum for basic IPC, Intermediate level, Fundamentals for IPC (FIPC) and Postgraduate diploma in IPC (PDIC). (**Table 5** and **Figure 5**). IPC

²⁶ National Department of Health, Implementation Plan for The Antimicrobial Resistance Strategy Framework in South Africa ; 2014-2019. Pretoria 2015

practitioners must plan and implement structured orientation and in-service training that includes training done during supportive supervision at the health facility level.

Table 5: Staff category to be trained and duration of training

Curriculum	Staff category to be trained	Duration
Basic IPC	All health care professionals	5 days
Intermediate level	Nurses volunteering to become link nurses, clinical teams working in infection related specialities	7 to 10 1-2 hour sessions In addition to the 5 days Basic IPC
Fundamentals for IPC (FIPC)	Interested in IPC including IPC practitioners starting in the job	6 months, part time
Postgraduate diploma in IPC (PDIPC)	IPC practitioners in post for 2 years or more	2 years part time (equivalent to 1 year full time)

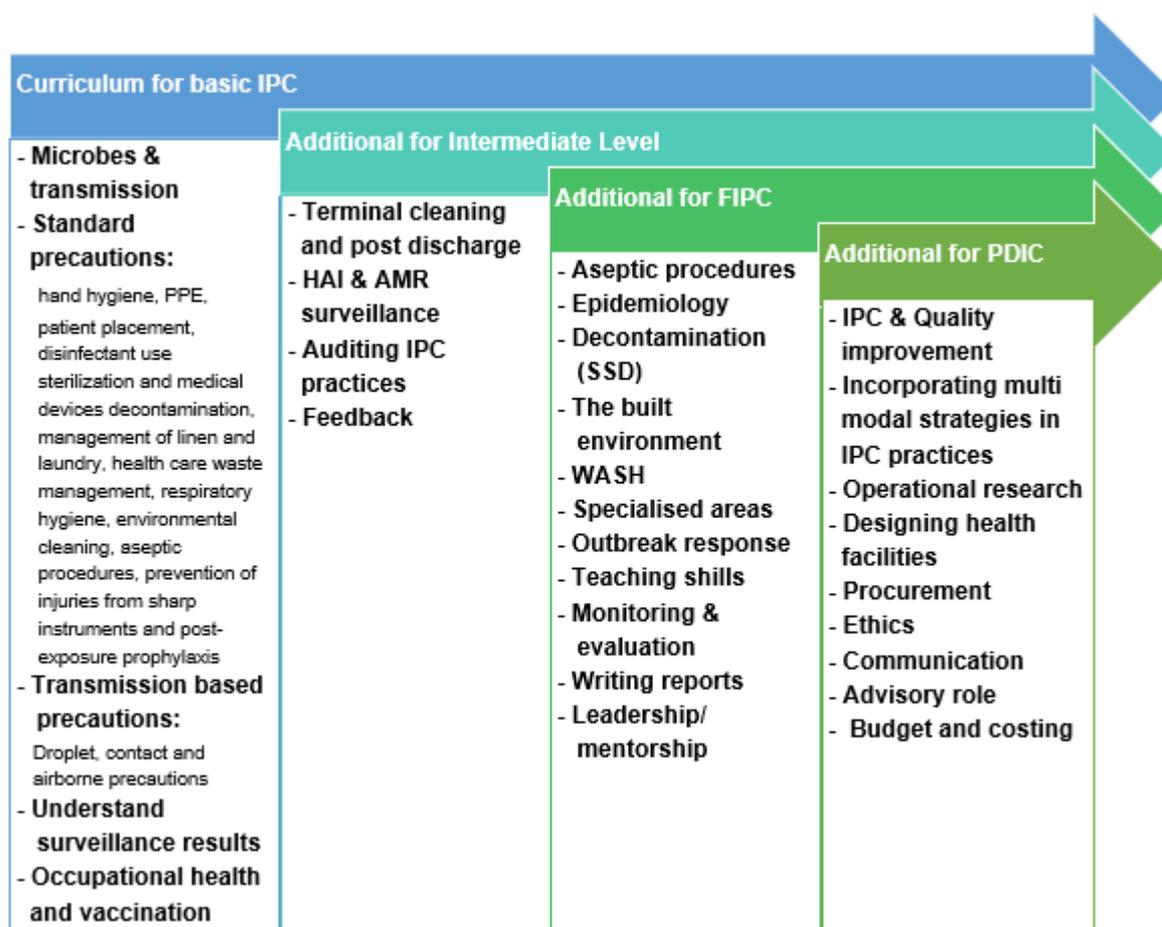


Figure 5: Structure for a national IPC curriculum for South Africa

7.4 Core component 4: Healthcare-associated infection surveillance

The Norms and Standards Regulations Applicable to Different Categories of Health Establishments, Section 8 sets the standards for IPC programmes.

A good HAI surveillance programme should:

- have a clear purpose;
- set out standard definitions, methods data fields, and protocols (including of cohorts or groups to be monitored and periods of data collection);
- be done under a 'no blame' culture with the sole purpose of improving patient outcomes;²⁷
- be carried out by trained personnel who understand data collection, methodology for data collection, understand the information and can interpret the results;
- provide feedback to relevant stakeholders at both clinical and administrative levels.

Therefore, HAI surveillance is pivotal for IPC programmes to be able to identify:

- Trends in HAI pathogens and their resistance profiles
- Trends in HAIs and patients at risk;
- Outbreaks in both healthcare facilities and in the community
- Effective use of microbiological findings
- Establishment of audit systems
- Areas for improving quality of patient safety and care.

Surveillance of the following HAIs, at a minimum, should be monitored at hospitals and long term care facilities:

- Bloodstream infections (BSI)
- Central line-associated blood stream infection (CLABSI)
- Peripheral line-associated bloodstream infections (PLABSI)
- Catheter-associated urinary tract infections (CAUTI)
- Surgical site infections (SSI)
- Ventilator-associated pneumonias (VAP)

Note: Case definitions for HAIs is defined in the Practical Manual for implementation of the National IPC Strategic Framework.

²⁷ World Health Organization. World Health Assembly Resolution WHA72.6 "Global Action on Patient Safety. Available from http://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_R6-en.pdf

7.5 Core component 5: Multimodal improvement strategies for implementing infection prevention and control activities

The implementation of IPC interventions at facility level is much more effective in improving IPC practices that reduce HAIs when a MMS is followed. WHO recommends that the national IPC programme should assess the extent to which standards are being met and activities are being performed according to the programme's goals and objectives.²⁸

A MMS consists of several components that are implemented in an integrated way, supported by leadership, increasing accountability via monitoring and feedback, resulting in behavioural change and safe patient care. The elements of a MMS are:

- **System change:** availability of the appropriate infrastructure and supplies to enable the implementation of infection prevention recommendations;
- **Education and training** of health workers and key role-players;
- **Monitoring** infrastructure, practices, processes, outcomes and providing feedback based on interpretation of data;
- **Reminders and communication** improvements in the workplace;
- **Culture change** within the facility or the strengthening of a safety climate,^{29,30,31}

Targeting only ONE area (i.e. unimodal) at the expense of the others is highly likely to result in failure. All five areas should be considered and necessary action taken, based on the local context and situation informed by periodic assessments.²²

7.6 Core component 6: Monitoring, evaluation and feedback

Monitoring and evaluation are major components of quality improvement and feeds into the Plan-Do-Study-Act (PDSA) cycle (see practical implementation manual) that is required for sustainable improvement where changes are tested on a continuous basis to ensure improvement in outcomes.³² Information gathered from surveillance and audit should be fed back to the relevant authorities at both national, provincial, district and facility levels.

²⁸Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from <https://www.who.int/infection-prevention/publications/core-components/en/>

²⁹ World Health Organization. Patient Safety and WASH. Global Action on Patient Safety and WASH. Director General Report for the 72nd World Health Assembly. WHO 2019.

³⁰ Guidelines on Core Components of infection prevention and control at the national and acute healthcare facility level. WHO 2016. Available from <https://www.who.int/infection-prevention/publications/core-components/en/>

³¹ World Health Organization [Internet]. Clean Care is Safer Care: Infection Prevention and Control. [updated 2017; cited 2019 May 29]. Available from: <https://www.who.int/gpsc/ipc/en/>

³² National Department of Health. Quality Improvement Guide. The key to providing improved quality of care. 2012

Timely feedback should be given on health care practices with a “no blame” learning culture and should include the relevant health facility authorities and staff who need to work together as a team to reduce HAIs and AMR and to improve patient safety and clinical outcomes. Regular feedback can lead to behaviour change. Feedback should be both to national level policy makers for action, and to health facility level to improve co-operation between staff and managers. At facility level, regular monitoring/audit and timely feedback of health care practices according to IPC standards should be performed to prevent and control HAIs at the health care facility level. Feedback should be provided to all audited persons and relevant staff.

WHO recommends regular monitoring and evaluation in a systematic manner and to document the progress and impact of the national IPC programme for defined indicators. The Norms and Standards Regulations applicable to different categories of health establishments should be used to monitor progress as set out in section 7 (Clinical Management), section 8 (IPC programmes) and section 9 (Waste Management) of the Regulations.

Hospitals should monitor the compliance rate for implementation of, and adherence to, infection control bundles of care for the prevention and reduction of HAIs.

The National IPC strategic framework should be reviewed in five years; with midterm evaluation of the policy or as necessary.

7.7 Core component 7: Workload, staffing and bed occupancy at the health facility.

In 2017, South Africa had 9.1/10,000 population of medical doctors, 35.1/10,000 nurses and midwives, 1.5/10 000 dentists, 1.5/10 000 pharmacologists. There were 3300 registered environmental health practitioners and 3379 occupational therapists.³³ Of greater concern is that there are as few as 0.05/10 000 biomedical engineers to maintain the IPC related infrastructure such as autoclaves and automated bedpan washers in health facilities. Overall, in 2016 there were only 60.46/10 000 skilled health work force for a population of almost 57 million. This suggests that health workers need to work smarter and safer, and follow IPC practices. Health worker staffing levels should be adequate for the level of care provided and assigned according to the patient workload. Staff shortages inevitably result in taking short cuts and missing essential aspects of IPC practice such as hand hygiene, or leaving patient zones without proper precautions, inadequate environmental cleaning and making clinically related errors.

³³ WHO Global Health Observatory data repository. <http://apps.who.int/gho/data/node.main.HWFGRP?lang=en>

“The bed occupancy should not exceed the standard capacity of the facility”.³⁴ Overcrowding leads to extra burden on the infrastructure and patient care facilities and also increases the risk of HAIs and the spread of AMR pathogens. The overall national inpatient bed utilisation rate for the 2018/19 financial year ranged from 65.2% in public district hospitals to 81% in national central hospitals, however overcrowding in neonatal units is common. The longer patients stay in hospital, the more likely they are of acquiring an HAI. In 2018 the national average of length of stay in public district hospitals was 4.3 days, while the average length of stay in national central hospitals was much longer at 7.4 days. Public specialised hospitals had the longest average length of stay (144) as mentally ill patients are often admitted for a longer period of time. See **Table 6**.³⁵

Table 6: Average length of stay and inpatient bed utilisation rate in public health facilities

Period: Financial year	Average length of stay					Inpatient bed utilisation rate				
	District Hospital	Regional Hospital	Provincial Tertiary Hospital	National Central Hospital	Specialised Hospital	District Hospital	Regional Hospital	Provincial Tertiary Hospital	National Central Hospital	Specialised Hospital
Apr 2018 to Mar 2019	4,3	5,4	6,2	7,4	144	65,2	76,2	78,5	81	53,6

7.8 Core component 8: Built environment, materials and equipment for infection prevention and control at the health facility

Delivery of quality healthcare should take place in a hygienically clean, safe environment with an adequate supply of clean running water and good sanitation for both patients and staff in order to reduce HAIs and transmission of AMR pathogens.^{36,37} For more information on global efforts on WASH in health facilities, visit www.washinhcf.org.

The infrastructure and services in the health facility should ensure a clean and dry environment. Medical devices should be reprocessed satisfactorily in designated decontamination facilities and

³⁴Improving infection prevention and control at the health facility: Interim practical manual supporting implementation of the WHO Guidelines on Core Components of Infection Prevention and Control Programmes. Geneva: World Health Organization; 2017 (WHO/HIS/SDS/2018.10). Licence: CC BY-NC-SA 3.0 IGO. Cataloguing-in-Publication (CIP) data. CIP data are available at <http://apps.who.int/iris>.

³⁵ National Department of Health. District Health Information System. 2018.

³⁶WHO and UNICEF. Water, sanitation and hygiene in health care facilities – urgent needs and actions. Global meeting report. World Health Organization, Geneva, 2015

³⁷ Core questions and indicators for monitoring WASH in health care facilities in the Sustainable Development Goals. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2018.

validated processes applied to each step of reprocessing. Availability of IPC materials such as those required for hand hygiene, cleaning and disinfection of medical devices and patient care articles, and the necessary IPC and environmental cleaning equipment is available at point of care.²⁸ The relationship between the built environment, WASH, IPC and AMR is illustrated in **Figure 6**.

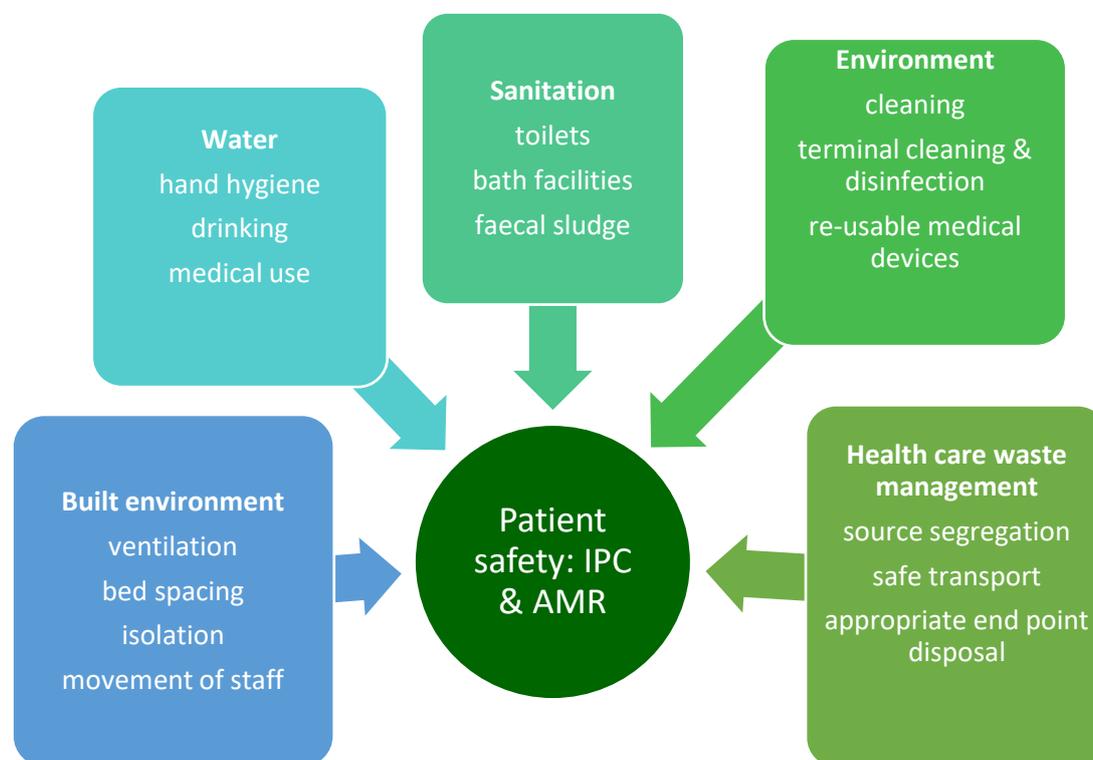


Figure 6: Relationship between the built environment, WASH and IPC & AMR

The built environment

Buildings should be designed to be airy, light and allow workflow activities to minimize the spread of pathogens via air, the movement of patients, staff and carers, equipment, supplies and contaminated items, including healthcare waste and to facilitate hygiene. Healthcare settings should be built, furnished and equipped with materials and finishes that are easy to clean, thus minimizing infectious disease transmission. The layout of wards and isolation rooms (preferably with en-suite ablution facilities), should be carefully designed so as to prevent transmission of infectious pathogens. Sufficient space should be provided for people in wheelchairs, mobile medical equipment and reduce overcrowding. The same principles should apply to all health facilities including PHCs and EMS with contextually appropriate modification.

The air temperature, humidity and airflow in the health-care setting provide a comfortable environment for patients, staff and carers. Airflow minimises the risk of transmission of airborne pathogens from

infected patients to susceptible staff, patients and carers and *vice versa*. There should be sufficient, preferably natural lighting, during daylight working hours and artificial lighting during evening and night hours, to allow safe movement of staff, patients and carers, and normal undertaking of medical activities.

Water

“WHO standards for drinking water quality, sanitation and environmental health in healthcare facilities should be implemented”.³⁸ International guidelines on sanitation (ISO/FDIS 30500 (2018)) should be followed when planning and executing WASH delivery.³⁹

All potable water supply should comply to the SANS 241.⁴⁰ Drinking water supply must regularly be sampled to assess its fitness for human consumption, both on an operational level and on compliance level. It is recommended that health facilities do water sampling four times a year. In the event of non-compliance with water quality standards, sampling frequency should be increased.

A risk management plan must be in place where a health facility has additional building-specific sources of water used to augment the external supply (such as boreholes or rainwater tanks), or have specific purposes that increase potential risk to both patients and staff. A water quality-monitoring programme should be implemented to include surveillance, chemical and microbiological testing of water to ensure fitness for human consumption. Temporary water storage facilities from reservoirs and tanks should be sufficient for at least 2 days. To prevent growth of organisms such as *Legionella spp.*, at temperatures between 25°C and 50°C should be monitored to ensure the appropriate temperatures are maintained. (hot water temperatures kept above 50°C and cold water below 20°C). If borehole is the main water source, it must be effectively protected from contamination by humans, animals and other environmental factors.⁴¹

Hand wash basins have been implicated in the transmission of multi drug resistant organisms such as *P. aeruginosa*, *A.baumannii*, *K.pneumoniae* and others.^{42,43} Functional hand wash basins should be placed outside the patient zone (e.g. located nearest to the door.) with a constant supply of clean

³⁸ Guidelines on Core Components of infection prevention and control at the national and acute health care facility level. WHO 2016. Available from <https://www.who.int/infection-prevention/publications/core-components/en/>

³⁹ International Organization for Standardization. ISO 30500 (2018) Non-sewered sanitation systems- Prefabricated integrated treatment units – General safety and performance requirements for design and testing. Geneva, Switzerland. 2108

⁴⁰ South African National Standard (SANS) 241. Drinking water specifications. 2015

⁴¹ National Department of Health. National Environmental Health Norms and Standards for premises and acceptable Monitoring Standards for Environmental Health Practitioners, 24 December 2015

⁴² Hopman et al. Reduced rate of intensive care unit acquired gram-negative bacilli after removal of sinks and introduction of 'water-free' patient care *Antimicrobial Resistance and Infection Control* (2017) 6:59 DOI 10.1186/s13756-017-0213-0

⁴³ Shaw E et al. Control of endemic multidrug-resistant Gram-negative bacteria after removal of sinks and implementing a new water-safe policy in an intensive care unit. *Journal of Hospital Infection* 98 (2018) 275-281

running water, liquid soap in a functioning dispenser and single use paper towels. Ideally, the ratio of sinks to beds is 1:10, however in isolation rooms or outpatients' consultation rooms there should be one basin per room. Alcohol based hand rub (ABHR) should be available at all points of care and at the entrance to clinical areas.⁴⁴

Sanitation

There must be adequate functional toilet facilities, which cater for staff and patients separately.^{33,37} Patient toilets should be available for both genders and there must be provision for menstrual hygiene in female toilets. There should be at least one toilet for disabled persons. More recently, the minimum number of toilets required to meet the criteria for a basic sanitation service is one toilet dedicated for staff and one gender-neutral toilet for patients that has menstrual hygiene facilities and is accessible for people with limited mobility.⁴⁵

Where bore hole water is being used in a health facility, at least 15 m horizontal distance and 1.5 m vertical distance between permeable faecal sludge containers and drinking-water sources is suggested.³³ Faecal sludge should not be discharged into an open drain, water body or open ground.

Healthcare waste Management

Healthcare waste in health facilities must be managed according to the:

- National Health Act, No 61 of 2003;
- National Environmental Management Act: Waste Management, No 59 of 2008;
- Regulations relating to healthcare waste management in health facilities, May 2014; and
- National Environmental Health Norms and Standards for premises and acceptable Monitoring Standards for Environmental Health Practitioners, 24 December 2015;
- SANS 10248-1: Management of healthcare waste Part 1: Management of healthcare risk waste from a healthcare facility;
- Births and Deaths Act, No 51 of 1992;
- Occupational Health and Safety Act, No 85 of 1993;
- Hazardous Substances Act, No 15 of 1973;
- Gauteng Health Care Waste Management Regulations, 2004;
- Western Cape Health Care Waste Management Act, no 7 of 2007.

⁴⁴ World Health Organization. WHO Guidelines on Hand Hygiene in Health Care. Geneva. 2009

⁴⁵ Core questions and indicators for monitoring WASH in health care facilities in the Sustainable Development Goals. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2018.

To summarize, a health care waste management programme should have the following:

- A health care waste manager or designated person on the premises to ensure compliance by setting up standard operating procedures (SOPs).
- Major waste generators (generate more than 20 kilograms per day of health care risk waste, including the container, calculated monthly as a daily average) must have a health care waste committee and a health care waste management plan.
- Source separation waste according to a clearly defined colour coding system.
- Safe transportation of health care risk waste.
- Safe storage of all health care waste.
- Approved disposal system for health care waste.
- Records of amount of different types of waste generated at the health facility.

Environmental cleaning

The healthcare environment is increasingly implicated as a risk factor for the development and transmission of HAIs⁴⁶. Environmental cleaning in health facilities must have

- clear protocols for cleaning which specify the frequency of cleaning in various areas,
- clearly defined responsibilities of the cleaning staff, irrespective of whether in house or contracted,
- documentation of the cleaning staff having received training on cleaning procedures
- the most recent guidelines on environmental cleaning
- An objective method of validation of cleaning and terminal cleaning.
- Regular training of all cleaners should be carried out to ensure understanding of the cleaning programme including products, methods of cleaning and validation of cleaning processes

There should be a designated person responsible for overseeing the cleaning in the facility. However, if there is no designated person, then the IPC team must work closely with the cleaning staff to ensure training is provided and proper cleaning procedures are followed. One of the responsibilities of the cleaning teams includes auditing of cleaning practices and these results should be reported to the IPC Committee.

⁴⁶Best Practices for Environmental Cleaning in Healthcare Facilities: for Resource-Limited Settings [Internet]. Atlanta: US Centers for Disease Control and Prevention and Cape Town: Infection Control Africa Network, 2019. Available from: <http://www.icanetwork.co.za/icanguideline2019/>