MASTER OF MEDICINE IN THE SPECIALITY OF INTERNAL MEDICINE

RESEARCH DISSERTATION

An Audit of the Infection Prevention and Control Program at Port Shepstone Regional Hospital

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Submitted as the dissertation component in partial fulfillment for the degree of MMed in the School of Health Science , University of Kwazulu-Natal.

As the candidate's supervisor I have approved this thesis for submission

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List of Figures Tables and Acronyms

ACRONYMS

AMR	Anti-Microbial resistance
ASP	antimicrobial stewardship program
CCU	Critical care unit
CDC	Centre for Disease Control
CRE	Celestin Resistant Enterococci
DOH	Department of Health
ESKAPE	Enterococcus, Staphylococcus, Klebsiellosis, Acinetobacter, Pseudomonas and ESBL (Enterobacter and E. coli)
ICU	Intensive care unit
IPC	Infection Prevention and Control
KZN	Kwazulu Natal
LoS	Length of Stay
MDR	Multidrug-resistant
NHLS	National Health Laboratory Service
SAASP	South African Antibiotic Stewardship program
UKZN	University of KwaZulu Natal
WHO	World health organization

Abstract

BACKGROUND

Infectious diseases are the leading cause of death in South Africa. The treatment of these diseases and their complications consume huge amounts of already limited healthcare resources. Antibiotic resistance is growing global concern and the strategy to contain it has 3 main components; Infection Prevention and Control (IPC) programs, microbiological resistance testing and antibiotic stewardship programs (ASP). South Africa has recently embarked on a journey to upgrade and develop its own Antimicrobial Program which encompass these 3 components. Emphases have been placed on developing antibiotic stewardship programs and recent literature reflects this. At the 400 bed Port Shepstone Regional Hospital (PSH), in contrast, the most developed of these components is the IPC program. We aim to describe the core component of PSH's antimicrobial program and compare its IPC program with that of an established program.

OBJECTIVE

To use the CDC's Infection Control Assessment Tool for Acute Care Hospitals (USA) to evaluate the infection control program at PSH and report on the Core Elements of the hospital's Antibiotic Stewardship Program

METHOD

A prospective descriptive study with a quantitative component was conducted at PSH between February to March 2018.

The first part of the study determined which of the *CDCs* 17 core components of an infection control program were operative at PSH. The assessed components were leadership commitment, pharmacy services, laboratory services, a dedicated specialist team, infection control policy, guidelines for antibiotic use, antibiotic rotation, personal protective equipment policies, protocols for prevention of catheter-related UTI, protocols for central line use, protocols for injection safely, protocols for prevention of ventilator-associated events, protocols for surgical site infection, services for environmental cleaning , infrastructure for isolation of contagious patients, policies for clostridium difficile infection, and policies for tracking of infective patients between institutions.

In the second part, in each of the 11 adult long-stay wards, responders (nurses) were identified for completion of 5 selected elements of the CDC tool. The tool elicited if responders knew which policies were in place, their knowledge of the protocol, the level of education and training and the ongoing auditing practices. These areas were Handwashing (15 questions), Personal protection equipment (19Q), Catheter-associated Urinary Tract Infections (38Q), Injection safety (16 Q) and surgical site infection (31Q)

After collection, the data was entered into an excel workbook. A positive answer received a score of 1 while a negative or unknown received a 0. Overall performance was graded arbitrarily into excellent (>80%), good (60 to 80%) and poor (<60%)

RESULTS

Part 1

The infection control program at PSH has 10 of the 17 components that were considered important. It has leadership commitment, pharmacy services, laboratory services, infection control policy, guidelines for antibiotic use, personal protection equipment, a protocol for prevention of catheter-related UTI, protocols for injection safely, protocols for surgical site infection, and services for environmental cleaning

PSH **does not have** a dedicated specialist team, infrastructure for isolation of contagious patients, policies for the prevention of central line-associated bloodstream infection, policies for clostridium difficile infection, antibiotic rotation, a protocol for prevention of ventilator-associated events, or tracking of infective patients between institutions.

Part 2: Comparison of 11 wards in 5 components

Handwashing: The score per ward ranged from 11 to 15 (68% to 100%). The questions where respondents performed poorly were because of poor initial education and poor auditing skills or systems.

Personal protective equipment: The score ranged from 16-19 (84% to 100%). The worst scoring questions were because PSH did not have a respiratory protection program.

Catheter-associated Urinary tract infections (CAUTI) – The scores ranged from 20 to 34 (52% to 89%). PSH does not have a system in place for a CAUTI database. There is no ongoing collection of data and thus no dissemination of information back to the wards.

Injection Safety: The score ranged from 10 to 14 (62% to 87%) Poor performance was due to lack of any protocol to identify tampering and on-going education. The Surgical Site Infections: Lowest score being 0 and highest 31 (0% - 85%). Non -surgical wards did not know the process so could not answer questions at all. The surgical wards were poor in the auditing process.

OVERALL PERFORMANCE.

The total possible score was 119. The highest scoring ward was the gynaecology ward 110 (95%). The lowest was in the psychiatric ward, which scored 64 (53%).
8 wards had excellent performance *(>80% [total score>95])*: High care, ICU, Post-natal, Gynaecology, Labour ward, Surgical male, Surgical female, Orthopaedic.
2 Wards had a Good performance (60%-80% [71-95]): Medical Male, Medical Female
One ward performed poorly <60% [71]): Psychiatry

The best overall performance was in handwashing. The worst performance was surgical site infections. Poor auditing practices were identified. Wards with a surgical focus performed the best. This is probably related to the fact that the staff working in surgical wards has to have additional familiarity with protocols and processes related to wound care. Units with no surgical expertise (medicine and psychiatry) do not usually have surgical patients under their care so do not have much-specialised knowledge. The psychiatric ward additionally usually does not often deal with patients that have any infectious diseases, so the staff is understandably less knowledgeable.

CONCLUSION

The South African literature is scanty and tends to favour Antibiotic Stewardship Programs above Infection Prevention and Control programs. Core strategies and coordination of audits and research are in the early stages. This audit is timely in the assessment of an IPC program in a provincial hospital *in* the public sector.

The results of the audit performed at PSH are encouraging and the strengthening of the entire IPC program should be possible. To achieve the proper application of the IPC program more emphasis needs to be placed on constantly auditing existing practice and giving feedback to staff.

Chapter 1 - Introduction

Infection control and antibiotic stewardship are key health priorities globally and locally. At the World Health Assembly in May 2014 the World Health Organization (WHO) reaffirmed its call to global action and with a nine-point plan urged member states to develop or strengthen their national plans, strategies and urged international collaboration for the containment of antimicrobial resistance.

Antibiotic resistance is a growing problem in South Africa (NICD, 2017). To counter antibiotic resistance, and aligned with the WHO's call to action, the South African Department of Health (DOH) has created the South African Antibiotic Stewardship Program (SAASP). This body aims to coordinate and provide guidance to public and private services in the country. The DOH is attempting to improve the collection of local antibiotic resistance data, and since 2016 has embarked on the creation of a national resistance map, which it aims to complete by the end of 2019.

Port Shepstone hospital finds itself at the forefront of this change. It has the infrastructure, resources and the manpower to be a beacon *for* other hospitals through this process.

South Africa's infection control policy is divided into 3 main arms, antibiotic resistance testing, antibiotic stewardship, and infection prevention and control. For the longest time in South African hospitals, infection prevention and control has been the domain of the nursing staff, resistance testing the domain of microbiologists, and antibiotic stewardship the domain of doctors. In an ideal situation, all 3 teams would work as a cohesive unit supporting and supplementing each other.

In Port Shepstone Hospital and many South African hospitals, this is not the case.

PSH does not have on-site microbiologist. All cultures are processed locally in the hospital but reported electronically by off-site microbiologist (at Inkosi Albert Luthuli Central Hospital in Durban 200km away). The microbiologist communicates regularly via email with the heads of the clinical departments whenever a significant organism is detected. It is, however, the responsibility of the requesting doctor to follow up on samples taken.

With regards to antibiotic stewardship, the decision on antibiotic use and escalation rests with the treating clinicians. Each of the departments at PSH (internal medicine, surgery, paediatrics, O&G, ICU, orthopaedics and family medicine) prescribe antibiotics in line with standard protocols. The decision to prescribe antibiotics is done on clinical grounds with the occasional supportive blood tests. Most times this is before any bacterial resistance patterns are known.

For most antibiotic usage there is no barrier to prescription. Tazobactam or carbapenems are the only antibiotics that require approval by the consultants in the various departments. There is no collection of data on antibiotic use and PSH has no infectious disease specialist to oversee the entire process.

The IPC programs tend to run independently of microbiology testing and antibiotic stewardship program. In most South African hospitals, the IPC program has been running longer than the other 2 components. At PSH a dedicated infection control nurse is responsible for the education and auditing practices at the hospital. She also traces patients that culture a resistant organism and makes sure that the patient is on appropriate antibiotics. In PSH the IPC program is integrated into the hospital's quality assurance program rather than a joint antimicrobial stewardship committee as is envisioned by the SAASP.

Although there have been notable South African publications on ASPs (Brink, Junaid, Mendelson), the research thus far has been done by well-resourced academic hospitals. Their experiences and lessons learned by some hospitals may be difficult to translate to other hospitals which are under-resourced for infrastructure and personnel. There is thus a requirement to better understand IPC programs by comparing local implementation against international programs and the current real-world study is aimed at supplementing the published studies in South Africa.

Chapter 2 - Literature review

In this review, we will attempt to gain insight into the scope of the current problem by trying to answer a few burning questions.

What is the history of Infection Control?

What progress has been made globally in addressing this problem?

What is the current burden of disease?

What benefits have Infection Prevention and Control programs had in the past?

What are the core components of an ideal Infection Control program?

What are South Africa's future plan and current research?

It is hoped that this audit will add to the body of knowledge that will ultimately inform changes to the Department of Health's new strategic plan.

Literature review

Pubmed was used to retrieve available literature. Keyword used were antibiotic stewardship, infection prevention, human past 5yrs, Meta-analysis, systemic review

There are approximately 1700 articles most of which are from developed nations

There are only 11 articles published in South Africa and there are no published audits of this kind in South Africa.

The history of Infection Control

Ignaz Semmelweis was a Hungarian physician and scientist and is now recognised as an early pioneer of antiseptic procedures.

In Vienna in the 1840s puerperal fever was the leading cause of mortality amongst pregnant woman giving birth in institutions. Two maternity clinics were run at the Viennese hospital in the 1840s. The First Clinic (a teaching hospital) had an average maternal mortality rate of about 10%. The Second Clinic (run by midwives) had a considerably lower rate, averaging less than 4%.

Semmelweis could not understand the reason for this. He decided to investigate and eventually, after 3 years he realised that the main difference between these clinics was that the first clinic also carried out autopsies. Doctors would often alternate between examining cadavers and delivering babies.

Semmelweis concluded that some unknown "cadaverous material" caused death amongst pregnant women. He instituted a policy of using a solution of chlorinated lime for washing hands between autopsy work and the examination of patients. He found that this chlorinated solution worked best to remove the putrid smell of infected autopsy tissue, and thus perhaps destroyed the causal "poisonous" or contaminating "cadaveric" agent hypothetically being transmitted by this material.

The result was that the mortality rate in the First Clinic dropped remarkably. The mortality rate in April 1847 was 18.3% %. After hand washing was instituted in mid-May, the rates in June were down to 2.2%, which was comparable to the Second Clinic. During 1848, Semmelweis widened the scope of his washing protocol, to include all instruments coming in contact with patients in labour.

Semmelweis published his results and experiences. He, however, faced severe backlash and was heavily ridiculed for his beliefs as his observations lacked any scientific explanation.

At that time in Europe, illness was believed to be due to imbalances in the 4 humours. This had been the prevailing medical theory for the past 2000 years.

Semmelweis was outraged by the indifference of the medical profession and began writing open and increasingly angry letters to prominent European obstetricians, at times denouncing them as irresponsible murderers. His contemporaries believed he was losing his mind, and in 1865, nearly twenty years after his breakthrough, he was committed to an asylum.

Only many years later when Louis Pasteur, Robert Koch, and others developed the germ theory of disease were people able to understand his observations and solutions.

Louis Pasteur was a French biologist, microbiologist and chemist who was renowned for his discoveries of the principles of vaccination, microbial fermentation and pasteurisation. He is often regarded as one of the fathers of germ theory.

Pasteur was responsible for disproving the doctrine of spontaneous generation. He performed experiments that showed that without contamination, microorganisms could not develop.

Pasteur's research also showed that the growth of micro-organisms was responsible for spoiling beverages, such as beer, wine and milk. With this established, he invented a process in which liquids such as milk were heated to a temperature between 60 and 100 °C. This killed most bacteria and moulds already present within them. The method became known as pasteurization.

Although Pasteur was not the first to propose the germ theory, his experiments indicated its correctness and convinced most of Europe that it was true.

Robert Koch

As one of the main founders of modern bacteriology, he identified the specific causative agents of tuberculosis, cholera, and anthrax and gave experimental support for the concept of infectious disease.

Koch's 4 postulates were that

1) The microorganism must be found in abundance in all organisms suffering from the disease, but should not be found in healthy organisms.
2) The microorganism must be isolated from a diseased organism and grown in pure culture.
3) The cultured microorganism should cause disease when introduced into a healthy organism.
4) The microorganism must be re-isolated from the inoculated, diseased experimental host and identified as being identical to the original specific causative agent.

In the 1880s, Robert Koch became interested in tuberculosis research. At the time, it was widely believed that tuberculosis was an inherited disease. Koch was convinced that the disease was caused by a bacterium and was infectious, and tested his four postulates using guinea pigs. Through these experiments, he found that his experiments with tuberculosis satisfied all four of his postulates. In 1882, he published his findings on tuberculosis, in which he reported the causative agent of the disease to be the slow-growing Mycobacterium tuberculosis.

As a direct result of these 2 visionaries, medical science grew at an amazing rate and was able to overturn centuries of dogmatic thinking.

The Era of antibiotics

Alexander Fleming had been investigating the properties of staphylococci in 1927. He was known as a brilliant researcher, but was notorious for leaving his laboratory cluttered and untidy. On 3 September 1928, Fleming returned to his laboratory after having spent August on holiday. Before leaving, he had stacked all his cultures of staphylococci on a bench in a corner of his laboratory. On returning, Fleming noticed that one culture was contaminated with a fungus and that the colonies of staphylococci immediately surrounding the fungus had been destroyed, whereas other staphylococci colonies farther away were normal.

Fleming grew the mould in a pure culture and found that it produced a substance that killed several disease-causing bacteria. He identified the mould as being from the genus Penicillium, and, after some months of calling it "mould juice", named the substance it released penicillin.

The antibiotic came into clinical use in the 1940s and led to the era of antimicrobial chemotherapy. It was accredited with saving the lives of many wounded soldiers during World War II.

During the subsequent two decades, new classes of antimicrobial agents were developed one after another, leading to a golden age of antimicrobial chemotherapy. In 1944, streptomycin, an aminoglycoside antibiotic, was obtained from the soil bacterium. Thereafter, chloramphenicol, tetracycline, macrolide, and vancomycin were also isolated from soil bacteria. The synthesized antimicrobial agent nalidixic acid was created in 1962.

Antibiotic Resistance

By the 1950s however, there were already signs that bacteria were developing resistance to antibiotics.

S. aureus was a common organism in clinical practice and was one of one the first organism noted to be developing resistance to antibiotics. This bacterium rapidly acquired resistance to sulfonamides when they were in use. Penicillin was initially effective to this microorganism, but resistant strains that produce penicillinase increased in the 1950s.

Penicillinase-stable methicillin was developed in 1960. However, as early as the following year, 1961, methicillin-resistant S. aureus (MRSA) was isolated in the UK

Although S. pneumoniae was originally susceptible to penicillin, penicillin-intermediate S. pneumoniae strains were found in the latter half of the 1960s, and the first penicillin-resistant S. pneumoniae strains were isolated in the latter half of the 1970s in Japan. By 1990 resistant strains were noticed throughout the world. Frequent use of oral cephalosporin antibiotics seemed to be responsible for this increase in resistance.

The future of infection control

By early 1970, many clinicians realised that the golden era of antibiotics was almost over. Countries throughout the world started developing new strategies to tackle this problem.

1) Research and resources were directed towards the development of new and more effective antibiotics.
2) Surveillance of resistance patterns and global reporting systems were improved.
3) New infection prevention and control strategies were created, building upon what Semmelweis had discovered 100 years ago. Starting with handwashing and instrument sterilisation other measures such as antiseptics use, gloves and sterile barrier protocols were introduced into medical practice.
4) Governing agencies, such as the American Centre for Disease Control (CDC), were created to coordinate these various strategies.

The progress thus far

Over 2 years, from 2013 to 2014, the WHO undertook an initial country situation analysis, to determine the extent to which effective practices and structures to address antimicrobial resistance, have been put in place and where gaps remain

Country authorities were asked to complete a questionnaire on their existing strategies, systems, and activities. The questionnaires were completed either by the authorities themselves through self-assessment or at an interview with a WHO officer on the occasion of a country visit. A total of WHO Member States provided information.

The key findings

-Very few countries had a comprehensive national plan. Other national mechanisms, such as a national focal point and a central coordination mechanism, were generally more common than plans

- Countries cited a lack of laboratories with sufficient competent technical staff, weak infrastructure, poor data management and lack of standards as impediments to effective laboratory surveillance

- Many countries in all regions reported that antimicrobial medication was freely available. However, few countries reported a system for monitoring the use of antimicrobials. The sale of antimicrobial medicines without prescription was widespread, and many countries lacked standard treatment guidelines. Overuse of antimicrobial medicines by the public and by the medical profession was a potential problem in all regions.

-Public awareness appeared to be low in all regions. Even in some countries in which national public awareness campaigns had been conducted, there was still a widespread belief that antibiotics are effective against viral infections

-Half the Member States in the European, South-East Asia and Western Pacific regions that responded to the survey reported having a national infection prevention and control program; however, fewer had corresponding programs in place in all tertiary hospitals

The current Burden of Disease

The WHO in its Antimicrobial resistance global surveillance report (2014) attempted to express the extent of the global problem.

Major gaps exist in national data from many countries. The most complete information was obtained from countries in the EU and the Americas, where long-standing regional surveillance and collaboration exist.

The reported and published data sets indicate that there are limitations. Ineffective oral treatment options for some common community-acquired infections in several countries and that there remain few, if any, treatment options for some common severe and health-care-associated infections in many places. Of particular concern is the fact that K. pneumoniae resistant to carbapenems, usually the last line of available treatment, is reported in all WHO regions.

...

Bacteria commonly causing infections in hospitals and in the community

Name of bacterium/ resistance	Examples of typical diseases	No. out of 194 Member States providing data	No. of WHO regions with national reports of 50% resistance or more
Escherichia coli/	Urinary tract infections, blood stream infections		
- vs 3rd gen. cephalosporins		86	5/6
- vs fluoroquinolones		92	5/6
Klebsiella pneumoniae/	Pneumonia, blood stream infections, urinary tract infections		
- vs 3rd gen. cephalosporins		87	6/6
- vs 3rd carbapenems		71	2/6
Staphylococcus aureus/	Wound infections, blood stream infections		
- vs methicillin "MRSA"		85	5/6

Figure 1

The commonest resistant organisms globally are E.Coli, Klebsiella pneumonia, and MRSA.

Bacteria mainly causing infections in the community

Name of bacterium/ resistance	Examples of typical diseases	No. out of 194 Member States providing data	No of WHO regions with national reports of 25% resistance or more
Streptococcus pneumoniae/ - non-susceptible or resistant to penicillin	Pneumonia, meningitis, otitis	67	6/6
Nontyphoidal Salmonella/ - vs fluoroquinolones	Foodborne diarrhoea, blood stream infections	68	3/6
Shigella species/ - vs fluoroquinolones	Diarrhoea ("bacillary dysenteria")	35	2/6
Neisseria gonorrhoea/ - vs 3rd gen. cephalosporins	Gonorrhoea	42	3/6

Figure 2

National Context - South Africa

In its report in 2017, the National Institute of Communicable Diseases (NICD) reported on the current resistance patterns in the country. The period reviewed was from 1/1/2015 to 30/6/2015.

Blood culture results from Enterococcus, Staphylococcus, Klebsiella, Acinetobacter, Pseudomonas, and ESBL (Enterobacter and E. coli) (ESKAPE) organisms were analysed. K. pneumoniae was the commonest organism (1437 cases) followed by S. aureus (1325 cases). S. aureus was resistant to oxacillin in 568 (37%) isolates and indicated decreased susceptibility compared to the previous year. All isolates were susceptible to vancomycin and linezolid.

P. aeruginosa presented susceptibility to piperacillin-tazobactam (65%) and high susceptibility to colistin (99%). K. pneumoniae cases revealed a high rate of ESBL (69%) and retained 100% susceptibility to colistin. Carbapenems show non-susceptibility of 5% which hasn't changed compared to the previous year. Acinetobacter baumannii isolates were highly resistant to most of the antimicrobial agents tested.

Laboratory-Based Nosocomial Disease Surveillance - ESKAPE

***ESKAPE* surveillance**

Reporting period 01/01/2015 to 30/06/2015 *Results until end of epidemiologic week 24 (2015)*

Table 6. Number of ESKAPE cases per month from January to June 2015

	Number of cases							
Month	*A. baumannii complex*	*E. cloacae complex*	*E. coli*	*P. aeruginosa*	*S. aureus*	*K. pneumoniae*	*E. faecalis*	*E. faecium*
Jan	127	59	150	46	246	270	70	68
Feb	129	40	135	71	182	218	53	51
Mar	124	64	206	65	213	254	72	69
Apr	123	53	141	59	238	206	59	63
May	142	57	147	59	242	234	74	65
Jun	118	44	165	55	204	255	69	92
Total	**763**	**317**	**944**	**355**	**1 325**	**1 437**	**397**	**408**

Figure 3

Staphylococcus aureus

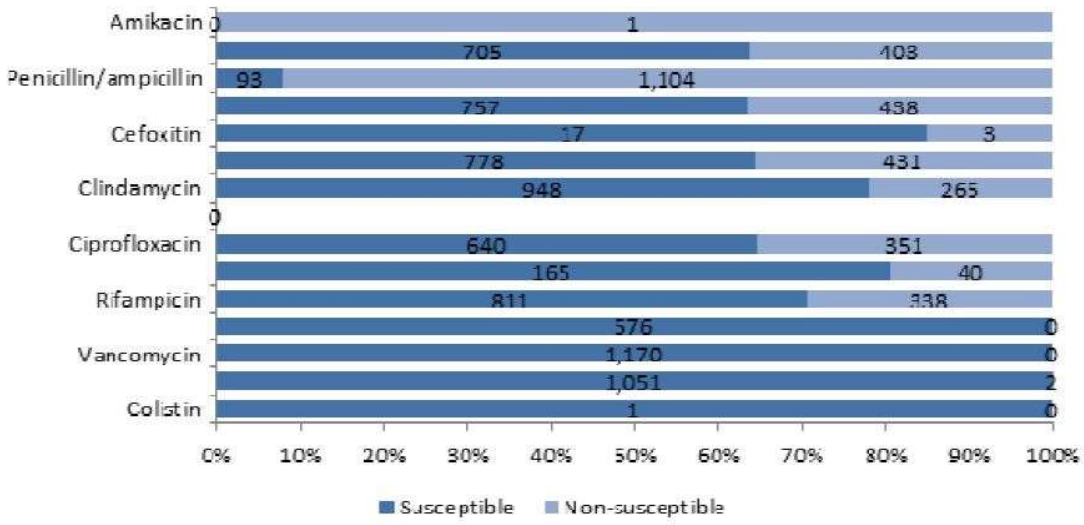


Figure 4

Comparison in susceptibility of *K. pneumoniae* during the same period of current year (CY) and previous year (PY)

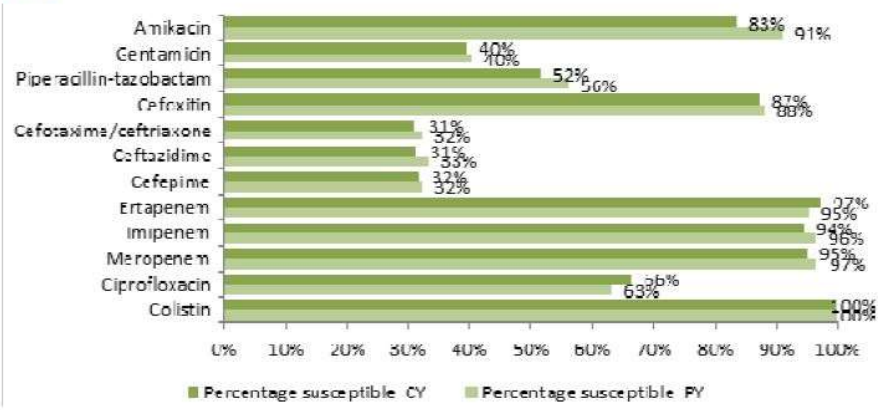


Figure 5

In May 2016 the NICD released its report on the colistin-resistant enterococci (CRE). There were 440 cases of CRE bacteraemia reported from July 2015 through to December 2016. A majority of cases were detected from sentinel sites in Gauteng (68%) followed by KwaZulu-Natal (24%). CRE isolates were available for 67% (294/440) Klebsiella pneumonia was the commonest organism (74%). 57% were non-susceptible to imipenem and 58% non-susceptible to meropenem.

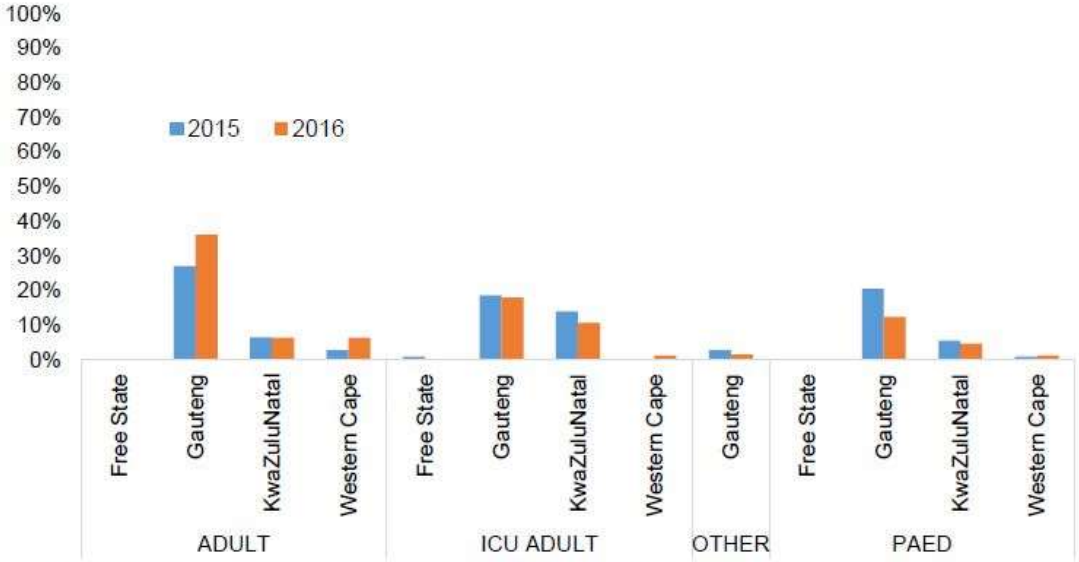


Figure 4. Distribution of cases of carbapenem-resistant Enterobacteriaceae (CRE) bacteraemia by hospital ward type, n=440.

Figure 6

Local Context

Port Shepstone hospital is a regional hospital with primary, secondary and tertiary services, located in KwaZulu-Natal. It is a 400-bed hospital and is the referral centre for 19 clinics and 3 district hospitals. It serves a population of over 720000. It has specialist run departments for Internal medicine, Surgery, Paediatrics, O&G, anaesthetics, and orthopaedics. It has an on-site laboratory (NHLS) with offsite support from microbiologists from Inkosi Albert Luthuli Hospital (tertiary referral hospital for KZN). The Infection Control and prevention (IPC) program has a single dedicated nurse coordinator.

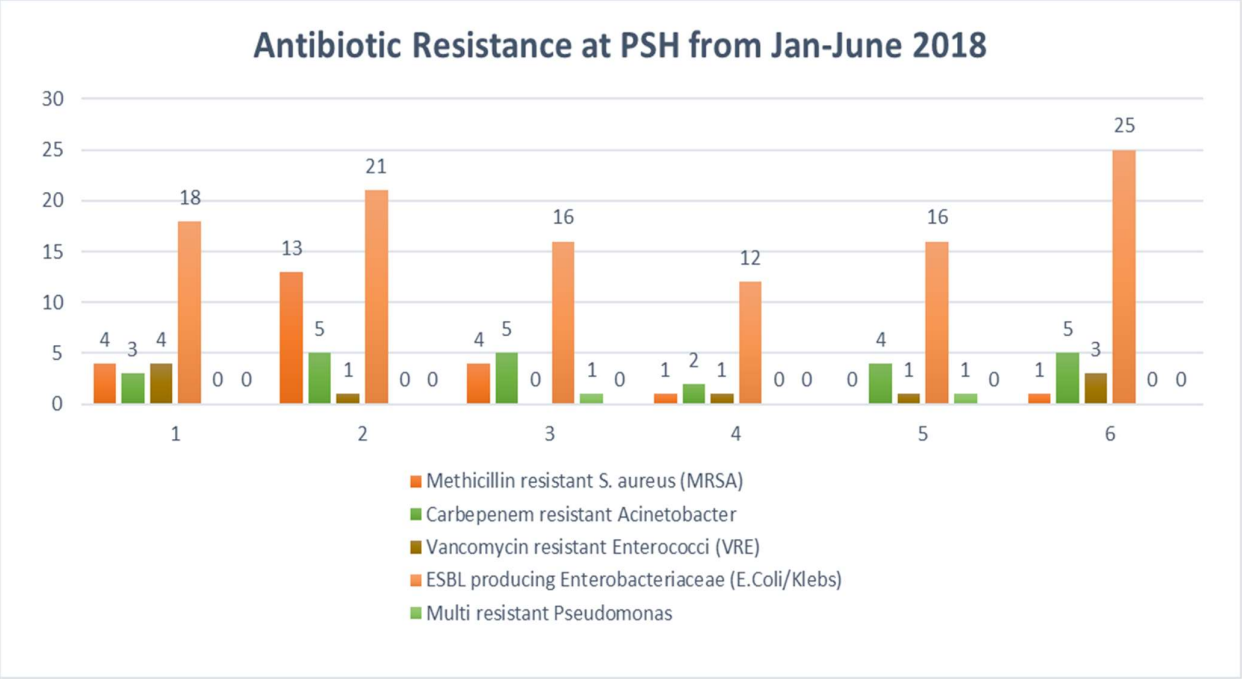


Figure 7

Port Shepstone's local antibiotic profile was extracted from the monthly resistance data provided by PSH microbiology lab from 1/1/2018 - 30/6/2018. It contains results for pus swabs, blood and urine cultures. The commonest organism is ESBL producing organisms with up to 3x higher than other resistant organisms. This is above the national average (which is 1.8x)

The benefit of Infection Prevention and Control programs

In their systemic review Ye li (2017) noted that it has been previously commented on that the act of surveillance itself leads to a decrease in nosocomial infections. They reviewed 25 articles from countries that had a national nosocomial reporting program (USA, Germany, Netherlands, and Korea).

There was a reduction tendency of nosocomial infections during the surveillance period. Multiple logistic regressions found that surveillance activities had a protective role on nosocomial infections. In 1 study, the adjusted infection rate declined by 1.0% per year in ICUs with continuous surveillance but increased by 16.1% in the ICUs in the year following surveillance disruption. They concluded that surveillance itself could reduce infection rates for the following reasons:

1) Providing infection trend, monitoring and early warning of outbreaks;

2) “Benchmarking” and feedback to healthcare works could stimulate them improving compliance with infection controls as well as performing surveillance;

3) Finding protective or risk factors of nosocomial Infections

In his review of 43 studies involving 583 ICUs articles, Blot et al (2014) showed quality improvement interventions reduced central line catheter-related systemic sepsis in most of the ICUs.

The important interventions were hand hygiene, chlorhexidine skin antiseptics, maximum sterile barrier precautions, optimal catheter site selection and daily review of line necessity.

He concluded that quality improvement interventions appeared equally effective in studies with low and high power or baseline settings and that before–after studies demonstrated consistent, beneficial results, which appeared to be more pronounced among studies implementing bundle and checklist interventions

Huis et al conducted a systematic review of hand hygiene strategies in 2012. They looked at which behaviour techniques resulted in better overall adoption of good hand hygiene practices.

The key strategies identified were knowledge, awareness, social influence, attitude, intention, action control, maintenance and facilitation of behaviour.

They concluded a strategy that targets various problems and barriers to change, at different levels (professional, team and organisation), is needed to achieve changes in hand hygiene behaviour.

Arefian et al (2016) conducted a systematic review of 27 articles looking at the cost and benefits of interventions preventing hospital-acquired infections.

The type of interventions that they reviewed were

1) Reducing person-to-person transmission (hand decontamination, personal hygiene, clothing, masks, gloves, and safe injections)
2) Measures preventing transmission from the environment
3) Measures for the prevention of urinary tract infections, surgical site infections, pneumonia, and vascular device infection.

Common cost components included nurse/physician time, antimicrobials, administration costs, and pharmaceuticals.

They concluded that prevention interventions yield very positive cost-benefit estimations and that on average, the savings of a prevention program were 11 times greater than the costs.

The Core Components of an ideal Antimicrobial program

In its Core Elements of a Hospital's Antibiotic Stewardship Program (2014) report, the CDC notes that an effective ASP must include the following:

1. Leadership commitment: Ensuring dedicated resources (human, financial, and technological)
2. Accountability: A single leader who is responsible for the outcomes of the ASP
3. Drug expertise: A single pharmacist who is responsible for efforts to improve the use of antibiotics
4. Action: Plan implementations based on the facility needs
5. Tracking: Monitoring of patterns of antibiotic prescribing and resistance
6. Reporting: Reporting antibiotic use and resistance information to doctors, nurses, and other relevant staff regularly
7. Education: Educating staff about the optimal antibiotic use
8. Infection prevention: key in supporting and enhancing the work of ASPs

South Africa's Plan

In its Antimicrobial Resistance National Strategy framework (2014), the Department of Health (DOH) has identified key components and a few weaknesses in the current system.

Figure 1: Strategic framework for the AMR national strategy

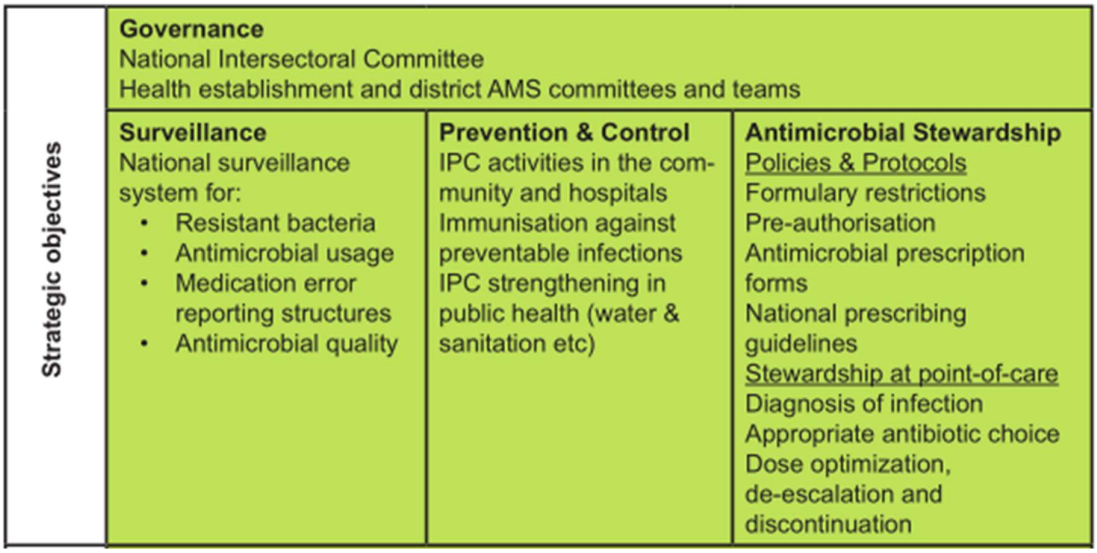


Figure 9

Surveillance and reporting activities

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, before prescribing antimicrobials.

The low numbers of trained microbiologists outside of major urban centres hamper surveillance activities in human health.

There is a great need to develop an AMR (Antimicrobial resistance) map of South Africa through data sharing between private and public sector laboratory services.

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.

Access to Laboratory Support

There is limited or no access to laboratory support. This seriously hampers ASP 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 appropriates prescribing. Long turnaround times are a weakness in the system, and commonly, when a result is available; contacting practitioners who will act on a result is difficult.

Infection Prevention and Control

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 practised. In certain provinces, there is no mandated provincial IPC committee.

At the healthcare facility level, IPC falls either under the nursing function; the quality directorate; under other structures; or some form of a hybrid model.

This creates challenges in terms of communication, line management, and overall accountability both at the individual and facility level.

South Africa's published literature on Infection Control

Boyles et al (2012) showed over the course of 1 month that under close observation and guidance that antibiotic use can be decreased. This has implications for costs at an institutional level. However, the study design did not take into consideration the degree of disability, if any resistances were present, or if the antibiotic choice were narrowed once spectrum was known.

Boyles (2015) showed in a study of blood cultures in 500 people in Cape Town that positive blood resulted in the alteration of antibiotic scripts. Seven per cent of blood cultures had a positive result. Of these positive cultures, 25% were resistant to initial therapy. The rest of the blood cultures allowed for the narrowing of antibiotic choice according to sensitivities. He suggested doing blood cultures on everyone even though for purposes of this study only took blood cultures with features of SIRS

In his article Whitelaw (2015) focuses on measures to prevent the spread of multidrug-resistant organisms in healthcare settings and interventions to prevent infection. He notes that infection control strategies are relatively inexpensive. Hand hygiene (using in particular alcohol-based hand rubs) remained the cornerstone of good infection control. Screening for drug-resistant organisms (specifically MRSA (Methicillin-resistant Staph Aureus)) in resource-limited remains challenging. The costs and potential benefits of screening programs need to be carefully weighed up. More importantly, he notes that prevention is the responsibility of every healthcare practitioner, not just the infection control team.

Boyles et al (2017) demonstrated a sustained reduction in antibiotic consumption over 4 years in a South African public sector tertiary hospital (Groote Schuur Hospital) and resultant savings, but no change in inpatient mortality, 30-day readmission rates, Clostridium difficile associated diarrhoea, and gram-negative sepsis. The aforementioned hospital is relatively well resourced with infectious disease sub-specialists.

In 2018 Junaid et al described their team's experiences during the process of setting up an ASP in George Hospital (a public district-level hospital) with the help of good leadership and support from Groote Schuur Hospital. They were able to set up a good ASP within a relatively short period despite resource challenges.

Chapter 3 - Aims and Objective

OBJECTIVE

To report on the Core Elements of Port Shepstone Hospital's Antimicrobial Program and to evaluate the Infection Prevention and Control program by using the CDC's Infection Control Assessment Toolkit.

METHOD

The research has 2 sections. In the first part the author describes the overall antimicrobial program at Port Shepstone Hospital while the second part focusses on auditing the infection Prevention and Control (IPC) Program.

In the first 3 sections of Part 1 *(Leadership, pharmacy level, Infection Prevention and Control Program*), the author describes the important systems and core elements *(introduced on page 18)* that PSH has in place to govern the entire antimicrobial program. It should be noted that initially the CDC describes these elements as the core of an Antibiotic Stewardship Program however the validity is retained when applied to a more generalised description of an Antimicrobial Program (which includes ASPs as a subset). In the rest of Part 1, the author describes PSH's IPC program using the CDC toolkit as a framework and highlights important positive and negative findings.

In the second part, responders (nurses) were identified for completion of selected elements of the CDC toolkit.

The research was conducted at Port Shepstone Regional Hospital between February and March 2018. The participants were the nurses who usually managed the wards. The sample size was determined as a census of the qualifying wards. Only adult wards that have long term patients were used. Neonatal and paediatric wards were not included due to vastly different infection control processes. Eleven (11) wards were selected. The CDC(US) Infection Control Assessment Tool for Acute Care Hospitals was used as the instrument for data collection. A total of 18 questionnaires were returned from respondents (7 of the wards had 2 respondents). One (1) questionnaire was selected to represent each of the 11 wards. In the situation where there was more than one questionnaire was returned, a single questionnaire was selected at random.

The sections audited were Handwashing, Personal protection equipment (PPE), Catheter-associated Urinary Tract Infections (CAUTI) Injection safety (IS) and Surgical site infection (SSI). The tool elicited if responders knew which policies were in place, their knowledge of the protocol, the level of education and training, and existing auditing practices.

Five of the ten sections of the toolkit were excluded from the audit.

Prevention of Central Line-associated Bloodstream Infection and *Prevention of Ventilator-associated Events* were not chosen as this expertise is only found in dedicated units (ICU and high care).

Environmental Cleaning and *Device Reprocessin*g are not usually done by the nurses, but by dedicated teams.

Prevention of Clostridium difficile is not an important clinical entity in PSH and there is thus no policy at PSH relating to this.

Due to physical hospital limitations, *Patient Isolation* is beyond the control of the nursing staff and patients with infective diseases are placed wherever a vacant bed is available

After collection, the data was entered into an excel workbook. A positive answer received a score of 1 while a negative or unknown received a 0. An arbitrary scoring system was used to grade performance as excellent (>80%), good (60 to 80%) and poor (<60%).

Chapter 4 - Results

PART 1 – An Evaluation of Port Shepstone Hospital's Antimicrobial Program

Leadership

Positive	Negative
There is a commitment from hospital leadership and support from the leadership that supports efforts to improve antibiotic use	Nil

At pharmacy Level

Positive	Negative
There is appropriate drug expertise with at least one pharmacist responsible for improving antibiotic use at the hospital. The hospital has hospital-specific treatment recommendations, based on national guidelines and local susceptibility, to assist with antibiotic selection for common clinical conditions. The hospital has specified antibiotic agents that need to be approved by a physician or pharmacist before dispensing at the hospital. The pharmacist reviews the course of therapy for specified antibiotic agents and communicates results with prescribers. The Hospital monitors antibiotic use (consumption). Prescribers receive feedback from the stewardship program about how they can improve their antibiotic prescribing.	There is no formal procedure for all clinicians to review the appropriateness of all antibiotics at or after 48 hours from the initial orders (i.e. antibiotic time out).

Stewardship program provides education to clinicians and other relevant staff on improving antibiotic use.	

Infection Prevention and Control Program

Positive	Negative
There is only one full-time nursing preventionist. All wards have nursing staff that are trained and they have a very active program with a weekly meeting where 3 topics are discussed and this is directed by the Infection control sister There are policies in place and these are reviewed and updated regularly Visitors are educated in infection control principles There is a competency-based training program for hand hygiene Wards are randomly selected every month for assessment. People are randomly selected and records of results are kept in a file Infection control sister gives feedback after the assessment	Each ward has both alcohol and water and soap-based system. This, however, is not individualised per patient or healthcare provider

Personal protection equipment

Positive	Negative
These are available in all wards in the form of gloves, aprons, and masks. After use, they are disposed of in clearly marked containers (red packets and cardboard boxes) Policies are available governing their use Audits are done regularly and results given monthly The staff has an annual health screen, with x-rays and sputum checks. If symptoms develop there is a staff clinic for a more detailed assessment	Nil

Prevention of Catheter-related UTI (urinary tract infections)

Positive	Negative
There are policies in place and ongoing training is done regularly, especially with junior staff Sterile packs and techniques are used during insertion Date and time of insertion are recorded and patients reviewed daily to determine if they require catheters Patients are educated on how to secure a catheter to prevent injury and to keep below the bed level to prevent backflow of urine. Nursing staff regularly empty catheter and document output volume. In patients who need samples taken they are aware of the sampling ports and techniques.	Nil

Prevention of central line-associated bloodstream infections

Positive	Negative
This is done mostly done in ICU (Intensive care unit)/CCU (Critical care unit) with trained staff. Date and time are indicated and the insertion site is visible and monitored for signs of infection Assessment of need is regularly determined and lines are removed when no longer warranted.	There is no formal supervision or audit of doctors with regards to insertion technique Regular nursing staff does not have much experience or training.

Injection Safety

Positive	Negative
There is a monthly training program Regular audits are carried out The hospital has policies in place in the event of an accident	Nil

Surgical Site Infection

Positive	Negative
There are trained staff in surgical wards. Non-surgical wards do have some training and can get advice from wound care sister There are antibiotic protocols in place	Nil

If a new infection is identified, patients can be isolated and infection control protocols enacted Barrier nursing and isolation wards are available	

Clostridium Difficile

	Negative
Nil	No policy exists

Environmental Cleaning

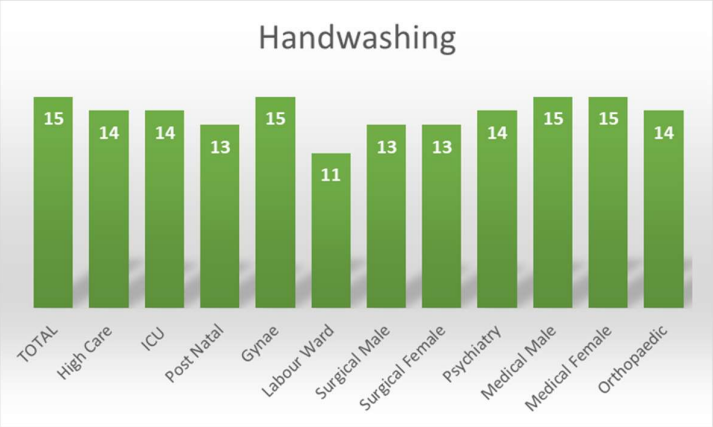
Positive	Negative
This is outsourced to a cleaning agency for general cleaning of the wards A colour-coded system is used to identify types of contamination Sterilisation of surgical tools and equipment is done at a dedicated department	Nil

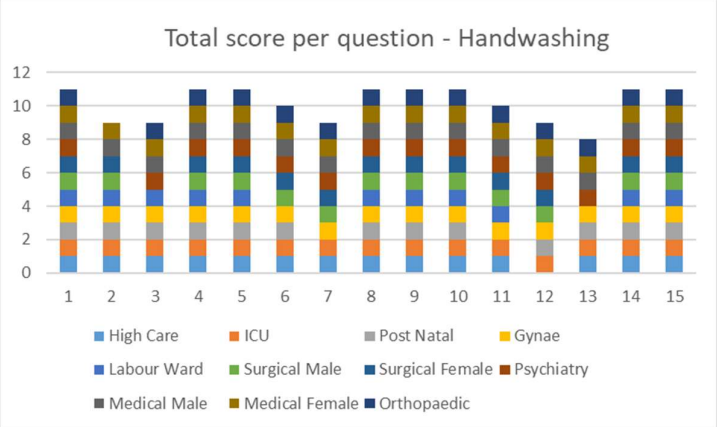
Isolation of Contagious or MDR Organisms

Positive	Negative
There is a case by case identification Once Identified therapy can be instituted as per sensitivity The microbiology lab regularly updates the hospital on an ongoing basis (weekly reports) The lab communicates directly when a resistant organism is identified.	A few Isolation wards are available in each ward; however, the burden of illness is so great that not all contagious patients can be isolated There are no mechanisms for the quarantine of highly contagious or dangerous patients There is no formal system in place for Interfacility transfer of patients that need isolation before a transfer If a patient is transferred across institutions, there is no mechanism in place for the microbiology lab to notify receiving hospital directly of resistant organisms or those with novel resistances.

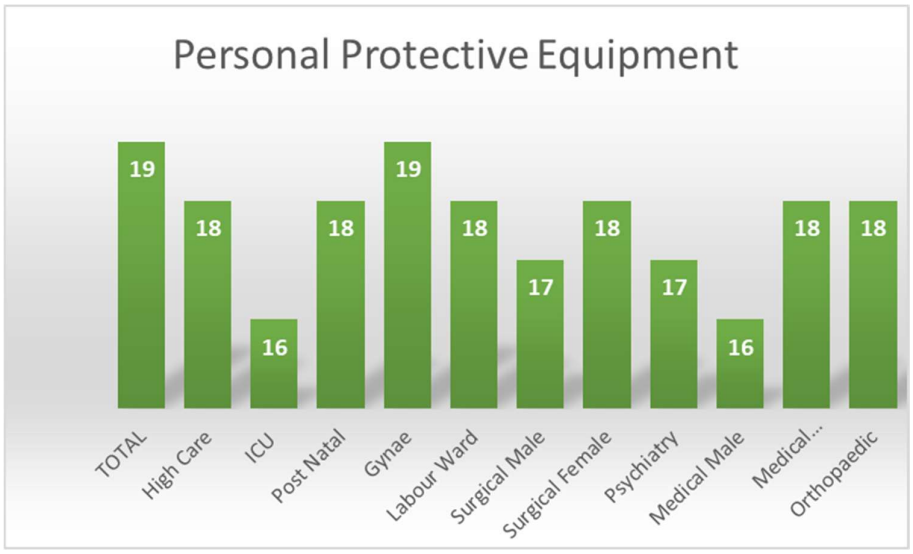
PART 2 – An Audit of the Infection Prevention and Control program

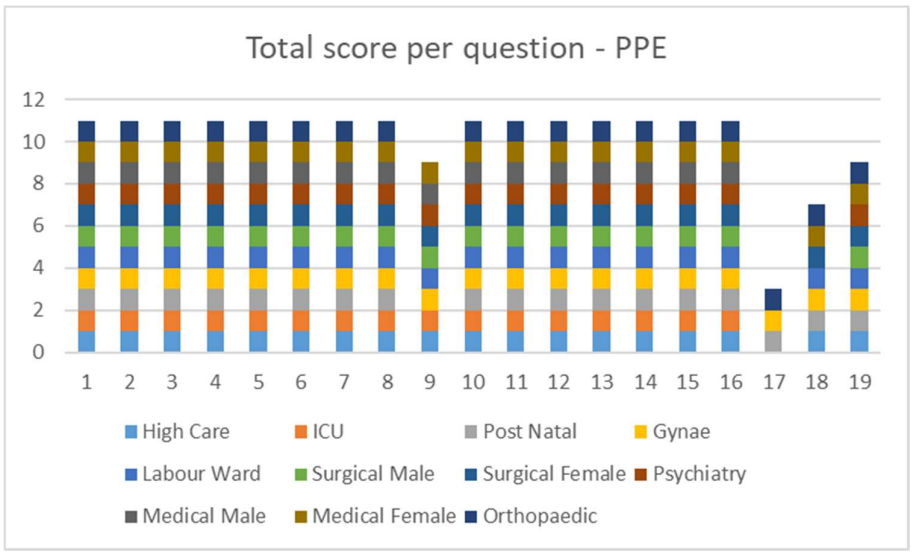
In the second part of the audit, we tested the nursing staff's awareness of PSH's Infection Prevention and control program in 11 wards across the 5 clinical components of Handwashing (HAND), Personal protection equipment (PPE), Catheter-associated Urinary Tract Infections (CAUTI), Injection safety (IS) and surgical site infection (SSI).





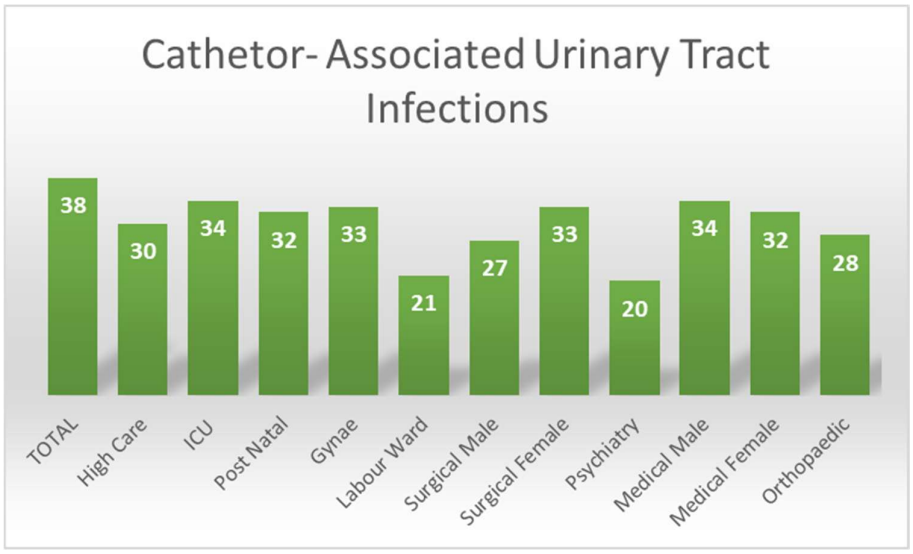
There was a total of 15 questions in the handwashing section. *(X-axis)* The score ranged from 11 to 15 (68% to 100%) *(Y-axis)*. The questions were about education, availability of handwashing supplies, auditing, and feedback process. Worst performing sections were because of poor initial education Q2 (9) Q3(9) and poor auditing feedback Q13 (8)

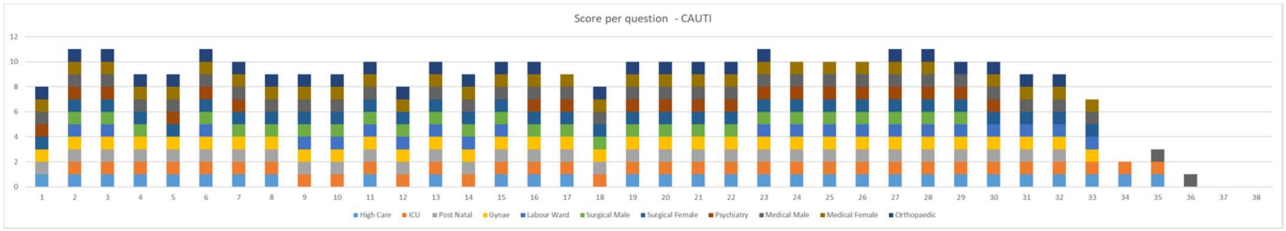




There was a total of 19 questions in the PPE section. The score ranged from 16-19 (84% to 100%).

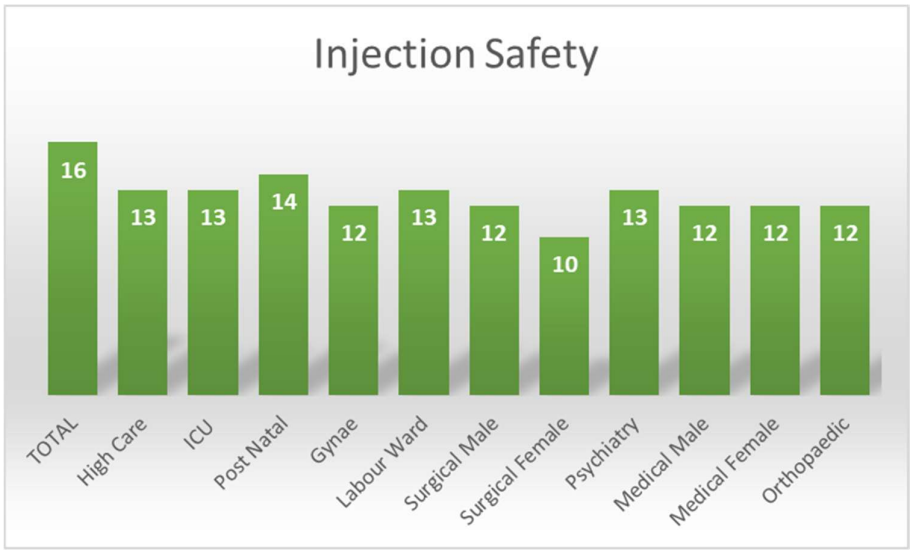
Questions related to the availability of PPE, training, and education in use, auditing on usage and feedback to respondents and mandatory test to determine the functionality of the equipment. The worst scoring questions were because PSH did not have a respiratory protection program Q17(3) Q18(7)

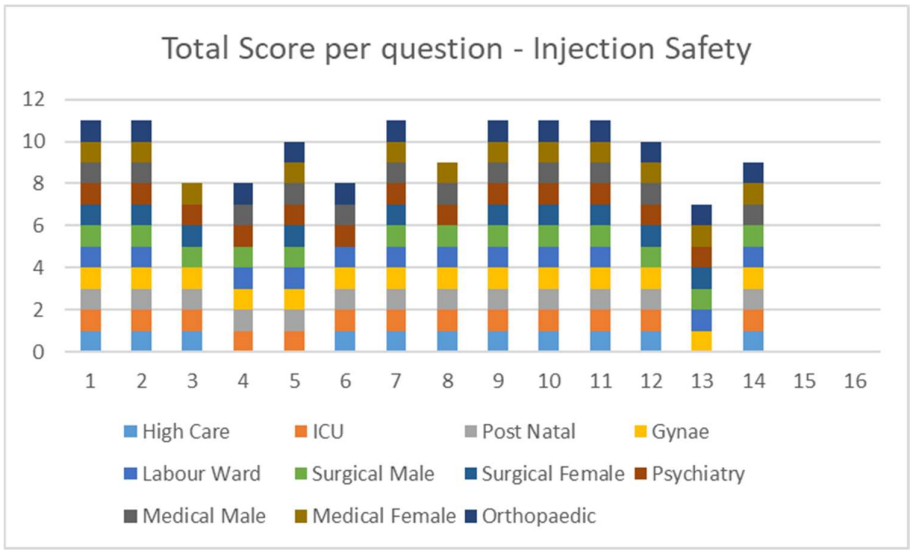




There was a total of 38 questions in the Catheter-associated – Urinary Tract infections (CAUTI) section. The scores obtained ranged from 20 to 34 (52% to 89%). Questions related to initial training, auditing and feedback on competence, daily assessment of patient need, collection of hospital data regarding CAUTI, and whether this data goes back to the wards.

PSH does not have a system in place for a CAUTI database Q34, Q35. There is no ongoing collection of data and thus no dissemination of information back to the wards. Q36- Q38 (0-1)



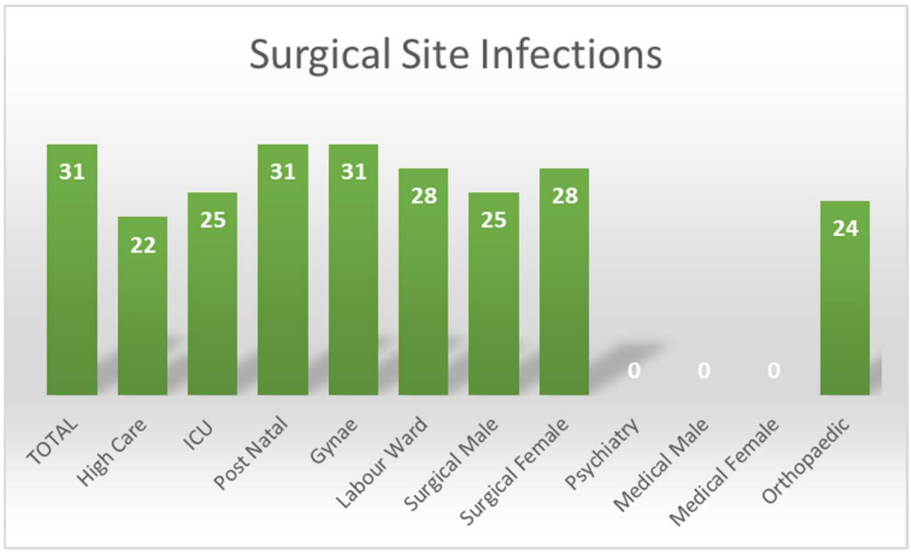


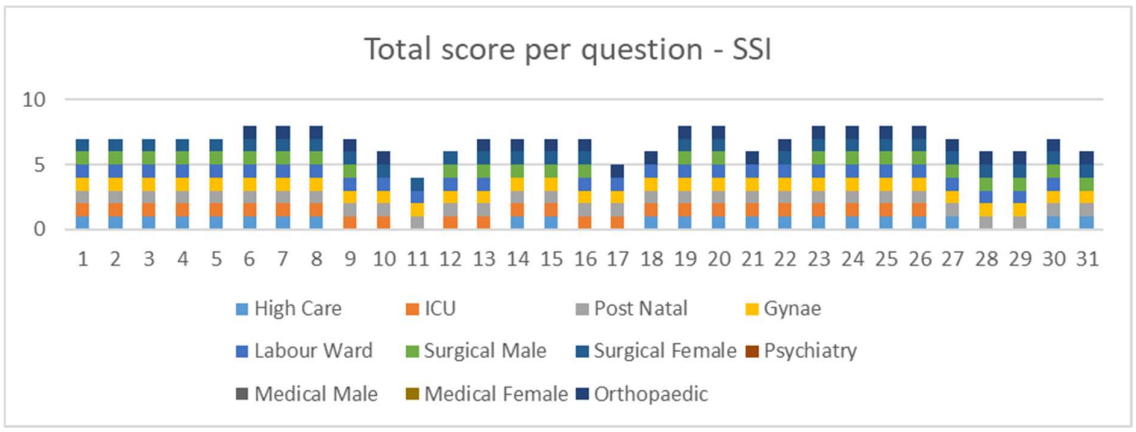
In the Injection Safety section total 16. The score ranged from 10 to 14 (62% to 87%)

Questions in the audit related to training in preparation and technique, awareness of the audit process and feedback, policy to identity tampering or alteration of medication.

Wards lost marks mostly due to lack of any protocol to identify tampering. Q15 (0) Q16 (0)

They also lost marks when it came to ongoing education Q3(8) Q4(8)





The Surgical Site Infections (SSI) section total was 31. Lowest score being 0 and the highest 31 (0% - 85%)

Questions were related to if policies were in place, use of prophylactic antibiotics, auditing processes, use of surgical draping and patient isolation.

This section has heavily skewed the overall score. Non -surgical wards did not know the process so could not answer questions at all. The surgical wards lost marks when it came to the auditing process. Q11(4) Q17(5)

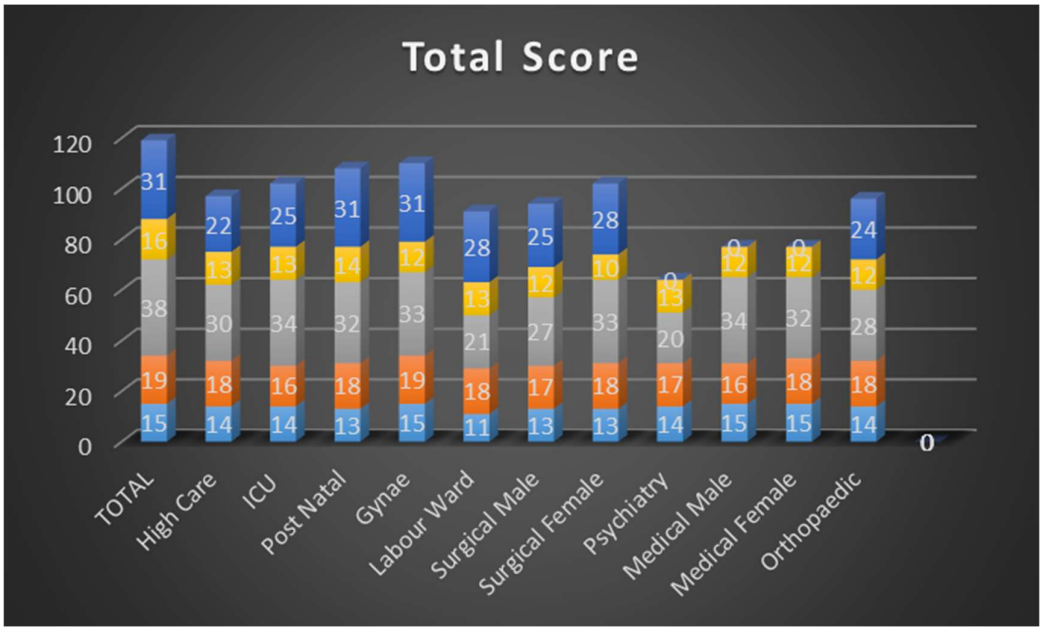
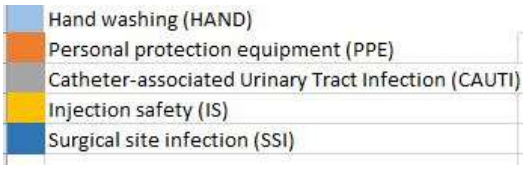
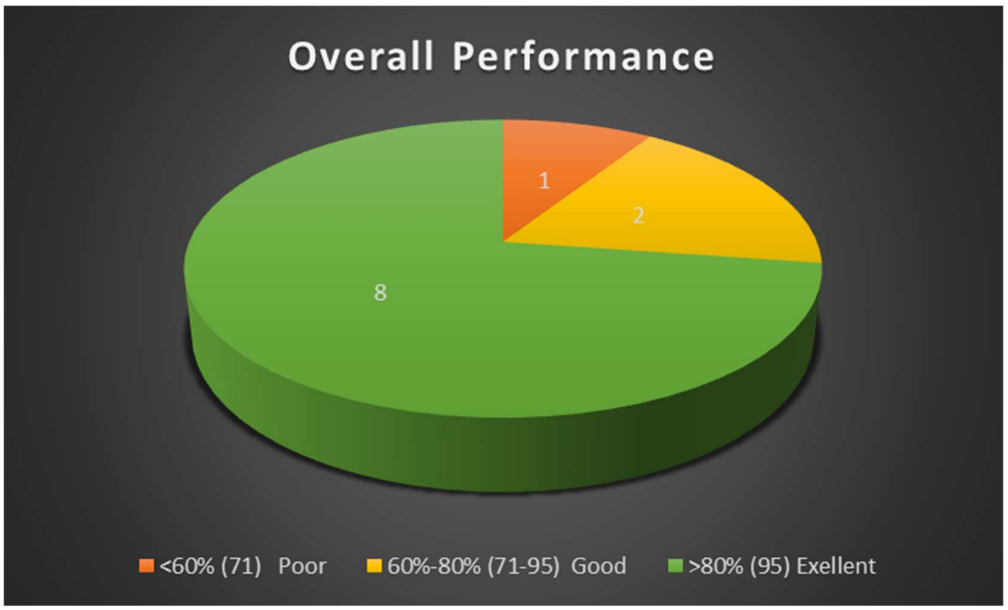


Figure 11



The total possible score was 119. The highest scoring ward was the gynaecology ward 110 (95%). The lowest psychiatry scored 64 (53%).

8 wards had excellent performance (>80% *[>95]*): High care, ICU, Postnatal, Gynaecology, Labour ward, Surgical male, Surgical female, Orthopaedic.
2 Wards had a Good performance (60%-80% *[71-95]*): Medical Male, Medical Female
One ward performed poorly <60% *[71]*: Psychiatry



Limitations of the study

This was a cross-sectional audit with a qualitative component. The audit loop was not complete after a remedial program. The study was not designed to determine the statistical significance or determine what an adequate sample size should be.

This study describes the situation in Port Shepstone Hospital. It may not lend itself to generalisation as other institutions may not have similar facilities or resource constraints.

In the scoring, the lack of a protocol was assigned 0 which resulted in skewed results.

Possible causes of additional bias included:

The participants may not have understood the question.

The participants may not have been aware of the policies that were in place

Participants bias was not assessed.

In this study, only nurses were chosen to complete the audit even though other disciplines like doctors, pharmacy and laboratory services are important stakeholders.

Non-surgical wards do not have much experience with the management of surgical wounds.

Despite limitations, the audit is sufficient to give insight into the Infection Prevention and Control program at Port Shepstone Hospital.

Chapter 5 - Discussion

South Africa has health ministerial-level commitment to control of antibiotic-resistant organisms and for antibiotic stewardship. There are substantive local and national surveillance systems in place. There is evidence that infection control and antibiotic stewardship programs impact positively on reducing the spread of resistant organisms and reducing the economic burden of antibiotic resistance. South Africa may be ahead of many developing world country-level programs, possibly enriched by the better provision of trained health care professionals.

The core components of an ideal antimicrobial program were evaluated in the first part of the audit. PSH has 10 of the 17 components considered important. It has leadership commitment, pharmacy services, laboratory services, infection control policy, guidelines for antibiotic use, personal protection equipment, a protocol for prevention of catheter-related UTI, protocol for injection safely, protocol for surgical site infection, services for environmental cleaning.

It does not have the infrastructure for isolation of contagious patients, a policy for the prevention of central line-associated bloodstream infection, a policy for clostridium difficile infection, a dedicated specialist team, antibiotic rotation policy, prevention of ventilator-associated events, or tracking of infective patients between institutions.

Currently, the burden of prescribing is placed on the most junior and inexperienced doctors (interns and medical officers). Consultant oversight is not available in all disciplines.

Tracking of antibiotic use and appropriateness remains a problem. Severely ill patients are admitted and antibiotics are started empirically before individual sensitivities are known. PSH has thus decided that only second-line (tazocin) and third-line antibiotic (meropenem/imipenem) prescribing practices should undergo scrutiny

The microbiology lab has also recently embarked on an initiative to notify the various department heads directly by email once a positive culture is identifies thus decreasing reliance on junior staff.

With regards to Infection Prevention and control the best overall performance was in the handwashing section. The worst performance was in monitoring of Surgical Site Infections. Poor auditing practices were identified globally. Wards with a surgical focus performed the best. It must be noted that in the authors experience patients with surgical wounds are found in all the long stay wards and there is an expectation that the nurses in all the wards should be able to manage these wounds. However, it is understandable that wards with a surgical focus would have constant

education and reinforcement of protocols and processes related to wound care while non-surgical wards nursing education and expertise align more with the focus of the discipline. The psychiatric ward additionally usually does not often deal with patients that have any acute infectious diseases, so thus the staff is less knowledgeable.

Another reason for sub-optimal ward performance was a lack of substantial ongoing auditing. This also explains why there were little feedback and advice on improvement

No published literature could be found for comparison.

Chapter 6 - Recommendations for Improvement

South Africa should aspire to keep pace with progress in the US and Europe and embrace the WHO program. In this review, the author used the CDC toolkit from the USA. The creation of a local toolkit (with guidelines, checklists and auditing tools) would be an important first step as it will allow the various institutions to conduct their own audits. Having sections that are appropriate to the South African infrastructure would enable hospitals to conduct audits accordingly. South Africa will do well to create bottom-up data at the hospital level. Education gaps would be identified and appropriate training programs may be fashioned for the hospital.

The infection control committee, pharmacy and microbiology lab create data on an ongoing basis. These reports are being sent via email to the heads of department. There is however no central repository and no way to easily track historical information. It is suggested that the installation of an institutional website would improve data collection for future research projects.

There needs to be transformative reallocation with more time and resources allocated to infection prevention and control program and policies.

New policies will have to be adopted in areas where the hospital was found to be deficient, e.g.:

Personal protection equipment
Prevention of Central Line-associated Bloodstream Infection
Prevention of Ventilator-associated Events
Management of clostridium difficile
Patient isolation

It is noteworthy that currently, the nursing staff are the champions of infection control. Doctors and allied health professionals need to become more actively involved in the process. Every opportunity should be taken for further education and involvement.

Importance of the Study

By conducting the study, the author has demonstrated that a regional hospital in the public sector of South Africa can have an Infection Prevention and Control program that fulfils some of the expectations of a first world country's program. PSH's current IPC program can easily be expanded and modified to upgrade its policies to an international standard.

More difficult to overcome will be issues relating to infrastructure and specialised teams.

It is hoped that the experience and findings at Port Shepstone hospital will provide insight and guidance to other hospitals hoping to improve their own IPC program.

A huge learning point is that crafting an IPC program is only the first step. Constant auditing and review of practice will eventually convert novel ideas into good habits. This should be the ultimate goal of any program.

Conclusion

South African literature is scanty and tends to favour Antibiotic Stewardship Programs above Infection Prevention and Control programs.

Core strategies and coordination of audits and research are in the early stages. This audit is timely in the assessment of an IPC program in a provincial hospital *in* the public sector.

This research has demonstrated that a regional hospital in the public sector of South Africa can have an Infection Prevention and Control program that fulfils some of the expectations of a developed country's program. PSH's current program can be expanded and modified to upgrade its policies to an international standard. More challenging to overcome will be issues relating to infrastructure and specialised teams of staff. To achieve the proper application of the IPC program more emphasis needs to be placed on constantly auditing existing practice and giving feedback to staff.

It is hoped that the experience and findings at Port Shepstone hospital will provide insight and guidance to other hospitals hoping to assess and improve their own IPC Programs.

Success is a journey, not a destination.

It requires constant effort, vigilance and re-evaluation

MARK TWAIN

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Appendix

I Ethics approval

UNIVERSITY OF KWAZULU-NATAL™
INYUVESI YAKWAZULU-NATALI

09 January 2018

Dr SK Chetty (963089697)
School of Clinical Medicine
College of Health Sciences
Skchetty@gmail.com

Dear Dr Chetty

Protocol: An audit of the Antibiotic Stewardship Program in Port Shepstone Regional Hospital
Degree: MMed
BREC Ref No: BE424/17

EXPEDITED APPLICATION

A sub-committee of the Biomedical Research Ethics Committee has considered and noted your application received on 07 July 2017.

The study was provisionally approved pending appropriate responses to queries raised. Your response received on 08 January 2018 to BREC correspondence dated 26 July 2017 has been noted by a sub-committee of the Biomedical Research Ethics Committee. The conditions have now been met and the study is given full **ethics approval** and may begin as from 09 January 2018.

This approval is valid for one year from **09 January 2018.** To ensure uninterrupted approval of this study beyond the approval expiry date, an application for recertification must be submitted to BREC on the appropriate BREC form 2-3 months before the expiry **date.**

Any amendments to this study, unless urgently required to ensure **safety** of participants, must be approved by BREC prior to implementation.

Your acceptance of this approval denotes your compliance with South African National Research Ethics Guidelines (2015), South African National Good Clinical Practice Guidelines (2006) (if applicable) and with UKZN BREC ethics requirements as contained in the UKZN BREC Terms of Reference and Standard Operating Procedures, all available at http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx.

BREC is registered with the South African National Health Research Ethics Council (REC-290408-009). BREC has US Office for Human Research Protections (OHRP) Federal-wide Assurance (FWA 678).

The sub-committee's decision will be **RATIFIED** by a full Committee at its next meeting taking place on **13 February 2018.**

We wish you well with this study. We would appreciate receiving copies of all publications arising out of this study.

Yours sincerely

Professor J Tsoka-Gwegweni
Chair: Biomedical Research Ethics Committee

cc supervisor: selva@doctors.org.uk
cc postgraduate administrator: konar@ukzn.ac.za

Biomedical Research Ethics Committee
Professor J Tsoka-Gwegweni (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 2486 **Facsimile:** +27 (0) 31 260 4609 **Email:** brec@ukzn.ac.za
Website: http://research.ukzn.ac.za/Research-Ethics/Biomedical-Research-Ethics.aspx

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II Hospital approval

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

PORT SHEPSTONE REGIONAL HOSPITAL
Private Bag X5706, PORT SHEPSTONE, 4240
11 Bazley Street, PORT SHEPSTONE 4240
Tel: 039-6886208 Fax: 039-6821514

KWAZULU-NATAL DEPARTMENT OF HEALTH
PORT SHEPSTONE REGIONAL
HOSPITAL

Reference: BE424/17
Enquiries: DR PANAJATOVIC
Telephone: (039) 688 6208

24 OCTOBER 2017

Chairperson: Research Committee
KZN Department of Health
Private Bag 9051
PIETERMARITZBURG
3200

RE: PERMISSION FOR RESEARCH TITLED: AN AUDIT OF THE ANTIBIOTIC STEWARDSHIP PROGRAM IN PUBLIC HOSPITAL IN KWAZULU- NATAL (DEPARTMENT OF HEALTH' AT PORT SHEPSTONE HOSPITAL)

OBJECT

To grant permission for Dr Chetty to do research on the Audit of Port Shepstone Hospital.

SUPPORTING DOCUMENTS

Appended hereto is documentation received.

OFFER OF SUPPORT

This office wishes to inform that the proposed research to be conducted by Dr Chetty is wholly supported. There are no financial implications.

RECOMMEDATION

In view of Dr Chetty's request I recommend the necessary authority be granted by the Research Committee for her to continue with her research.

REGIONAL
2017 -10- 30
PORT SHEPSTONE
REGIONAL HOSPITAL

Yours sincerely

Dr PANAJATOVIC
ACTING MEDICAL MANAGER
PORT SHEPSTONE REGIONAL HOSPITAL

III Department of health approval

health
Department:
Health
PROVINCE OF KWAZULU-NATAL

DIRECTORATE:
Health Research & Knowledge Management

HRKM Ref: 454/17
NHRD Ref: KZ_201711_007

Date: 28 November 2017
Dear Dr SK Chetty
UKZN

Approval of research

1. The research proposal titled **'An audit of the antibiotic stewardship program in Port Shepstone regional hospital'** was reviewed by the KwaZulu-Natal Department of Health.

   The proposal is hereby **approved** for research to be undertaken at Port Shepstone Hospital.

2. You are requested to take note of the following:
   a. Make the necessary arrangement with the identified facility before commencing with your research project.
   b. Provide an interim progress report and final report (electronic and hard copies) when your research is complete.

3. Your final report must be posted to **HEALTH RESEARCH AND KNOWLEDGE MANAGEMENT, 10-102, PRIVATE BAG X9051, PIETERMARITZBURG, 3200** and e-mail an electronic copy to hrkm@kznhealth.gov.za

For any additional information please contact Mr X. Xaba on 033-395 2805.

Yours Sincerely

Dr E Lutge
Chairperson, Health Research Committee
Date: 30/11/17

Fighting Disease, Fighting Poverty, Giving Hope

IV CDC Assessment tool

II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	**Assessment**	**Notes/Areas for Improvement**
A. Hand Hygiene		
1. Hospital has a competency-based training program for hand hygiene. Verify the following: a. Training is provided to all healthcare personnel, including all ancillary personnel not directly involved in patient care but potentially exposed to infectious agents (e.g., food tray handlers, housekeeping, and volunteer personnel). b. Training is provided upon hire, prior to provision of care at this hospital. c. Training is provided at least annually. d. Personnel are required to demonstrate competency with hand hygiene following each training. e. Hospital maintains current documentation of hand hygiene competency for all personnel.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No d. ○ Yes ○ No e. ○ Yes ○ No	
2. Hospital routinely audits (monitors and documents) adherence to hand hygiene. Verify the following: a. Respondent can describe process used for audits. b. Respondent can describe frequency of audits. c. Respondent can describe process for improvement when non-adherence is observed.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No	
3. Hospital provides feedback from audits to personnel regarding their hand hygiene performance. Verify the following: a. Respondent can describe how feedback is provided. b. Respondent can describe frequency of feedback.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	
4. Supplies necessary for adherence to hand hygiene (e.g., soap, water, paper towels, alcohol-based hand rub) are readily accessible in patient care areas.	○ Yes ○ No	
5. Hand hygiene policies promote preferential use of alcohol-based hand rub (ABHR) over soap and water in most clinical situations. *Note: Soap and water should be used when hands are visibly soiled (e.g., blood, body fluids) and is also preferred after caring for a patient with known or suspected C. difficile or norovirus during an outbreak or if rates of C. difficile infection (CDI) in the facility are persistently high.*	○ Yes ○ No	

II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	**Assessment**	**Notes/Areas for Improvement**
B. Personal Protective Equipment (PPE)		
1. Hospital has a competency-based training program for use of personal protective equipment (PPE). Verify the following: a. Training is provided to all personnel who use PPE. b. Training is provided upon hire, prior to provision of care at this hospital. c. Training is provided at least annually. d. Training is provided when new equipment or protocols are introduced. e. Training includes 1) appropriate indications for specific PPE components, 2) proper donning, doffing, adjustment, and wear of PPE, and 3) proper care, maintenance, useful life, and disposal of PPE. f. Personnel are required to demonstrate competency with selection and use of PPE (i.e., correct technique is observed by trainer) following each training. g. Hospital maintains current documentation of PPE competency for all personnel who use PPE.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No d. ○ Yes ○ No e. ○ Yes ○ No f. ○ Yes ○ No g. ○ Yes ○ No	
2. Hospital routinely audits (monitors and documents) adherence to proper PPE selection and use, including donning and doffing. Verify the following: a. Respondent can describe process used for audits. b. Respondent can describe frequency of audits. c. Respondent can describe process for improvement when non-adherence is observed.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No	
3. Hospital provides feedback to personnel regarding their performance with selection and use of PPE. Verify the following: a. Respondent can describe how feedback is provided. b. Respondent can describe frequency of feedback.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	
4. Supplies necessary for adherence to personal protective equipment recommendations specified under Standard and Transmission-based Precautions (e.g., gloves, gowns, mouth, eye, nose, and face protection) are available and located near point of use.	○ Yes ○ No	
5. The facility respiratory protection program provides employees protection from recognized hazards. Verify the following: a. Annual fit testing of respirators is provided for all personnel who are anticipated to require respiratory protection. b. Supplies of respiratory protection devices (e.g., powered air purifying respirators) are maintained for those who cannot be fitted. c. Employees are educated about conditions that may compromise proper fit and function of respiratory devices (e.g., weight gain/loss, facial hair).	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No	

II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	**Assessment**	**Notes/Areas for Improvement**
C. Prevention of Catheter-associated Urinary Tract Infection (CAUTI)		
1. Hospital has physician and/or nurse champions for CAUTI prevention activities.	○ Yes ○ No	
2. Hospital has a competency-based training program for **insertion** of urinary catheters. Verify the following: a. Training is provided to all personnel who are given responsibility for insertion of urinary catheters. *Personnel* may include, but are not limited to, nurses, nursing assistants, medical assistants, technicians, and physicians. b. Training is provided upon hire, prior to being allowed to perform urinary catheter insertion. c. Training is provided at least annually. d. Training is provided when new equipment or protocols are introduced. e. Personnel are required to demonstrate competency with insertion (i.e., correct technique is observed by trainer) following each training. f. Hospital maintains current documentation of competency with urinary catheter insertion for all personnel who insert urinary catheters.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No d. ○ Yes ○ No e. ○ Yes ○ No f. ○ Yes ○ No	
3. Hospital routinely audits (monitors and documents) adherence to recommended practices for **insertion** of urinary catheters. Verify the following: a. Respondent can describe process used for audits. b. Respondent can describe frequency of audits. c. Respondent can describe process for improvement when non-adherence is observed.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No	
4. Hospital provides feedback from audits to personnel regarding their performance for **insertion** of urinary catheters. Verify the following: a. Respondent can describe how feedback is provided. b. Respondent can describe frequency of feedback.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	

II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	**Assessment**	**Notes/Areas for Improvement**
C. Prevention of Catheter-associated Urinary Tract Infection (CAUTI), continued		
5. Hospital has a competency-based training program for **maintenance** of urinary catheters. Verify the following: a. Training is provided to all personnel who are given responsibility for urinary catheter maintenance (e.g., perineal care, emptying the drainage bag aseptically, maintaining the closed drainage system, maintaining unobstructed urine flow). Personnel may include, but are not limited to, nurses, nursing assistants, medical assistants, technicians, and transport personnel. b. Training is provided upon hire, prior to being allowed to perform urinary catheter maintenance. c. Training is provided at least annually. d. Training is provided when new equipment or protocols are introduced. e. Personnel are required to demonstrate competency with catheter maintenance (i.e., correct technique is observed by trainer) following each training. f. Hospital maintains current documentation of competency with urinary catheter maintenance for all personnel who maintain urinary catheters.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No d. ○ Yes ○ No e. ○ Yes ○ No f. ○ Yes ○ No	
6. Hospital routinely audits (monitors and documents) adherence to recommended practices for **maintenance** of urinary catheters. Verify the following: a. Respondent can describe process used for audits. b. Respondent can describe frequency of audits. c. Respondent can describe process for improvement when non-adherence is observed.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No	
7. Hospital provides feedback from audits to personnel regarding their performance for **maintenance** of urinary catheters. Verify the following: a. Respondent can describe how feedback is provided. b. Respondent can describe frequency of feedback.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	
8. Patients with urinary catheters are assessed, at least daily, for continued need for the catheter. Verify the following: a. Respondent can describe methods used to trigger the daily assessments (e.g., patient safety checklist, daily rounds, nurse directed protocol, reminders, or stop orders). b. Hospital routinely audits adherence to daily assessment of urinary catheter need.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	

II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	**Assessment**	**Notes/Areas for Improvement**
C. Prevention of Catheter-associated Urinary Tract Infection (CAUTI), continued		
9. Hospital monitors CAUTI data and uses it to direct prevention activities. Verify the following: a. Respondent is familiar with National Healthcare Safety Network (NHSN) CAUTI data. b. Respondent can describe how CAUTI data are used to direct prevention activities.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	
10. Hospital provides feedback of CAUTI data to frontline personnel. Verify the following: a. Respondent can describe how feedback is provided. b. Respondent can describe frequency of feedback.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	

II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	**Assessment**	**Notes/Areas for Improvement**
F. Injection Safety (This element does not include assessment of pharmacy practices)		
1. Hospital has a competency-based training program for preparation and administration of parenteral medications (e.g., SQ, IM, and IV) outside of the pharmacy. Verify the following: a. Training is provided to all personnel who prepare and/or administer injections and parenteral infusions. b. Training is provided upon hire, prior to being allowed to prepare and/or administer injections and parenteral infusions. c. Training is provided at least annually. d. Training is provided when new equipment or protocols are introduced. e. Personnel are required to demonstrate competency with preparation and/or administration of injections and parenteral infusions following each training. f. Hospital maintains current documentation of competency with preparation and/or administration procedures for all personnel who prepare and/or administer injections and parenteral infusions.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No d. ○ Yes ○ No e. ○ Yes ○ No f. ○ Yes ○ No	
2. Hospital routinely audits (monitors and documents) adherence to safe injection practices. Verify the following: a. Respondent can describe process used for audits. b. Respondent can describe frequency of audits. c. Respondent can describe process for improvement when non-adherence is observed.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No	
3. Hospital provides feedback from audits to personnel regarding their adherence to safe injection practices. Verify the following: a. Respondent can describe how feedback is provided. b. Respondent can describe frequency of feedback.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	
4. Hospital has a drug diversion prevention program that includes consultation with the IP program when drug tampering (involving alteration or substitution) is suspected or identified to assess patient safety risks. Verify the following: a. Respondent can describe how the hospital would assess risk to patients if tampering is suspected or identified.	○ Yes ○ No a. ○ Yes ○ No	

II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	**Assessment**	**Notes/Areas for Improvement**
G. Prevention of Surgical Site Infection (SSI)		
1. Hospital has a program to improve surgical care.	○ Yes ○ No ○ Not Applicable (Check if facility does not perform surgeries and move to item H. *Clostridium difficile* Infection)	
Verify the following: The program to improve surgical care addresses appropriate prophylactic antibiotic use including:		
a. Preoperative timing of prophylactic antibiotic administration (within 1 hour prior to incision or 2 hours for vancomycin or fluoroquinolones).	a. ○ Yes ○ No	
b. Appropriate prophylactic antibiotic selection based on procedure type.	b. ○ Yes ○ No	
c. Discontinuation of prophylactic antibiotics within 24 hours (48 hours for CABG or other cardiac surgery) after surgical end time.	c. ○ Yes ○ No	
d. The program to improve surgical care addresses prompt removal of urinary catheter on post-op day 1 or 2, unless there is a documented appropriate reason for continued use.	d. ○ Yes ○ No	
2. Hospital routinely audits (monitors and documents) adherence to elements of program to improve surgical care.	○ Yes ○ No	
Verify the following: a. Respondent can describe process used for audits.	a. ○ Yes ○ No	
b. Respondent can describe frequency of audits.	b. ○ Yes ○ No	
c. Respondent can describe process for improvement when non-adherence is observed.	c. ○ Yes ○ No	
3. Hospital provides feedback from audits to personnel regarding their adherence to elements of the program to improve surgical care.	○ Yes ○ No	
Verify the following: a. Respondent can describe how feedback is provided.	a. ○ Yes ○ No	
b. Respondent can describe frequency of feedback.	b. ○ Yes ○ No	

II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	**Assessment**	**Notes/Areas for Improvement**
G. Prevention of Surgical Site Infection (SSI) , continued		
4. Hospital routinely audits (monitors and documents) adherence to recommended infection control practices for SSI prevention. Verify the following: Auditing includes: a. Adherence to preoperative surgical scrub and hand hygiene b. Appropriate use of surgical attire and drapes c. Adherence to aseptic technique and sterile field d. Proper ventilation requirements in surgical suites e. Minimization of traffic in the operating room f. Adherence to cleaning and disinfection of environmental surfaces g. Respondent can describe process used for audits. h. Respondent can describe frequency of audits. i. Respondent can describe process for improvement when non-adherence is observed.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No c. ○ Yes ○ No d. ○ Yes ○ No e. ○ Yes ○ No f. ○ Yes ○ No g. ○ Yes ○ No h. ○ Yes ○ No i. ○ Yes ○ No	
5. Hospital provides feedback from audits to personnel regarding their adherence to surgical infection control practices. Verify the following: a. Respondent can describe how feedback is provided. b. Respondent can describe frequency of feedback.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	
6. Hospital monitors SSI data and uses it to direct prevention activities. Verify the following: a. Respondent is familiar with NHSN SSI data. b. Respondent can describe how SSI data are used to direct prevention activities.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	
7. Hospital provides feedback of SSI data to surgeons and other surgical personnel. Verify the following: a. Respondent can describe how feedback is provided. b. Respondent can describe frequency of feedback.	○ Yes ○ No a. ○ Yes ○ No b. ○ Yes ○ No	

An audit of the antibiotic stewardship program in Port Shepstone Regional Hospital

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