



health

Department:
Health
REPUBLIC OF SOUTH AFRICA

ANTIMICROBIAL RESISTANCE BACKGROUND DOCUMENT

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I. FOREWORD

Antimicrobial resistance (AMR) is a major threat to the public health and has the potential to negatively impact our society. It is a serious and growing global health risk, which needs to be prioritised at local and international levels.

The development and implementation of a national AMR strategy that complements international efforts is a major step towards containment of this growing threat. Global partnerships need to be strengthened because of the shared responsibility for reducing AMR. This responsibility is not only limited to the health care sector, but calls for collaborative action in all sectors - human, animal and agriculture.

The alarming trend in the rise of resistance to existing antibiotics and the slow-down in the development of new antibiotics will lead to the catastrophic consequence of not being able to treat common infections effectively. Conditions that were previously managed by first line agents with narrow spectrum of activity are becoming more difficult to treat, as is the case with drug-resistant tuberculosis (TB). This could also lead to an increase in the cost of healthcare because of the need for more expensive second or third line antimicrobial agents, as well as a reduced quality of life.

Strengthening surveillance systems by collaborating with local and international partners and sharing data is key in the detection of resistance. Developing early warning systems will assist to institute appropriate interventions to effectively contain resistance. We should innovate, optimise and further enhance our current surveillance capacity.

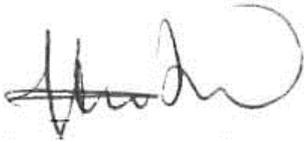
The mainstay of AMR containment is infection control and prevention. Basic hygiene measures such as hand washing are invaluable. There are also a number of simple and effective interventions, which can be implemented including adequate ventilation, improved sanitation and access to clean water. The judicious use of vaccines prevents infections and reduces the need to use of the antimicrobials.

In veterinary medicine, antimicrobials should be used for therapeutic purposes only. Current practices should also be scrutinised. Changing practices and public perceptions about antibiotic usage can turn the tide.

In addition to addressing the inappropriate use of antimicrobials, their availability according to national standard treatment guidelines needs to be sustainable. This is particularly important in the setting of HIV/AIDS and TB, where missed doses or inadequate therapy contribute to the selection of resistance. Robust regulatory and medicine management systems, including procurement, distribution and dispensing systems are needed to support team efforts.

If we can find ways to decrease antimicrobial consumption in humans, animals and crops; to diagnose infections promptly and use the right treatment; quickly identify trends in antimicrobial susceptibility, we can curb the trend and reduce the global spread.

The AMR strategy will enhance South Africa's response to combat resistance with the tools, expertise and team work.

A handwritten signature in black ink, appearing to read 'Ms P Matsoso', with a large, stylized flourish at the end.

MS P MATSOSO
DIRECTOR-GENERAL: HEALTH

EXECUTIVE SUMMARY

Antimicrobial resistance (AMR) is a multifaceted, international public health problem, which poses a direct threat to the safety of the population of South Africa. A national response is required to complement the development of a global plan, as articulated in the WHO's draft resolution EB134/37 "Combating antimicrobial resistance including antibiotic resistance", adopted by the World Health Assembly in May 2014.

The overuse of antimicrobials is driving resistance. A return to appropriate, targeted antimicrobial use in humans, animals and the environment is critical if we are to conserve the antimicrobial armamentarium.

Various interventions have been put in place to address antimicrobial resistance in South Africa. However, these are insufficient to effectively tackle the threat faced by the country. The strengths of the current system are outnumbered by its weaknesses.

INTRODUCTION

Antimicrobial resistance (AMR) is a major global public health threat. In the case of bacterial infections, decades-long overuse of antibiotics has resulted in a tipping point, where the world finds itself on the verge of a 'post-antibiotic' era and will lose the benefits of these medicines entirely.

The WHO, in its resolution at the Executive Board meeting of 24 January 2014 entitled '*Combating antimicrobial resistance, including antibiotic resistance*', summarised the actions required of member states:

- Increase political awareness, engagement and leadership
- Strengthen infection prevention and control
- Strengthen international collaboration
- Strengthen overall pharmaceutical management systems, including regulatory systems and supply chain mechanisms, as well as laboratory infrastructure
- Monitor the extent of antimicrobial resistance
- Encourage and support research and development
- Promote responsible use of antimicrobials
- Encourage the development of novel diagnostics and antimicrobial drugs
- Develop an AMR Surveillance System for inpatients in hospitals, for outpatients in all other health care settings and the community, and for animals and non-human usage of antimicrobials
- Develop a national plan with accountability and civil society engagement.

The International Committee of the World Organisation for Animal Health (OIE) decided in May 1999 to create an international expert group to address, in a comprehensive and

interdisciplinary approach, the public health risks related to AMR originating from the use of antimicrobial drugs in veterinary medicine. The OIE Expert Group was mandated to develop guideline documents for all OIE Member Countries relating to:

- Risk analysis methodology for managing the potential impact on public health of antimicrobial resistant bacteria of animal origin
- The responsible and prudent use of antimicrobial agents in veterinary medicine
- Monitoring the quantity of antimicrobials used in animal husbandry
- Harmonisation of national antimicrobial resistance monitoring programmes in animals and animal-derived foods
- Standardisation and harmonisation of antimicrobial susceptibility testing methodologies

The guidelines were published in 2003 as the OIE International Standards on Antimicrobial Resistance (ISBN 20044-601-3).

ANTIMICROBIAL RESISTANCE

1. Global situation

Antimicrobial resistance (AMR) is a process that involves the natural selection of microorganisms that contain either naturally occurring gene mutations or those acquired from other microorganisms by horizontal gene transfer that allows the microorganism to survive in the presence of an antimicrobial agent. The social and financial costs of treating antimicrobial resistant infections place a significant human and economic burden on society. Whilst acknowledging the importance of AMR in tuberculosis, HIV, and malaria, the immediate and unmet need is to combat increasing levels of MDR-bacterial infections other than tuberculosis in South Africa.

Antibiotics play a vital role in the management of bacterial infections, reducing morbidity and preventing mortality. They are estimated to increase life expectancy by 20 years. However, the extensive use of antibiotics has resulted in drug resistance that threatens to reverse the life-saving power of these medicines. In Europe, 25,000 patients die each year from resistant bacterial infections, and in South-East Asia 1 child dies every 5 minutes from a resistant bacterial infection.

2. Drivers of antimicrobial resistance

Inappropriate use of antibiotics drives the selection of antibiotic resistant bacteria that resist and overcome the action of the antibiotic and are 'selected out' during antibiotic use, while the sensitive bacteria are killed. These selected, resistant bacteria can then replicate either colonising (present but not causing infection) or causing infection (clinical disease).

3. The total volume of antibiotics used:

International estimates suggest that half of all antibiotics prescribed in humans are unnecessary, either as no infection exists, the infection is not caused by a bacterium e.g. antibiotics given for the common cold, combinations of antibiotics with overlapping action are used to treat the same infection¹, or antibiotics are prescribed for too long a duration.

Approximately, 80% of all antibiotics used globally are in agriculture and aquaculture. In animal husbandry, antibiotics may be used for prevention of infection i.e. prophylaxis or metaphylaxis (the simultaneous treatment of sick and healthy animals in a group during an outbreak of disease), treatment of infection, or for growth promotion/performance enhancement as antimicrobial feed additives (AFA). As of 1 January 2006, the EU has prohibited the use of AFA for growth promotion in swine, cattle, poultry and rabbits. The US Food and Drug Administration brought the voluntary phasing out of antibiotics for growth promotion (AGP) in animals in the United States of America into effect in December 2013². No such bans or plans to phase out AGPs have been put in place in South Africa.

A study published in 2012, found that in the years 2002-2004, a total of 64 antimicrobial products (representing 19 active pharmaceutical ingredients) registered as in-feed mixes for growth promotion including WHO-banned antimicrobials (tylosin, spiramycin, bacitracin and virginiamycin) were being used in South Africa³. Indeed, of all antimicrobials sold for animal use over this 3 year period, two-thirds were administered in-feed (61% macrolides and pleuromutilins) and a further 12% as water soluble preparations (95% sulphonamides), both methods of delivery used growth promotion. Studies showing a direct effect of antibiotic use in animals, on human health have been published, including a study linking antibiotic use for growth promotion in pigs with increased colonisation rate of methicillin-resistant *Staphylococcus aureus* (MRSA) in humans living in close proximity to a pig farm⁴. Figure 1 depicts the complex inter-relation between antibiotic use in humans, animals and the environment.

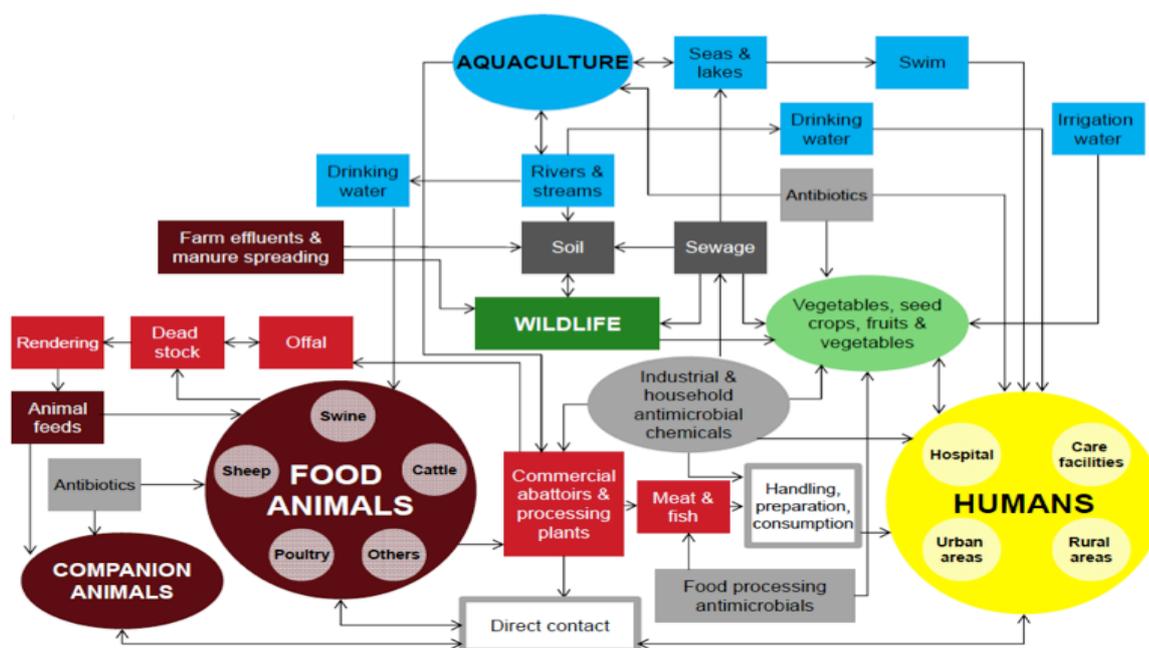
¹Paruk et al. South Afr J Med 2012; 102(7):613-6

²http://www.washingtonpost.com/national/health-science/fda-finalises-voluntary-rules-on-phasing-out-certain-antibiotics-in-livestock/2013/12/11/e64ca05c-61e8-11e3-8beb-3f9a9942850f_story.html Accessed 24th March 2014

³Eagar et al. J S AfrVetAssoc. 2012;83(1)

⁴Carrel M et al. Infect Control HospEpidemiol 2014;35(2):190-2

Figure 1 the complex inter-relation between antibiotic use in humans, animals and the environment.



Based on Linton (1977), as adapted by Rebecca Irwin, Health Canada (Prescott 2000) and IFT

4. Reliance on broad-spectrum antibiotics,

Broad-spectrum antibiotics with activity against a wide range of different bacteria may select for a greater range of resistant populations than narrow-spectrum antibiotics. Broad-spectrum antibiotics are associated with greater rates of ‘collateral damage’, such as *Clostridium difficile* infection of the colon causing potentially life-threatening pseudo membranous colitis. Changing from broad-spectrum to narrow spectrum antibiotics (de-escalation) currently requires culture and sensitivity testing of bacteria isolated from appropriate specimens sent to the laboratory. The opportunity to de-escalate antibiotics is often missed as appropriate specimens are not sent for testing. Rising levels of bacterial resistance within a hospital or community increases the need for the use of empirical antibiotics with a broader spectrum of activity, setting up a vicious cycle and further fuelling the selection of resistant bacteria in the human population.

5. Acquisition of hospital-acquired infection (HAI):

Hospitalised patients are at high risk of developing MDR-bacterial infection, as they are often immune compromised, may have MDR-bacteria transferred to them as a result of poor hand hygiene practice by health care professionals, and may have MDR-bacteria introduced into the body as a result of one of the following:

- i. Asurgical wound (surgical site infection, SSI),
- ii. Insertion of a urinary catheter (catheter-associated urinary tract infection, CA-UTI),

- iii. Placement of an intravascular catheter to give intravenous fluids/medications (central line-associated bloodstream infections, CLABSI; peripheral line-associated bloodstream infection),
- iv. Are incubated and ventilated to support breathing, a risk factor for ventilator-associated pneumonia (VAP).

Strict guidelines for the use of urinary catheters and intravascular lines, their timely removal, and stringent infection prevention control practice can reduce HAI. As HAI are often MDR, broad-spectrum antibiotics are again required, further driving the resistance cycle.

ANTIMICROBIAL RESISTANCE SITUATION IN SOUTH AFRICA

1. Bacterial resistance rates

In 2011, the identification of a *Klebsiella pneumoniae* resistant to all available antibiotics documented the most extreme case of multi-drug resistant (MDR) bacterial infection in South Africa. The South African surveillance data confirms increasing resistance in all major types of bacteria that cause infection.

For the two broad classes of bacteria, Gram-positive and Gram-negative, new antibiotics are only available for treating Gram-positive infections, albeit expensive and some not yet licensed for use in South Africa. However, for Gram-negative bacteria, which are the cause of common infections such as urinary tract and abdominal infections, no new antibiotics are in the pipeline or expected in the next 15–20 years. Therefore, the antibiotics we have to treat Gram-negative bacterial infections are particularly important to conserve.

Resistance patterns in humans

- **Methicillin resistant *Staphylococcus aureus* (MRSA)**

Over half of all hospital-acquired *S. aureus* isolated from the blood of sick patients in public hospitals in 2010 were MRSA⁵. Furthermore, a recent study showed that MRSA accounted for three quarters of all hospital-acquired *S. Aureus* infections in a large tertiary level paediatric hospital⁶.

- **Vancomycin-resistant enterococci (VRE)**

In 2012, there were large outbreaks of VRE in public and private hospitals in South Africa. *Enterococcus faecium* bloodstream isolates from the private sector between Jan-Jun 2012 showed variable sensitivity to Vancomycin ranging between 33-100% depending on geographical location⁷.

⁵Bamford et al. *SAJIE* 2011;26:243-250

⁶Naidoo et al. *PLoS One*. 2013 8(10): e78396

⁷SASCM Laboratory Surveillance data, Private Sector, Jan-Jun 2012

- **Extended-spectrum beta-lactamase (ESBL)-producing Gram-negative bacteria**
Of particular concern, common Gram-negative infections such as *K. Pneumonia* and *E. coli* from public and private hospitals produce ESBL, rendering them resistant to penicillins and cephalosporins. Carbapenems are commonly required to treat these common infections. In studies from 2010 and 2012, three quarters of *K. Pneumonia* isolated from the blood of hospitalised patients were ESBL⁸.
- **Carbapenemase-producing Enterobacteriaceae (CPE)**
The emergence of CPE in South African hospitals poses the greatest level of threat to patient safety in terms of antibiotic resistance. Treatment of CPE commonly necessitates use of colistin, the last line of antibiotic defence. Colistin is not currently licensed for use in South Africa, and to which cases of resistance have occurred, effectively rendering the infection untreatable. CPE have now spread throughout South Africa⁹.

Resistance patterns in animals

There is little published data on resistance rates for bacteria in food animals, and even less in companion animals. In 2007, a National Research Foundation collaborative surveillance project between South Africa and Sweden led to surveillance and reporting of antimicrobial resistance rates in bacteria from production animals from laboratories in all 9 provinces. Funding for the South African National Veterinary Surveillance and Monitoring Programme for Resistance to Antimicrobial Drugs (SANVAD) was not continued after the completion of the grant. High rates of tetracycline and sulphonamide resistance in *E. coli*, *Enterococcus spp* and *Salmonella enterica* was highlighted¹⁰

2. Current efforts to address antimicrobial resistance

The following initiatives to address AMR have been undertaken:

- **Global Antibiotic Resistance Partnership (GARP) in South Africa(GARP-SA):** In 2011, a situational analysis was published in the South African Medical Journal by GARP-SA as part of phase I of their programme [S. Afr Med J 2011, 8). This included an analysis of AMR in human and animal health.
- **South African Antibiotic Stewardship Programme (SAASP):** In response to the growing crisis, SAASP was formed in 2012, under the auspices of the Federation of Infectious Diseases Societies of Southern Africa (FIDDSA). SAASP comprises members from public and private sectors, building on the GARP-SA model, bringing together the necessary skills set of infectious disease physicians and paediatricians, veterinarians, microbiologists, IPC practitioners, pharmacists, pharmacologists, intensivists, surgeons, epidemiologists and quality improvement

⁸Bamford et al. *SAJE* 2011;26:243-250. And GERMS-SA Annual Report 2012

⁹ Communicable Diseases Communiqué 2014;13(8):6-7

¹⁰Henton et al. *S Afr J Med* 2011;101(8): 583-6

experts. Its objectives are to promote appropriate antibiotic prescribing, education and engagement with and support of the National Department of Health in work on AMR.

- **Infection Prevention and Control and National Core Standards (IPC and NCS)** – NCS for infection control and antibiotic stewardship have been developed by the National Department of Health.
- **Expanded Programme on Immunisation (EPI)**– The EPI has recently included pneumococcal conjugate vaccination (PCV) for children to add to *Haemophilus influenzae* B, and a license for use of PCV-13 in adults >50 years has been granted.

3. Current Antimicrobial stewardship(AMS) activities in South Africa

At the national level, the South African Antibiotic Stewardship Programme (SAASP) coordinates advocacy and experience sharing of AMS teams active in the public and private sectors, to drive institutional change. An antibiotic prescription chart is available on the SAASP website for use nationally,¹¹

Coordination of AMS activities has also begun at provincial level. The Provincial Government of the Western Cape has an AMR working group and a multi-disciplinary team that is tasked with visiting every hospital in the province. A situational analysis is performed with laboratory and dispensing data, a meeting with all stakeholders is undertaken followed by a site visit to determine AMS and IPC practice. Feedback and mentoring is instituted and a 6-month follow-up visit undertaken.

At public institutions, AMS activities are predominantly driven from central hospitals with outreach and support for AMS at secondary and district institutions. Most activities centre on AMS committees (either stand-alone or incorporated into the hospital's management structure) directing AMS teams, which perform AMS ward rounds. Successful implementation has been reported¹². All hospitals have a restricted formulary to varying extent, and many employ some form of pre-authorisation procedure for selected antimicrobials. Some district hospitals are using antibiotic motivation forms to control prescribing. None of the private hospital groups run prescriber-led AMS activities. Rather, AMS activities are focused on pharmacists monitoring and directing change through personal engagement with prescribers. There are currently no formal AMS activities at the district level, outside of district hospitals.

In the public sector there currently is a hierarchical structure of clinicians, which functions to control prescribing. In tertiary hospitals, AMS/IPC teams provide the opportunity to augment prescribing practice; however this is not typical in non-academic settings, as resources, capacity and expertise don't necessarily exist. The private sector has no formal governance systems in place to control prescribing practices other than those systems being put in

¹¹ http://www.fidssa.co.za/A_SAASP_PrescriptionChart.asp

¹² Boyles et al. PLoS ONE 2013; 8(12): e79747. doi: 10.1371/journal.pone.0079747

place through quality improvement initiatives. Therefore one strategic plan should be applied to both sectors.

There is no single, national guideline for AMS. The EDL and STGs constitute national guidance for the use of antimicrobials at different levels of institution and at district level. SAASP has recently produced a set of algorithmic treatment guidelines “*A pocket guide to antibiotic prescribing for adults in South Africa, 2014*” that is freely available¹³ and could be adopted for national use.

AMS activities in animal health are largely centred at the Faculty of Veterinary Sciences at University of Pretoria, and some individual practices throughout South Africa. The Medicines Committee of the South African Veterinary Association together with the Faculty of Veterinary Science has developed technical guidelines for the responsible and prudent use of antimicrobials in veterinary medicine in South Africa. The guidelines have been published in a booklet that has been distributed to all members of the SA Veterinary Association.

A similar guidance document with a broader focus and entitled ‘*Veterinary drug control and management for the practicing veterinarian in South Africa*’ has been developed by the Faculty of Veterinary Science. It contains inter alia information on antimicrobial drug residues that may pose a risk for human health and has been distributed to all practicing veterinarians in South Africa. These guidance documents underpin efforts that have been made during the past decade to create and strengthen awareness within the veterinary profession of the emerging threat of antimicrobial resistance.

Governance of antibiotic use in animals is regulated by two Acts:¹⁰

1. The Fertilisers, Farm, Feeds, Agricultural Remedies and Stock Remedies Act (Act 36 of 1947), under which antimicrobials may be purchased without a Veterinarian’s prescription. Stock remedies accounted for 72% of antimicrobials for animal use in South Africa 2002-2004.⁴ The use of antimicrobials for growth promotion and prophylaxis/metaphylaxis is regulated by this act, and can be purchased over the counter (OTC) by the lay public (chiefly farmers). The National Department of Agriculture, Forestry and Fisheries has a responsibility to ensure that farmers have access to veterinary drugs for disease control and improved food production and to safeguard human health by monitoring residues (including antibiotics) in products of food-producing animals, preventing zoonoses and controlling notifiable diseases.
2. Medicines and Related Substances Control Act (Act 101 of 1965), administered by the Department of Health. The Department of Health is responsible for controlling veterinary medicines in such a way as to ensure that they are produced, distributed and used without compromising human and animal health. A total of 28% of antimicrobials used for treatment of feed and companion animals were prescribed under the terms of this Act in 2002-2004.⁴ Antimicrobials intended for use in animals

¹³http://www.fidssa.co.za/A_SAASP_Home.asp

and registered under Act 101 can only be administered or prescribed by a veterinarian¹⁴

The role of antimicrobial feed additives (AFA) in the development of resistance to antimicrobial drugs is unquestionable. In addition, the impact that residues of AFAs in food of animal origin may have on export and import policies of trading partners renders the review process of currently registered AFAs in South Africa imperative. This will necessitate a special review programme coordinated by the Registrar of Stock Remedies for example; products are placed under review in accordance with statutory powers whenever evidence becomes available that the use of one product can shorten the therapeutic life span of products used in animal and human therapy, or products that may in future become helpful when resistance necessitates the use of newer or previously unused products.

Strengths and weaknesses of the current system to address AMR

1. Strengths

Surveillance and reporting activities

The National Health Laboratory Service (NHLS) and networks of private laboratories are a valuable resource and providers of resistance data on bacterial and fungal isolates. Public surveillance of resistance is performed through sentinel active surveillance on selected pathogens by the Group for Enteric, Respiratory and Meningeal disease Surveillance (GERMS) at the National Institute for Communicable Diseases, and compliments institutionally and provincially available line-listed data from a Central Data Warehouse. Private sector aggregate data on selected pathogens is also available, and both public and private data is regularly reported through the South African Society of Clinical Microbiology.

AMSactivities

Expertise of the limited cadre of Infectious Diseases specialists, Veterinarians, Microbiologists, Pharmacists and IPC practitioners trained in AMS is one strength of the current South African AMS effort, although as discussed in the following section, the small numbers of such individuals is also a weakness. A strong AMS theme runs through current HIV and TB programmes, and the HAST monitoring system represents a potential model for monitoring efforts. The EDL and STGs give clear guidance on appropriate antimicrobial prescribing; yet do not encompass the non-pharmaceutical aspects of AMS.

Infection Prevention and Control

There are a number of systems and programmes in place, which directly mandate infection control practices or standards; or are aimed at changing practice in health care workers. These include:

- The National Core Standards, under the auspices of the Office of Health Standards Compliance (National Health Amendment Act of 2013)
- The Best Care---Always campaign, launched in 2009 primarily by the private health sector, now adopted by many state facilities
- The Infection Control Assessment Tool, commissioned and published by the South African National Department of Health

The Infection Control Society of Southern Africa (ICSSA), a constituent society of the Federation of Infectious Diseases Societies of Southern Africa, is a forum, which brings together a large number of public and private sector South African IPC practitioners (IPCP). ICSSA can serve as an existing vehicle to promote IPC strategies and policies, as well as serving as a source of expertise for the development of such policies.

Nationally, three academic centres offer a range of formal IPC training programmes; Stellenbosch University, University of the Witwatersrand, and University of Kwa-Zulu Natal. The coordinators of these programmes have agreed on a common core curriculum for the training of IPCPs.

The national vaccination programme, aimed primarily at vaccinating infants and children, is well functioning, with the regular inclusion of new vaccines in the program attesting to the progressive nature of the programme.

2. Weaknesses

Surveillance and reporting activities

- Antimicrobial resistance – Efforts to determine the national burden of bacterial and fungal resistance is undermined by prescribers' inability to send appropriate clinical samples for culture and sensitivity testing, prior to prescribing antimicrobials. Low numbers of trained microbiologists outside of major urban centres hampers surveillance activities in human health, and in the animal sector, the loss of capacity to undertake surveillance and reporting that occurred when funding for the SANVAD programme was discontinued is a major weakness in the system. There is a need to develop an AMR map for South Africa through data sharing between private and public sector laboratory services for both human and animal health.
- Antimicrobial use – Data capture of antimicrobial use is disadvantaged by the lack of a national electronic prescribing system and a lack of linkage of pharmacy, clinical and laboratory data systems in institutions. The current variable availability of non-electronic pharmacy reporting systems across South Africa means data on antimicrobial consumption is often incomplete and variably reported.

AMSactivities

- Human Resources – there is a lack of trained AMS practitioners to expand AMS in institutions that are currently active, nor to institutions and districts without AMS activities. Furthermore, those practitioners currently involved are not given protected time to perform AMS activities. This is particularly true of pharmacists in the public sector. Only 5 out of 9 Provinces employ an Infectious Diseases specialist and in some e.g. Eastern Cape, a single specialist currently covers the entire Province.
- Private hospitals do not currently have a mechanism to allow employment of specialists to undertake AMS.
- Training – Skills transfer is currently focused at individual institutions where AMS ward rounds are performed. The Provincial Government of the Western Cape runs a 1-day training course for healthcare professionals and managers.
- Inadequate legislation governing antimicrobial use in feed animals (Act 36). This lack of control of antimicrobials used as stock remedies and purchased OTC perpetuates the use of animal growth promoters and overuse of antimicrobials in animal husbandry.
- Access
 - Laboratory Support - limited or no access to laboratory support seriously hampers AMS activities by making it difficult to choose an appropriate antimicrobial based on culture and sensitivity profiling. Similarly, lack of access to trained microbiologists in many areas limits appropriate prescribing. Long turn-around-times are a weakness in the system, and commonly, when a result is available; contacting practitioners who will act on a result is difficult.
 - Lack of antimicrobials used to treat resistant microorganisms – this includes
 - drugs for the use of MDR/XDR tuberculosis
 - those under section 21, such as artesunate (currently subject to a group section 21 application) used to treat severe falciparum malaria, and colistin, which is used to treat carbapenemase-producing Gram-negative bacteria.

3. Infection Prevention and Control

- **Organisation and Accountability** -While there is a clear directive from the Minister of Health prioritising infection control, there is still no clear person/office at a national level under which IPC directly falls. At present, although IPC forms part of the quality directorate, at provincial levels this is not consistently practiced. It is understood that at least in certain provinces there is no clearly mandated provincial IPC committee. At health care facility level, IPCPs invariably fall directly under the nursing function; under the quality directorate; under other structures; or under some form of hybrid model. This creates challenges in terms of communication, line management, and overall accountability both at the individual and facility level.
- Related to this, is the lack of accountability for IPC activities and practices in some facilities. This may be either at the level of top management, or at various lower levels. It encompasses, for example, accountability for ensuring supplies are

available, accountability for ensuring equipment is serviced, accountability for ensuring that appropriate resources are made available, etc.

- A number of factors may be at least partially responsible for the lack of accountability. For many years, IPC has been regarded as a nursing function; and in many cases regarded as the sole responsibility of the IPC practitioner. This has hampered the change to a more multi-disciplinary, integrated approach to infection control. This is likely compounded by the increasing recognition that many clinicians are not well versed in IPC, and some of the blame for this can be laid at the feet of the various medical faculties. IPC is often poorly taught at undergraduate level. Many hospital managers are ill-informed about its importance, basic principles, and resource requirements, further hampering effective communication and implementation of basic policies.
- **Human Resources:** There is a lack of trained IPC practitioners in the country. In a survey conducted about 5 years ago, none of the facilities surveyed had the required (by draft legislation, Government gazette 2008) ratio of 1 IPCP per 200 beds. Whether this ratio is the most appropriate is also not clear. Of the 253 practitioners surveyed, >50% had no formal training in IPC. This is compounded by the fact that, at present, qualifications in IPC (whether it be diploma or degree) are not recognised by the South African Nursing Council, nor is IPC recognised as a specialist area within nursing, and thus IPCPs did not qualify for the Occupation Specific Dispensation based remuneration. This has led to nurses employed as IPCPs leaving infection control for more financially rewarding areas in nursing. The exact number is unknown.
- **Infrastructure and resources** - Many of the current health care facilities are not well designed for IPC. Facilities to isolate (and cohort) infectious / infected patients are often lacking; appropriate environmental controls are not in place; and the layout and ventilation of congregation areas is inadequate. Anecdotal complaints about the lack of basic resources, may be due to poor supply chain management, rather than a lack of funds, and relates directly back to lack of accountability.
- **Research** - Very little active IPC research is underway in South Africa and very few nurses are involved in research, partly due to a lack of resources, and partly to a lack of promotion and recognition of research.
- **Vaccine programme**—Potential weaknesses in the EPI including occasional supply chain issues and lack of public awareness in some settings about vaccinations, threatens the success of the programme.