DISSERTATION

KIMBERLEY HOSPITAL HEALTH-CARE ASSOCIATED INFECTION PREVALENCE SURVEY 2015/2016

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KIMBERLEY HOSPITAL HEALTH-CARE ASSOCIATED INFECTION PREVALENCE SURVEY 2015/2016

by

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DECLARATION:

I, Arun Nair, declare that the dissertation hereby submitted is my own independent work and has not previously been submitted by me at another University/Faculty. I further more cede copyright of this dissertation in favour of the University of the Free State.

DEDICATIONS

This study is dedicated to my wife Deepti and my daughter Diya. I would like to express my thanks for always being there for me and for the support and understanding shown during these last four years of postgraduate study that has helped me to persist and not give up during the frustrating and challenging moments.

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NO.	ABBREVIATION	EXPANDED FORM
1.	**AIDS**	Acquired Immuno-Deficiency Syndrome
2.	**AM**	Anti-Microbial
3.	**AMR**	Anti-Microbial Resistance
4.	**BSI**	Blood Stream Infection
5.	**CAUTI**	Catheter Associated Urinary Tract infection
6.	**CDC**	Centers for Disease Control and Prevention
7.	**CI**	Confidence Interval
8.	**CLABSI**	Central Line Associated Blood Stream Infection
9.	**CVC**	Central Venous Catheter
10.	**CVP**	Central Venous Pressure
11.	**DAI**	Device Associated Infections
12.	**DHSS**	District Health Surveillance Service
13.	**DOB**	Date Of Birth
14.	**DOH**	Department of Health
15.	**ECDC**	European Center for Disease Prevention and Control
16.	**HCAI/ HAI**	Healthcare-associated infection
17.	**HELICS**	Hospitals in Europe Link for Infection Control through Surveillance
18.	**HIS**	Hospital Infection Society
19.	**HIV**	Human Immunodeficiency Virus
20.	**HOU**	Head of Unit
21.	**HRN**	High Risk Nurseries
22.	**ICNA**	Infection Control Nurses Association
23.	**ICU**	Intensive Care Unit
24.	**IPC**	Infection Prevention and Control
25.	**KHC**	Kimberley Hospital Complex
26.	**LOS**	Length of hospital Stay

NO.	ABBREVIATION	EXPANDED FORM
27.	**LRTI**	Lower Respiratory Tract Infection
28.	**NCDOH**	NORTHERN CAPE DEPARTMENT OF HEALTH
29.	**NHS**	National Health Service
30.	**NHSN**	National Healthcare Safety Network
31.	**NICE**	National Institute for Health and Clinical Excellence
32.	**NNIS**	National Nosocomial Infection Surveillance System
33.	**OMR**	Optical Mark Reader
34.	**PBSI/PBI**	Primary Blood Stream Infection
35.	**PHLS**	Public Health Laboratory Service
36.	**PHREC**	Provincial Health Research and Ethics Committee
37.	**PN**	Pneumonia
38.	**PPS**	Point Prevalence Survey
39.	**PVC**	Peripheral Venous Catheter
40.	**SA**	South Africa
41.	**SA-HISC**	South African Healthcare-associated Infection Surveillance Centre
42.	**SCIP**	Surgical Care Improvement Project
43.	**SENIC**	Study on the Efficacy of Nosocomial Infection Control
44.	**SPSS**	Statistical Package for the Social Science
45.	**SSI**	Surgical Site Infection
46.	**SWI**	Surgical Wound Infection
47.	**UK**	United Kingdom
48.	**USA**	United States of America
49.	**UTI**	Urinary Tract Infection
50.	**VAP**	Ventilator Associated Pneumonia
51.	**VICNISS**	Victorian Healthcare Associated Infection Surveillance System
52.	**WHO**	World Health Organisation

ABSTRACT

This survey was a point-prevalence survey to determine the rates of four of the most important healthcare-associated infections (viz. urinary tract, lower respiratory tract, surgical site and primary bloodstream infections) in Kimberley Hospital in the province of Northern Cape, South Africa. This was the first survey of this kind conducted in the Northern Cape. Where data was available, the infections were linked to the causative microorganism/s and their antimicrobial susceptibility data was explored.

On one day in each of the following months, February 2016 and March 2016, all patients hospitalized in one of fifteen selected wards within Kimberley hospital were studied. A total of 326 patients were surveyed. Data was collected according to the Centers for Disease Control and Prevention National Nosocomial Infection Surveillance Systems criteria which included the demographic details of the patients, clinical characteristics and Laboratory findings.

The overall prevalence rate was found to be 7.76% and varied significantly between the major units (with minimum of 20 patients admitted) ranging from 4.54% to 15.15%. The highest rates were noted in the surgical disciplines. Among the individual infection types studied, the highest prevalence was for surgical site infections at 4.60% followed by urinary tract infections (1.53%) and both primary bloodstream Infections and pneumonia (both 0.92%). Among the surgical site infections, superficial incisional subtype made up almost 67% of the infections. The paediatric healthcare-associated infection prevalence was 6.12%.

Sixty-seven percent of patients with blood stream infections had a vascular access device (peripheral) in the 48 hours prior to the onset of infection. Forty percent of patients with urinary tract infections had a urinary catheter present within seven days prior to the onset of infection. The most common microorganism isolated was *Klebsiella pneumoniae* which was prevalent in 37 % of the infections. Hundred and thirty seven patients (42%) were receiving at least one antimicrobial agent and the most common antibiotic prescribed in the hospital was amoxicillin/clavulanic acid (Augmentin). The most prominent resistance profile was to the Penicillin antibiotics (55% of the isolated organisms).

The healthcare-associated infection rates were comparable to other studies done in South Africa, Wales and England, however the surgical site infection rate in Kimberley hospital was higher than those found in other studies conducted in South Africa (4.60% vs 3.00%) but less than the study conducted in Argentina using the same Methodology (10.19%).

These findings do indicate that the overall infection prevalence rates found in Kimberley Hospital is in keeping with international trends but the prevalence of surgical site infections are of concern and further studies are needed to identify the relevant risk factors involved and target this as an area where preventative interventions can be implemented. This survey also provided a baseline for Kimberley hospital against which future prevalence surveys can be compared.

1. INTRODUCTION

1.1 BACKGROUND

Nosocomial (hospital-acquired) infections are infections that originate in a patient while admitted in a hospital or any other healthcare facility. It denotes a new disorder (unrelated to the patient's primary condition) and associated with being in a hospital. That is, it was not present / incubating at the time of admission or the residual of an infection acquired during a previous admission[1]. The terms 'hospital-acquired' and 'nosocomial' are often used interchangeably but in essence refer to infections that present for the first time to hospitalised patients at least 48 hours after admission[2]. "Surveillance by definition refers to the systematic, ongoing observation of the occurrence and distribution of disease in a population and the events or conditions that increase or decrease the risk of disease. It is important to note that surveillance encompasses the entire process involving planning, collection and analysis of data up to the point when the dissemination of results can be done so that appropriate actions can be taken"[3].

HCAI (Healthcare-associated infections) are a major problem worldwide. A prevalence survey conducted in 14 countries by the World Health Organization (WHO) reported that 8.7% of admitted hospital patients had a nosocomial infection at any one point in time[4]. This poses many challenges to the health system as a whole.

HCAI have numerous repercussions. They may lead to an increase in disability, morbidity and even eventually have the potential to result in death. Patients who develop nosocomial infections cost more to health institutions due to an increase in the length of stay (LOS) which in turn is linked to an increase in the use of diagnostic tests and drugs. "One study showed that the overall increase in the duration of hospitalization for patients with surgical wound infections was 8.2 days, ranging from 3 days for gynaecology to 9.9 for general surgery and 19.8 for orthopaedic surgery"[4].

There are indirect costs to the patient secondary to loss of work and inability to provide for the needs of the family. Legal costs cannot be ignored in the present environment of litigation processes especially when nosocomial infection are often attributed to negligence or substandard health care[5].

Many patient factors influence the acquisition of nosocomial infections such as age, immune status, preexisting disease, and diagnostic or therapeutic interventions. The extremes of life (the very young and very old) are especially prone to infection. Patients with chronic diseases [malignant tumours, diabetes mellitus, renal failure, or the Acquired Immuno-Deficiency Syndrome (AIDS)] are vulnerable to infections especially with opportunistic organisms[4]. Many modern diagnostic and therapeutic procedures (biopsies, endoscopic examinations, catheterization, intubation/ventilation and surgical procedures) also increase the risk of HCAI. Other contributing factors to the development of HCAI are crowded conditions within the hospital, frequent transfers of patients from one unit to another, and concentration of patients highly susceptible to infection in one area (e.g. newborn infants, burn patients, intensive care etc.)

Infections caused by antimicrobial-resistant pathogens are of a major concern and nosocomial infections are therefore becoming more difficult and expensive to treat. At the same time it has also been noted that a proportion of nosocomial infections (15-30%) may be avoidable[6].

In South Africa, the prevention of nosocomial infections is of national importance. The National Department of Health has drafted the Infection Prevention and Control Policy[7]. A working group of local specialists have also published guidelines for the management of nosocomial infections in South Africa. The guidelines provide recommendations on the appropriate management of these infections including the choice of antimicrobial agents. The South Africa Thoracic Society, the Critical Care Society of Southern Africa and the Federation of Infectious Diseases Societies of Southern Africa have all endorsed the document. It states the following in point 11.1.2 (page 12 of the document) with regards to each health facility in South Africa: “At facility level, regular reports of comparative data on the levels of healthcare associated infections and anti-microbial resistance within the facility should be made available to treating clinicians to make them aware of their local resistance profiles, to enable them

to make better empirical treatment choices where necessary and to assess implications of their treatment choices and infection control practices"[7].

A meta-analysis done in 2011 found that 66% of developing countries worldwide had no published data on the endemic burden of HCAI. Most studies were done at single centres which were often large, referral hospitals in urban areas therefore not representative of the wider healthcare systems in the region. Yet, the available evidence is sufficient to raise concern that nosocomial infections are significantly adding to the already high burden of infection in Sub Saharan Africa[2]. HCAIs need to be properly managed in order to prevent transmission of microorganisms amongst patients, health care workers and visitors to the healthcare facility. Health care workers and visitors may themselves be sources of infections that could potentially result in facility-based outbreaks[7].

1.2 HCAI SURVEILLANCE

The surveillance of HCAI, i.e. the collection of standardised data, its dissemination and the subsequent action accruing from the results, is an important aspect of infection control[1].

Surveillance is done to measure the extent of nosocomial infections. Continuous surveillance is time-consuming but can lead to beneficial results. Surveillance, when followed by action, can result in the reduction of nosocomial infections with an associated reduction in morbidity, mortality and cost[3]. The Study on the Efficacy of Nosocomial Infection Control (SENIC) evaluated nosocomial infection prevention and control programs in hospitals in the United States of America (USA). The Study found that hospitals that had a programme of surveillance and fed results back to clinical staff had considerably lower infection rates than others[8]. The US National Nosocomial Infections Surveillance (NNIS) system has also shown a significant reduction of nosocomial infection rates in participating hospitals in the USA[9].

There are mainly two approaches used in the surveillance of HCAI: continuous (incidence) surveillance and point prevalence ('snapshot') surveys (PPS). To be able to assess the true impact of all the HCAI would require the need for continuous prospective surveillance for all the HCAI that involves sequential data collection for every patient that is admitted to the hospital. This is a labour and resource intensive process that is not feasible in many settings. PPS is an effective method that is also cost-effective for collecting valuable data on HCAI. PPS is also very valuable to determine antimicrobial (AM) prescribing patterns and to identify changes in prescribing over time[10].

The gold standard for surveillance of HCAI would be prospective, onsite, continuous, hospital-wide surveillance but this kind of approach requires numerous resources, so point prevalence survey is the most common type of surveillance done because they are less demanding when it comes to human and technical resources[11]

PPS has some advantages in that it is relatively ease to perform, needs less resources, and can be used to assess a number of hospitals within a short duration of time. PPS can also be used to monitor the effectiveness of infection control programmes. PPS is the best method to use in areas with financial constraints. However these surveys must be done using standardised methodology and internationally recognised definitions[1].

At present, there is a paucity of data available in South Africa regarding the prevalence of HCAI. Local studies have been conducted in some facilities and areas that describe clusters or outbreaks such as the *Klebsiella pneumoniae* infection in neonatal Intensive Care Units (ICU)[1213]. Other studies have also investigated antimicrobial sensitivity and resistance patterns.

Most of these studies were based on laboratory confirmed cases of infection and not clinical diagnosis of cases. The data is not such that it can be benchmarked nationally or internationally. Despite this, the burden of HCAI in sub-Saharan Africa is always assumed to be higher than in most other countries without any formal studies done

and yet there is evidence that doing surveillance and implementing prevention measures improves infection rates[2].

HCAIs from resource-limited countries are mostly underrepresented in the literature although the associated mortality, morbidity and healthcare costs are substantial[14].

Four major infections i.e. Primary bloodstream infections (PBSI), surgical site infections (SSI), urinary tract infections (UTI) and lower respiratory tract infections (LRTI) are implicated in up to 80% of nosocomial infections[15]. To standardise the surveillance process, a baseline is required which will highlight problem areas and direct further action.

2. LITERATURE REVIEW

2.1 HISTORY OF SURVEILLANCE OF HCAI

The concept of surveillance is not a recent phenomenon. It has been going on for a very long time.

Sir Thomas Percival in the 19th century commented as follows, in an essay on medical ethics (1803): "By the adoption of the register, physicians and surgeons would obtain clearer insight into the comparative success of their hospital and private practice; and would be incited to a diligent investigation of the causes of such difference."

Florence Nightingale while working with James Young Simpson and Joseph Lister (pioneers of hospital sepsis and reform) advocated an “epidemiological" approach to surgical audits, focusing on summary statistics of mortality rates and demographics. She stated: “To understand God's thoughts we must study statistics, for these are the measure of His purpose.”[16].

Ernest Codman in 1914 commented on the importance of outcomes evaluation: "Every hospital should follow every patient it treats long enough to determine whether the treatment has been successful, and then to inquire ‘if not, why not’ with a view to preventing similar failures in the future."

Prof AM Emmerson in 1995 noted the following: “Without doubt, the greatest improvements have been made by carrying out targeted surveillance with interpretive feedback to clinical staff. This strategy has been shown to decrease infection rates, decrease the need for antibiotics therapy, alleviate morbidity and save on hospital costs”[17]. The following table summarises the history of HCAI surveillance in the UK until 2011.

TABLE 1 : SURVEILLANCE INITIATIVES CONDUCTED IN THE UK

YEAR	INITATIVE	OVERALL HCAI RATES
1944	The concept of having an infection control committee emerges	
1959	Report by an infection control subcommittee on staphylococcal infections pointing to importance of surveillance systems	
1962	Infection control sister /nurse comes into effect	
1980	First prevalence survey done by Meers & Emmerson involving England and Wales[18]	9.2%
1988	*DHSS/PHLS appoint an infection control Doctor and a working infection control group	
1993/94	Second prevalence study conducted by the HIS, the *PHLS and the ICNA involving 157 hospitals across the British Isles[19]	9.0%
1995	The Cooke report is released by E Mary Cooke(director of health services)	
1994-2000	Data in Belfast was collected from January/April each year for a total of seven years[20]	8.0%
2006	English National Point Prevalence Survey[10]	8.2%
2005/06	Third prevalence survey carried out by HIS completed[21]	4.9%
2011	English National Point Prevalence Survey[10]	6.4%

* DHSS-District Health Surveillance Service; PHLS-Public Health Laboratory Service; ICNA-Infection Control Nurses Association: HIS-Hospital Infection Society

2.2 INTERNATIONAL SURVEILLANCE SYSTEMS

There are a number of international surveillance systems monitoring nosocomial infections. The USA has the most comprehensive system. The NNIS system was developed in the early 1970s and is a voluntary reporting system between hospitals and the Centres for Disease Control and Prevention (CDC). There are approximately 300 hospitals reporting to the CDC. All NNIS data is collected using standardized protocols for adult and paediatric ICUs, high-risk nurseries (HRN) and surgical units.

The weakness of the NNIS system is that ascertainment of cases is time-consuming and costly for hospitals. Therefore the NNIS system is best suited for focused surveillance only[22].

In Europe, several countries have set up national or regional networks for the surveillance of nosocomial infections in the 1990s. The Hospitals in Europe Link for Infection Control through Surveillance (HELICS) project was organized in 1994. The objectives of HELICS was to standardize surveillance methods, promote and assist with the development of new networks, to improve the way results were used and to promote the integration of surveillance with routine data collection. Currently 18 countries or regions in Europe have ongoing surveillance activities using HELICS procedures. HELICS targets surveillance in two areas, which are surgical wound infections (SWI) and infections in ICUs[23]. Some countries differ with regards to duration of surveillance. The surveillance of HCAI in the German KISS (Krankenhaus-Infektions-Surveillance-System) network is continuous, while surveillance in France is done over a 3 month period.

In Australia, the Victorian Hospital Acquired Infection Surveillance System (VICNISS) was established in February 2002. The primary objective of VICNISS was to reduce nosocomial infections. The programme is based on the NNIS system with some adaptation to local needs and resources. Larger hospitals were initially included but the programme has now been established in 98% of all public acute hospitals[24].

The contribution of data from sub Saharan Africa is small. A 2011 meta-analysis found that more than 60% of developing countries worldwide had no published data on the burden of HCAI endemically[2]. HCAI in developing countries unfortunately only usually receive public attention when there are epidemics.

TABLE 2: INTERNATIONAL PREVALENCE SURVEYS: COMPARISONS

Country	Study year	Prevalence (%)	Total study patients	Definitions	Reference no
UK	1980	9.0	18,186	HIS	[18]
UK	1993/4	9.2	37,111	HIS	[19]
Germany		3.5	14,996	CDC	[25]
Lithuania	1994	9.2	1772	Own, broad	[26]
Norway	1997	5.4	12,775	Modified CDC	[27]
Spain	1990-94	8.5 to 7.1 over 5 years	119,356	CDC	[28]
Italy	2000	7.84	9467	CDC	[29]
France	1996	6.7	236,334	Modified CDC	[30]
Lebanon	2001	6.8	834	CDC	[31]
Mauritius	1992	4.9	1190	1980 HIS	[32]
Greece	2002	9.3	3925	CDC	[33]
Slovenia	2001	6.4	5628	CDC	[34]
Tunisia	2002	17.9	280	CDC	[35]
Indonesia	2006	7.1	2222	CDC	[36]
Switzerland	1998	11.3	1928	CDC	[37]

HIS Hospital Infection Society

CDC Centres for Disease control

Most first world countries have HCAI prevalence of less than 10% (Table 2) while third world countries/ developing countries tend to have rates greater than 10% going even up to 20%. “The main determinants for a higher HCAI prevalence may be environmental factors, hygiene conditions, infrastructure, equipment, relationship between healthcare

staff and patients, paucity of knowledge and application of basic infection-control measures"[3].

"Surveillance of HCAIs in South Africa (SA) is neglected and poorly resourced. The true burden of HCAIs is unknown, although it is largely accepted that it is greater in the public sector than in the private sector, and probably somewhere in the region of 10 - 20%. However, a figure of 10 - 20% provides a very limited perspective on HCAIs, and if we are to use the scarce resources at our disposal efficiently, more detailed analyses and reporting of HAI rates are required. A systematic review of HCAIs in developing countries over the years 1995 - 2008 revealed only 13 studies from Africa, none of them from SA. The lack of data from SA is an indictment of our healthcare system and raises serious concerns"[38].

2.3 PREDISPOSING FACTORS IN DEVELOPMENT OF HCAI

The chances of microorganisms to manifest into an infection is increased by the following factors (as directly quoted from the source)[39]:

1. Patients already have a medical condition or underlying illness and this can impair their natural defence response against pathogens.
2. Patient wounds obtained through injury or surgery can provide a route of entry for certain pathogens, as can the use of invasive medical devices (such as catheters, drains and tubes).
3. Certain treatments can leave patients vulnerable to infections. Immunosuppressive drugs, antimicrobial treatments and recurrent blood transfusions are all risk factors.

2.4 THE SOCIOECONOMIC BURDEN OF HCAI

TABLE 3: THE SOCIOECONOMIC BURDEN OF HCAI

COUNTRY/DEPT. OF HEALTH	YEAR	ESTIMATED COST/YEAR	REFERENCE NO
ENGLAND (NHS)	2000	GBstg ONE BILLION	[40]
IRELAND DEPT. OF HEALTH	2001	EUROS 11-22,000	[41]
US NATIONAL HEALTH SERVICE	1992	$ 4,500,000	[42]

In a study that took place in 140 hospitals in England, the cost for the additional post-operative Length Of Stay (LOS), ranged from £959 for an abdominal hysterectomy to £6 103 for a limb amputation[43]. "An estimated 320 994 (95% CI; 288 071, 353 916) patients per annum acquire one or more infections which present during the in-patient period, and these infections cost the hospital sector an estimated 930.62 million pounds (95% CI; 780.26 pounds; 1080.97 million pounds) per annum. The results presented represent the gross economic benefits that might accrue if these infections are prevented"[44] In the same study, it was estimated that cost of patients with nosocomial infections was 2.8 times greater than that of uninfected patients with an average of £3 000 ($5 000).

So the costs are substantial and hence the importance of having a good surveillance system to identify trends and take actions.

Other reviews have estimated that HCAI causes annual financial losses of about €7 billion in Europe and about $6.5 billion in the USA, whereas the burden of HCAI in developing countries was even higher[45].

2.5 GENERAL OBJECTIVES OF HCAI SURVEILLANCE[4]

1. To improve awareness of clinical staff and other hospital workers (including administrators) about nosocomial infections and antimicrobial resistance, so they appreciate the need for preventive action.

2. To monitor trends: incidence and distribution of nosocomial infections, prevalence and, where possible, risk-adjusted incidence for intra- and inter-hospital comparisons.
3. To identify the need for new or intensified prevention programmes, and evaluate the impact of prevention measures.
4. To identify possible areas for improvement in patient care, and for further epidemiological studies (i.e. risk factor analysis).

A prevalence survey, using the same methodology and definitions was done in South Africa involving six healthcare-facilities (4 in public sector and 2 in the private sector). The combined prevalence was found to be 9.7%, highest rates were found in the paediatric wards, and urinary tract infections and pneumonias were the predominating HCAIs. This was accounted to the fact that more than half of the public hospital admissions were HIV-related[46]. So the extent of the problem of HCAIs is poorly defined in the South African context, Outbreak responses are GENERALLY REACTIVE, NOT PROACTIVE and who is responsible or accountable for it? Prevalence studies should be done initially for benchmarking and identify high-risk areas, and then periodically repeated for trends.

3. AIMS AND OBJECTIVES

3.1 BROAD OBJECTIVE

To determine the prevalence of the following four groups of nosocomial infections in Kimberley Hospital, a tertiary and academic hospital in the Northern Cape Province of South Africa:

- Bloodstream infections
- Pneumonias
- Urinary tract infections
- Surgical site infections

The above infections are thought to account for 70% to 80% of all the nosocomial infections. Obtaining data can be used to benchmark Kimberley Hospital nationally and internationally, and it can be used to prioritise problems and direct Infection Prevention & control strategies.

3.2 SPECIFIC OBJECTIVES

1. To obtain baseline information on the prevalence of the four HCAI (mentioned above) in health-care units in Kimberley Hospital. This information will be available to guide priority setting in the development of strategy and policy.

2. From the above, where microbiology data is available, to identify the microorganism profile and sensitivity patterns.

3. To guide future strategies and approaches to surveillance of HCAI in the hospital.

4. METHODS

4.1 SETTING AND SCOPE

The study took place in Kimberley General Hospital which is part of the Kimberley Hospital Complex. “The Kimberley Hospital Complex (KHC) is located in Kimberley in the Northern Cape Province of South Africa, and consists of Kimberley General Hospital, West End Psychiatric and TB Hospital (incorporated in 1997), and Kimberley Hospital Rehabilitation Centre (incorporated in 2001). The original Kimberley Hospital dates back to the discovery of diamonds in the late 1800s, and has in recent years experienced many problems in the delivery of quality health services to the Northern Cape, the largest province in South Africa, but the least populated”[47]. The vastness of the province has led to a need for more health facilities, especially in far-lying and hard-to-reach places, to cater to all citizens.

Kimberley Hospital has been categorised as a provincial tertiary hospital (level 3 hospital) with 604 beds serving roughly 96,977 people locally but receives referrals from all over the Northern Cape[48]. Kimberley Hospital is the only tertiary hospital in the Northern Cape and due to the health challenges faced in regional and district hospitals (shortage of staff; limited resources etc.), patients often came to the hospital without referral from other levels of facilities. So it goes to reason that patients that present to Kimberley hospital come from all levels of healthcare…from primary healthcare level to patients requiring quite specialised care. Therefore patients admitted in the hospital can be from different backgrounds and coming with different risk factor profiles making them susceptible to illness. The referrals to Kimberley Hospital come from all the surrounding primary healthcare centres as well as other areas in the Northern Cape such as Prieska (238 km away), Haartswater (117 km away), Kuruman (236 km away), Upington (410 km away), Pietrusburg (84 km away), Douglas (114 km away), Barkley West (35 km away), Posmansburg (195 km away), Calvinia (648 km away), Springbok (775 km away), Kathu (281 km away) and Keimoes(463 km away). Out of the total 604 beds, a total of 488 beds were chosen to be surveyed from the following selected wards as shown in table 4.

TABLE 4: WARDS SURVEYED DURING THE STUDY.

DISCIPLINE: NUMBER OF BEDS	NAME OF WARD	BED CAPACITY
GENERAL SURGERY: 134 beds	***A3***	34
	A4	34
	L3	40
	K2	26
ORTHOPAEDICS: 61 beds	***A1***	29
	A2	32
INTERNAL MEDICINE: 125 beds	***M1***	42
	M2	42
	L2	41
PAEDIATRICS: 111	***K3***	43
	A5	22
	L1	46
OPTHALMOLOGY: 24	***X1***	24
OBSTETRICS/GYNAECOLOGY: 33	***L5***	33
TOTAL BED CAPACITY		488

These beds represented the major disciplines offered in the hospitals and were the wards with the most number of beds. Intensive care units were not considered as there were only a total of 10 adult ICU beds and 6 paeds ICU beds in the hospital with low occupancy during the period of survey and due to logistical difficulty to get convenient timings amicable to the staff members to conduct the survey.

4.2 STUDY DESIGN

The study was designed as a point prevalence survey. This meant that, in an ideal world, the information should be completed for all the hospital wards on a single day. This is probably not feasible even for the smallest centres; therefore at least one ward was completed on a single day, with all the other wards having been completed during the period from February 2016 and March 2016.

Data recovered for each patient aimed to identify an active HCAI and/or the use of antimicrobial drugs at the time of the survey. Data was collected using the "data form" subdivided in three parts: the first one dedicated to demographic and clinical data, the second one describing antimicrobials use and the last one regarding HCAI.

Active health care–associated infections were defined as infections not present or incubating on admission to Kimberley hospital that met the CDC NHSN surveillance definition criteria, with signs or symptoms of infection present on the survey date or with antimicrobial therapy still being given on the survey date.

4.3 STUDY POPULATION AND SAMPLING

Inpatients of any age in participating wards in the hospital were eligible for inclusion. Patients in outpatient areas, emergency departments, burns unit, psychiatry, ICUs, short stay wards and rehabilitation units were excluded. All eligible patients present in the selected ward on the day of the survey were included, provided they were willing, and had given informed consent. One ward was completed in a day until all the selected wards were completed.

The population was divided into paediatric and adult groups. Age was treated as a categorical variable and distributed into the following age groups: <1 month (neonate), 0 to 5 years(inclusive of the <1 month group), 6-15 years, 16-30 years, 31-50 years, 51-70 years, and 70+ years.

4.4 MEASUREMENT TOOLS

A questionnaire was designed in keeping with standardised surveillance questions to facilitate the task of data collection. It was contained on both sides of an A4 sheet and illustrated in Appendix 2 and 3. The questionnaire consisted of four sections. The first section included the survey date and hospital details; the second dealt with demographic details; the third with HCAI-related risk factors and the final section recorded details of the HCAIs if identified. If a microorganism was isolated, antibiograms forms were filled (Appendix 4 & 5)

Each sheet was uniquely serialised [designed using an optical mark reader (OMR) system (Formic 4; Formic Ltd, London, UK)] and was filled in using black/blue ballpoint pens. Data items were completed by placing an 'X' within a box or writing numeral(s) in appropriate boxes. A number of questions required numerical codes (Appendices 6, 7 & 10). If patient had no infection, only one side needed completion. If an HCAI was actively present, then page two and further relevant pages were filled.

5. PILOT STUDY

A pilot study was conducted on the 4th of June 2015 with 2 data collectors and involving a single surgical ward. This was to test the tool and for validation purposes (explained later). A total of 26 patients were surveyed of whom 15/26 (58%) patients were female, age ranged from 16 years to 77 years and the overall prevalence was 15.4% (4/26). Two of the patients had a urinary catheter in situ and 15/26 (58%) patients had a PVC present. Seven of the patients were on antimicrobial treatment of which 57% were on empirical treatment. Of those on treatment 5/7 (71%) were on Augmentin. The prevalence of SSI was 7.7%, UTI and Pneumonia were 3.9% each and there were no BSI present. No antibiograms were filled. These results should be taken into context considering the ward surveyed was a surgical ward. Retrospectively the Main study findings for this particular ward was very similar to the Pilot study findings.

6. DATA MANAGEMENT AND ANALYSIS

6.1 HOW?

Data was gathered from a number of sources available in the ward at the time of survey. These included: nursing notes, medical notes, temperature charts, drug charts, radiology reports, surgical notes, laboratory reports and other relevant charts, e.g. care plans. Data collected for each patient included: age, sex, date of patient admission to the hospital, current disease diagnosis and specialty of the patient's care, presence of invasive devices and whether the patient had one or more active HCAIs and/or received antimicrobial treatment. For HCAIs, infection site, date of onset, and pathogens were included.

The importance of routine bedside observation was emphasized, especially when doubts arose about the presence of some risk factors such as the presence of vascular or urinary catheters. This included viewing of x-rays, when it was available, for supportive evidence for the diagnosis (e.g. in the case of nosocomial pneumonia). The researcher did not interfere in the ordering of any tests; only document the information available at the bedside.

Each bed was surveyed just once. Those beds that were not occupied at the time of the survey were considered already surveyed. Only the bed allocated to a patient that transiently was not in the ward, at the moment of the survey (because was undergoing a diagnostic test or any other procedure) was re-surveyed if patient arrived before the ward was completed.

6.2 WHEN?

Data was collected during the months of February and March 2016. It was collected during the week days (Monday to Friday) with permission from the staff as well as the Heads of each of the units. Weekends were excluded from data collection due to lack of availability of data collectors as well as to avoid interference with the function of the ward with minimal staff present.

6.3 WHO COLLECTED THE DATA?

The data collection was done by the principal investigator (Dr A. Nair), a Family Medicine specialist at Kimberley hospital (Dr T. Habib) as well as two infection control sisters (Sisters Radebe and Langeveld) working at the hospital. The principal investigator was trained in the use of Centers for Disease Control and Prevention National Nosocomial Infection Surveillance Systems (CDC NNIS) definitions at Belfast in Northern Ireland and was also a founding member in the establishment of the Michael Emmerson/ South African HCAI surveillance centre (SA-HISC) at the University of the Witwatersrand in Gauteng, South Africa as indicated in the following logo for the centre[49].

The principal investigator then shared this training with the other members of the data collection teams regarding the various aspects of the data collection by means of group discussions as well as practical illustrations in the filling of the data collection sheet.

6.4 VALIDATION

Internal Validation exercises were conducted during the pilot study by comparing the filling of the questionnaires by 2 independent data collectors surveying the same patients in the same ward at the same time. Then assessment was done to assess the inter-investigator variability in the collection of data as well as determining whether patients fulfilled the criteria for an HCAI. This validated the uniformity of data collection by the investigators prior to the start of the actual data collection.

6.5 CONFIDENTIALITY & ETHICAL CONSIDERATIONS

Each participant's records was captured on a data sheet, which was serialised by a unique number (Appendix 3). No personal patient identification information was captured on the data sheet. All records were confidentially kept and handled. Databases were password protected in the main software system. The data collection forms were kept under lock and key by the investigator in a lockable cupboard.

Permission to do the research was received from the Head of Clinical Management at Kimberley hospital on 11/09/2014 (Appendix 14). Consent /Approval for the study was received from the Human Research Ethics Committee at the University of Free State, Bloemfontein on 20/10/2014 (Appendix 12). Approval was received from the Provincial Health Research and Ethics Committee (PHREC) from the Northern Cape Department of Health (NCDOH) on 28/04/2015 (Appendix 13).

Informed consent was obtained from study participants and patients who did not wish to participate were not compromised in any way (Appendix 1). The experience after conducting this survey was that we did not encounter any patient that refused participation once the purpose and benefits of the study was clearly explained to the participants.

6.6 DATA ANALYSIS

The data sheets, once completed, were sent to the Michael Emmerson Surveillance unit based at Wits University in Johannesburg where they were run through an optical

scanner that retrieved the data into a formic system software. "Optical scanning technology has the advantages of reducing the costs of clerical time, automated data entry, and an error rate of < 0.2 errors/1000 responses"[1]. The data was then exported into Microsoft Excel and sent back to the principal investigator electronically with password protection that limited editing. The data was cleaned and handed over to the biostatistician based at the University of the Free State.

The data was further analysed using SPSS version 23.0 (IBM, Armonk, New York, USA). The prevalence of HCAIs was reported as the percentage of patients with at least one active HCAI among the total number of patients. The prevalence of antimicrobial use was reported as the percentage of patients receiving at least one antimicrobial agent among the total number of patients. Odds ratio with 95% confidence intervals as well as p-values were calculated where relevant. The prevalence were calculated as follows:

Hospital HCAI prevalence:

$$\frac{Total\ no.of\ patients\ with\ HCAI\ \ surveyed\ in\ the\ hospital\ at\ point\ in\ time}{No.of\ hospitalized\ patients\ in\ the\ hospital\ at\ point\ in\ time} \text{ X } 100$$

Ward HCAI prevalence:

$$\frac{\boldsymbol{No.of\ patient\ with\ HCAI\ in\ the\ ward\ on\ the\ day\ of\ survey}}{\boldsymbol{No.of\ hospitalized\ patients\ in\ the\ ward\ on\ the\ day\ of\ survey}} \text{ X } 100$$

Department / discipline HCAI prevalence:

$$\frac{\boldsymbol{No.of\ patient\ with\ HCAI\ in\ the\ department\ on\ the\ day\ of\ survey}}{\boldsymbol{No.of\ hospitalized\ patients\ in\ the\ department\ on\ the\ day\ of\ survey}} \text{ X } 100$$

The final analysis and report would be dessimated to the University of the Free State, Kimberley Hospital management, SA-HISC as well as the NCDOH.

7. RESULTS AND FINDINGS

Table 5: HCAI PREVALENCE: PATIENT CHARACTERISTICS AND CONSULTANT SPECIALITY GROUPS

	No of Patients	No of patients with HCAI	Prevalence 0f HCAI (%)	OR(95% CI)		p-value
All patients	326	25	**7.67**			
Sex						0.886
Male	152	12	7.89	1.06 (0.46-2.40)		
Female	174	13	7.47	1		
Age group(yrs)						0.452
0 to 5	88	5	5.68	1.56 (0.17-14.02)		
6 - 15	14	1	7.14	2.00 (0.11-34.59)		
16 - 30	44	3	6.81	1.90 (0.18-19.28)		
31 - 50	75	10	13.3	4.00 (0.48-32.84)		
51 - 70	78	5	6.41	1.66 (0.18-14.92)		
>70	27	1	3.70	1		
Consultant specialty group						0.538
GENERAL MEDICINE	66	3	4.54	1		
GENERAL SURGERY	33	5	15.15	3.75 (0.83-16.78)		
ORTHOPAEDICS	34	4	11.76	2.80 (0.58-13.30)		
GYNAECOLOGY	24	3	12.50	3.00 (0.56-16.01)		
MAXILO-FACIAL	6	1	16.60	4.20 (0.36-48.16)		
BURN	9	1	11.10	2.65 (0.24-28.35)		
PAEDIATRICS	98	6	6.12	1.36 (0.33-5.68)		

A total of 326 patients were surveyed in the study. Males comprised 152 (47%) of the patients while females comprised 174 (53%) of the patients. The age range for the patients was from <28 days to 91 years. 41 (13%) patients were less than 1 month of age (table 19). 25 (7.67%) out of the 326 patients had an HCAI. One patient had two healthcare infections, so the total burden of HAIs was 26.

SSIs represented the commonest type of HCAI (15 out of 26), followed by UTIs (5 out of 26), pneumonia (3 out of 26), and BSI (3 out of 26) (table 5). The overall bed occupancy of the wards at the time of survey was 67% (326/488). The highest bed occupancy was in the Paediatric wards at 88% and the lowest occupancy at the ophthalmology wards at 21%. Patients with Urinary catheters and peripheral vascular catheters had higher infection rates than those without these risk factors. 42% of patients surveyed were on at least one form of microbial cover of which 41% of those patients were on empirical cover and 39 % were on cover for specific infections. Ward

A4 (General Surgery) and Ward L5 (Obs/Gynae) were the 2 areas identified with the highest % of HCAI (per number of patients in the ward) at 19% and 18.5% respectively.

Table 4 shows that there was a slightly higher number of females compared to males in the study group (174 vs 152) but the prevalence of HCAI between the 2 groups were similar. The prevalence of infection was highest in the 31 year to 50 year age group at 13.3%. A few of the departments had less than 10 patients and hence their rates must be taken in context to that. Among clinical disciplines that had more than 20 patients admitted, the rate of infection in relation to patients admitted to that specific discipline, was highest with Surgery and Gynaecology at 15.15% and 12.5% respectively.

Table 6: PREVALENCE RATES ACCORDING TO TYPE OF HCAI

Infection type	No. of infections	Prevalence of HCAI(%) by infection type	Percentage of total HCAIs
Surgical site	15	4.60	57.70
Pneumonia	3	0.92	11.54
Primary bloodstream	3	0.92	11.54
Urinary tract	5	1.53	19.23

Table 5 illustrates that by infection type, the highest prevalence was for SSI at 4.60% followed by UTI at 1.53% and PBSI and Pneumonia both sitting at 0.92%. This is further illustrated by figure 1 which shows the percentages among the total identified HCAI infections.

Figure 1: HCAI PREVALENCE ACCORDING TO SUBTYPE OF INFECTION

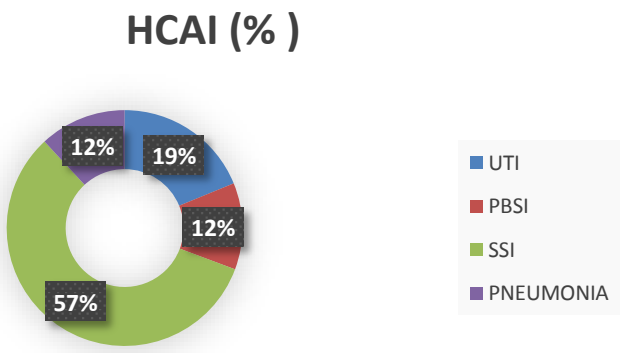


Table 7: DEVICE ASSOCIATED INFECTIONS (DAI)

Infection type	No of infections	No of DAIs	Prevalence of DAIs	95% CI	% 0f DAIs
Urinary tract	5	2	0.61		40.00
Pneumonia	3	0	0.00		0.00
Primary bloodstream	3	2	0.61		66.67

No central vascular catheter (CVC)-related infection were identified. Sixty-seven percent of patients with BSI had a vascular access device (peripheral) in the 48 hours prior to the onset of infection. Forty percent of patients with UTI had a urinary catheter present within seven days prior to the onset of infection. (Table 6).

Table 8: RISK FACTORS FOR HCAI AMONG ALL PATIENTS

Risk factor	Prevalence of HCAI (%) in patients with risk factor	Prevalence of HCAI (%) in patients without risk factor	OR (95% CI)	P-value
URINARY CATHETER	14.70 (5 / 34)	6.84 (20/292)	2.34 (0.81-6.71)	0.103
PERIPHERAL VASCULAR CATHETER	9.64 (16/166)	5.63 (9/160)	1.79 (0.76-4.17)	0.173
NEUTROPENIA	9.09 (1/11)	7.62 (24/315)	1.21 (0.14-9.87)	0.857
DIABETES	6.52 (3/46)	7.85 (22/280)	0.81 (0.23-2.85)	0.752
SURGERY	16.47 (14/85)	4.56 (11/241)	4.12 (1.79-9.48)	0.000
STEROIDS	3.23 (1/31)	8.14 (24/295)	0.37 (0.04-2.88)	0.328
BLOOD TRANSFUSION	4.00 (1/25)	7.97 (24/301)	0.48 (0.06-3.71)	0.473
IMMUNODEFICIENCY	8.10 (6/74)	7.53 (19/252)	1.08 (0.41-2.81)	0.872

Table 7 points out that some risk factors clearly seem to be associated with a higher prevalence of HCAI such as urinary catheters, PVCs, and surgery. Interestingly in some cases the HCAI prevalence seems to be more without the specific risk factor as is the case with steroids and blood transfusions.

Table 9: COMPARITIVE HCAI RATES WITH SA, ARGENTINA, IRELAND, WALES AND ENGLAND

HCAI prevalence (%)	Kimberley hospital	Gauteng South Africa	Argentina	Republic of Ireland	Northern Ireland	Wales	England
Overall	7.67	9.73	11.30	4.87	5.43	6.35	8.19
Primary bloodstream infection	0.92	5.01	1.46	0.49	0.38	0.56	0.62
Pneumonia	0.92	2.88	3.32	0.86	1.29	0.68	1.27
SSI-surgical patients only	4.60	3.00	10.19	4.56	3.69	4.56	4.65
Urinary tract infection	1.53	1.53	3.13	1.10	1.84	1.08	1.80

The overall prevalence rate at Kimberley hospital was better than expected and comparable to some of the developed counties above but still higher than the Northern Ireland and Republic of Ireland rates. Argentina who also did their first prevalence survey using the same methodology had a higher rate but was inclusive of many hospitals with varying HCAI prevalence. Of interest is the trend that Kimberley hospital shows along with the majority of studies (shown in table 8) in that SSIs were the most prominent of the HCAIs except in the case of the study done at Gauteng, South Africa where PBIs were significantly more prevalent than the other infections. This can be explained by the fact that the hospitals involved there included 2 academic hospitals and 2 large private hospitals as well. The use of CVCs and other invasive procedures were more common and may have contributed to the high rate of PBI[49].

Table 10: PREVALENCE OF SSI BY SUBTYPE

SURGICAL SITE INFECTIONS		
SSI	NUMBER	% TO TOTAL INFECTIONS
SUPERFICIAL INCISIONAL	10	**38.5**
DEEP INCISIONAL	4	15.4
ORGAN/SPACE	1	3.8
TOTAL	15	**57.7**

Table 9 demonstrates that 67% (10 out of 15) of the SSIs were of the superficial incisional subtype followed by 4 deep space and 1 organ space subtypes.

Table 11: PREVALENCE OF BLOOD STREAM INFECTIONS BY SUBTYPE

BLOOD STREAM INFECTIONS		
BSI	NUMBER	% TO TOTAL INFECTIONS
PRIMARY BSI	3	**11.5**
SECONDARY BSI	0	0.00
TOTAL	3	**11.5**

There were 3 PBIs that were seen but no secondary BSIs were prevalent.

Table 12: PREVALENCE OF UTI BY SUBTYPE

URINARY TRACT INFECTIONS		
UTI	NUMBER	% TO TOTAL INFECTIONS
UTI-A: MICROBIOLOGICALLY CONFIRMED SYMPTOMATIC UTI	3	11.5
UTI-B: NOT MICROBIOLOGICALLY CONFIRMED SYMPTOMATIC UTI	2	7.7
TOTAL	5	19.2

Three out of the five symptomatic UTIs were microbiologically confirmed and 3 different microorganisms were identified being *Candida albicans, Klebsiella pneumoniae* and *Enterobacter cloacae*

Table 13: PREVALENCE OF RESPIRATORY TRACT INFECTION BY SUBTYPE

RESPIRATORY TRACT INFECTIONS		
PNEUMONIA (PN)	NUMBER	% TO TOTAL INFECTIONS
PN 1	1	3.8
PN 2	0	0.0
PN 3	0	0.0
PN 4	0	0.0
PN 5	2	7.7
TOTAL	3	**11.5**

There were only 3 pneumonias present and they were diagnosed on clinical grounds and x-ray changes with no microbiological confirmations. As ICUs were excluded, Ventilator Associated Pneumonias (VAPs) were not part of the picture which are the main contributors to pneumonia in other studies.

Table 14: PATIENT NUMBERS AND BED OCCUPANCY PER WARD OF THE SURVEYED PATIENTS

WARD						
NO	WARD NAME	TYPE OF WARD	PATIENT NO	BED CAPACITY	BED OCCUPANCY (%)	% FROM TOTAL
1	A3	GENERAL SURGERY	30	34	88.24	9.20
2	A4	GENERAL SURGERY	21	34	72.41	6.44
3	L3	GENERAL SURGERY	18	40	45.00	5.52
4	K2	GENERAL SURGERY	9	26	34.62	2.76
5	S1	GENERAL SURGERY	RENOVATION AT TIME OF SURVEY			
6	A1	ORTHOPAEDICS	21	29	72.41	6.44
7	A2	ORTHOPAEDICS	24	32	75.00	7.36
8	M1	INTERNAL MEDICINE	28	42	66.67	8.59
9	M2	INTERNAL MEDICINE	16	42	38.10	4.90
10	L2	INTERNAL MEDICINE	29	41	70.73	8.90
11	K3	PAEDIATRICS	**45**	43	**104.65 (TWINS)**	**13.80**
12	A5	PAEDIATRICS	17	22	77.27	5.21
13	L1	PAEDIATRICS	36	46	78.26	11.04
14	X1	OPTHALMOLOGY	**5**	24	**20.83**	**1.53**
15	L5	GYNAECOLOGY	27	33	81.81	8.28
TOTAL			326	488	**66.80**	100
GENERAL SURGERY			78	134	58.20	23.93
ORTHOPAEDICS			45	61	73.77	13.80
INTERNAL MEDICINE			73	125	58.40	22.40
PAEDIATRICS			**98**	111	**88.29**	**30.06**
OPTHALMOLOGY			**5**	24	**20.83**	**1.53**
GYNAECOLOGY			27	33	81.81	8.28

Wards A3 (general surgery), ward K3 (paediatrics) and ward L5 (gynaecology) were the only wards to have >80% bed occupancy during the survey while X1 (ophthalmology) and K2 (general surgery) had the lowest bed occupancy at 21% and 35% respectively. Overall the best bed occupancy among the disciplines was with Paediatrics (88%) and Gynaecology (82%). Of the total 488 beds that were surveyed, only 326 were occupied by patients giving an overall bed occupancy of 67%. The information is further illustrated in figure 2 and figure 3. It is evident that paediatrics and general surgery combined made up almost 55% of the total number of patients surveyed.

Figure 2: PATIENT DISTRIBUTION AMONG THE SPECIALITIES AT TIME OF SURVEY

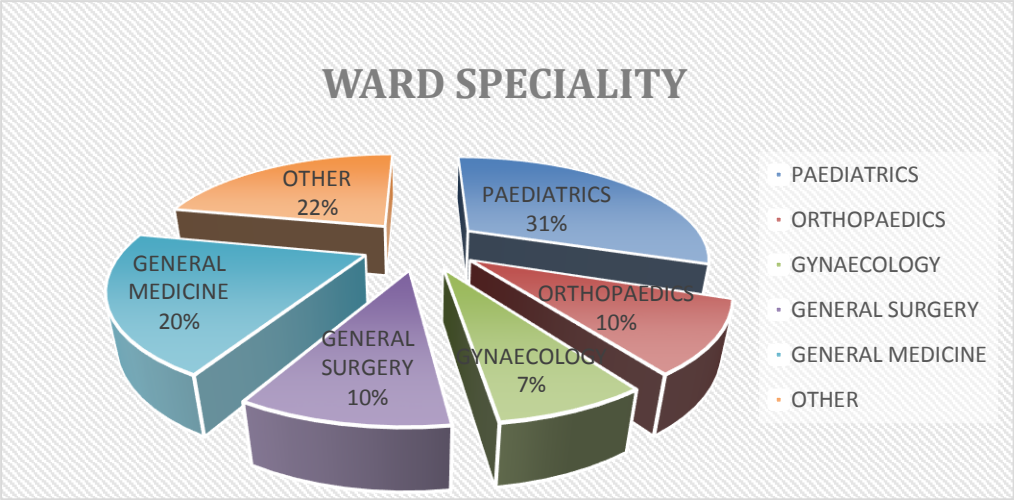


Figure 3: PATIENT NUMBERS AND BED OCCUPANCY IN THE MOST OCCUPIED WARD SPECIALITIES

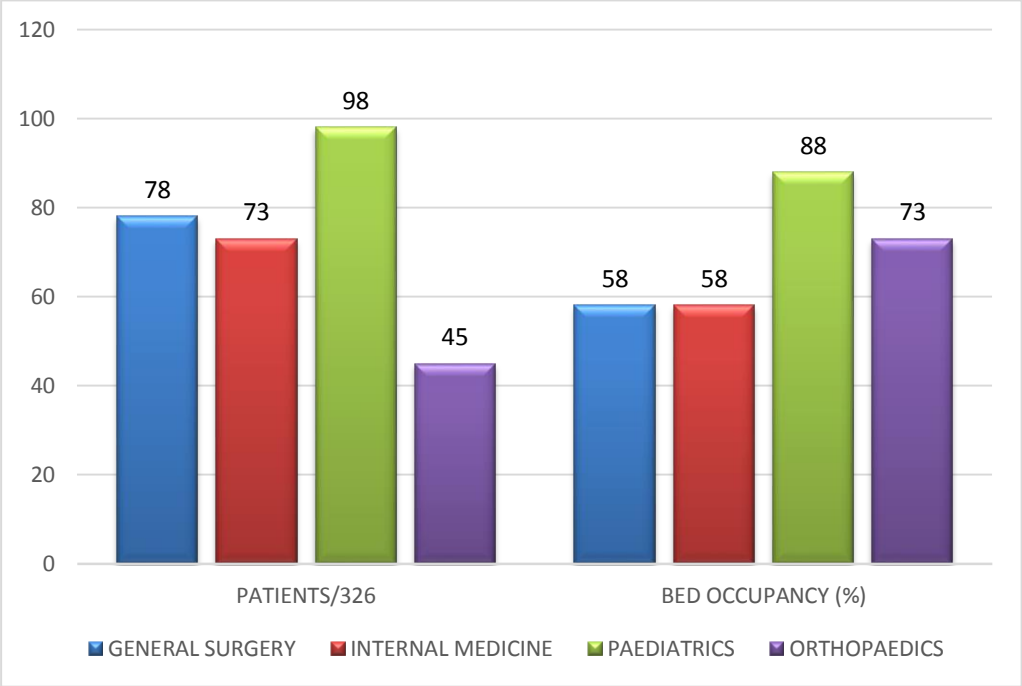


Table 15: HCAI PREVALENCE PER WARD SURVEYED

WARD VS INFECTIONS						
NO	WARD NAME	TYPE OF WARD	INFECTIONS (NO)	NO OF PATIENTS IN THE WARD	% PER NO OF PATIENTS	% FROM TOTAL INFECTIONS
1	A3	GENERAL SURGERY	2	30	6.67	0.61
2	A4	GENERAL SURGERY	1	21	**4.76**	0.31
3	L3	GENERAL SURGERY	2	18	11.11	0.61
4	K2	GENERAL SURGERY	1	9	11.11	0.61
6	A1	ORTHOPAEDICS	3	21	14.28	0.92
7	A2	ORTHOPAEDICS	4	24	16.67	1.22
8	M1	INTERNAL MEDICINE	0	28	0.00	0.00
9	M2	INTERNAL MEDICINE	2	**16**	**12.5**	0.61
10	L2	INTERNAL MEDICINE	1	29	3.45	0.61
11	K3	PAEDIATRICS	3	45	6.67	0.92
12	A5	PAEDIATRICS	0	**17**	0.00	0.00
13	L1	PAEDIATRICS	3	36	8.33	0.92
14	X1	OPTHALMOLOGY	0	5	0.00	0.00
15	L5	GYNAECOLOGY	3	27	**11.11**	0.92

In terms of the number of patients present in each ward at the time of survey, the highest HCAI prevalence was seen in wards A2 and A1 (orthopaedics) [16.67% and 14.28%]. M2 (internal medicine) followed at 12.5% and then 3 wards (L3, K2 as well as L5) each had prevalence of 11.1%. The high rates found in the orthopaedic wards may be in keeping with the finding of SSIs being the most prominent HCAI in Kimberley hospital. The above mentioned findings is further illustrated with figure 4 below:

Figure 4: HCAI PREVALENCE PER INDIVIDUAL WARD SURVEYED

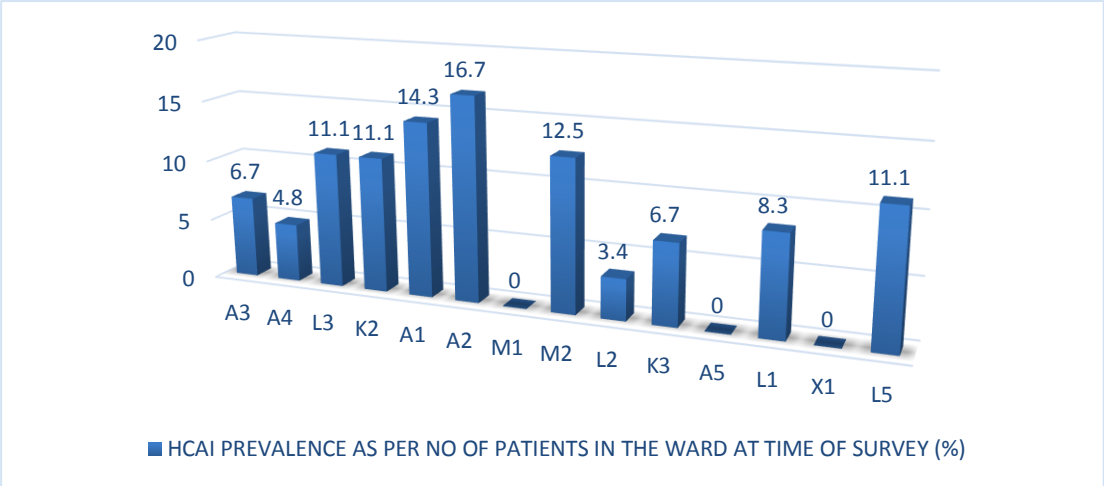


Table 16: DISTRIBUTION OF PATIENTS BY GENDER

GENDER		
SEX	TOTAL NUMBER	%
FEMALE	174	**53.37**
MALE	152	**46.63**
ALL	326	100

Table 17: PREVALENCE RATE OF HCAI BY GENDER

GENDER VS INFECTIONS		
GENDER	TOTAL NO OF INFECTIONS	% FROM NUMBER OF PATIENTS
FEMALE (174)	13 (52%)	**7.5**
MALE (152)	12 (48%)	**7.9**
TOTAL	25 (100%)	**15.4**

The prevalence rate of infections were similar between males and females and did not seem to be contributing factor (tables 15 & 16)

Table 18: DISTRIBUTION OF PATIENTS BY AGE GROUP

AGE		
AGE GROUP(YRS)	NO OF PATIENTS(N)	%
0 - 5	**88**	**27**
6 - 15	14	4
16 - 30	44	13
31 – 50	75	23
51 – 70	**78**	**24**
>70	27	8
ALL	326	100.00

Table 19: PREVALENCE RATE OF HCAI PER AGE GROUP

AGE GROUP(YRS)	PATIENTS WITH HCAI (N)	TOTAL PATIENTS (N)	% OF INFECTION PER PATIENT NUMBER	% FROM TOTAL INFECTIONS
0 - 5	5	88	5.7	1.53
6 - 15	1	14	**7.1**	0.31
16 - 30	3	44	6.8	0.92
31 – 50	10	75	**13.3**	3.10
51 – 70	5	78	6.4	1.53
>70	1	27	3.7	0.31
ALL	25	326		7.7

As per Tables 17 and 18 above, 88/326 patients were below the age of 5 years but the overall prevalence rate was low at 1.53%. The highest HCAI prevalence was in the age group of 31 – 50 years at 3.10% with 75/326 patients surveyed belonging to this group. The other extreme of age being the >70 years had a low prevalence rate of 0.31% although only 27/326 patients surveyed belonged to this group. Figure 5 below looked at absolute numbers of patients in each age groups differentiating them into those who had HCAI infection and those who did not have infection.

Figure 5: NUMBER OF INFECTIONS SEEN IN THE DIFFERENT AGE CATEGORIES

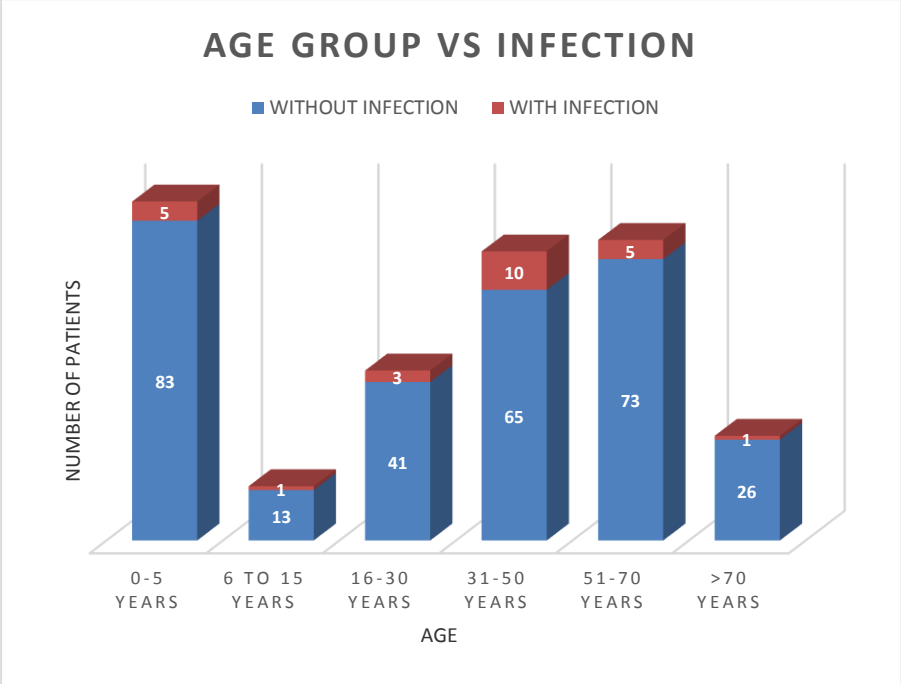


Table 20: HCAI PREVALENCE IN PATIENTS LESS THAN 1 MONTH OF AGE

measure		Treatment			total
		No treatment	Empirical treatment	Specific treatment	
HCAI	No	30	8	0	38
	Yes	0	2	1	3
Total		30	10	1	41

The less than 1 month old is a vulnerable group when it comes to acquiring HCAI infections and 41/326 (13%) patients surveyed belonged to this group. The HCAI prevalence in this specific age group was 7.31 (3/41) which was in keeping with the overall Prevalence rate for the hospital. But as table 20 illustrates, the gestational age at birth for these children ranged from 27 weeks to 40 weeks and the birth weights were variable from 850 grams to 3580 grams making those with lower end of each category more susceptible to pick up HCAIs in the ward.

Table 21: BIRTH WEIGHT AND GESTATIONAL AGE IN PATIENTS LESS THAN 1 MONTH OF AGE

MEASURES	GESTATIONAL AGE (WEEKS)	BIRTH WEIGHT (grams)
Mean	32.76	1578.81
Standard deviation	3.55	654.14
Minimum	27.00	850.00
Maximum	40.00	3580.00

Table 22: PRESENCE OF RISK FACTORS IN THE SURVEYED PATIENTS

RISK FACTORS		
RISK FACTOR	NO OF PATIENTS	% FROM TOTAL
URINARY CATHETER	34	**10.43**
PERIPHERAL VASCULAR CATHETER	166	**50.92**
CENTRAL INTRAVASCULAR CATHETER	5	1.53
MECHANICAL VENTILATION	1	0.30
NEUTROPENIA	11	3.37
DIABETES	46	**14.11**
SURGERY	85	**26.07**
STEROIDS	31	**9.50**
BLOOD TRANSFUSION	25	7.66
CHEMOTHERAPY/CYTOTOXIC	7	2.15
IMMUNODEFICIENCY	74	**22.70**
PARENTERAL NUTRITION	9	2.76

As can be expected, around half of the patients admitted (166/326) were admitted with a PVC inserted and 14% of patients were diabetic and 23% of patients had some form of immunodeficiency. 85/326 (26%) patients had surgery after admission into the hospital and 10% of patients had a urinary catheter in situ at the time of the survey. As

ICUs were excluded from the study, very few patients were on mechanical ventilation (2%), had CVPs in situ (2%) and were on parental nutrition (3%).

Figure 6: RISK FACTORS IDENTIFIED AMONG THE SURVEYED PATIENTS IN %

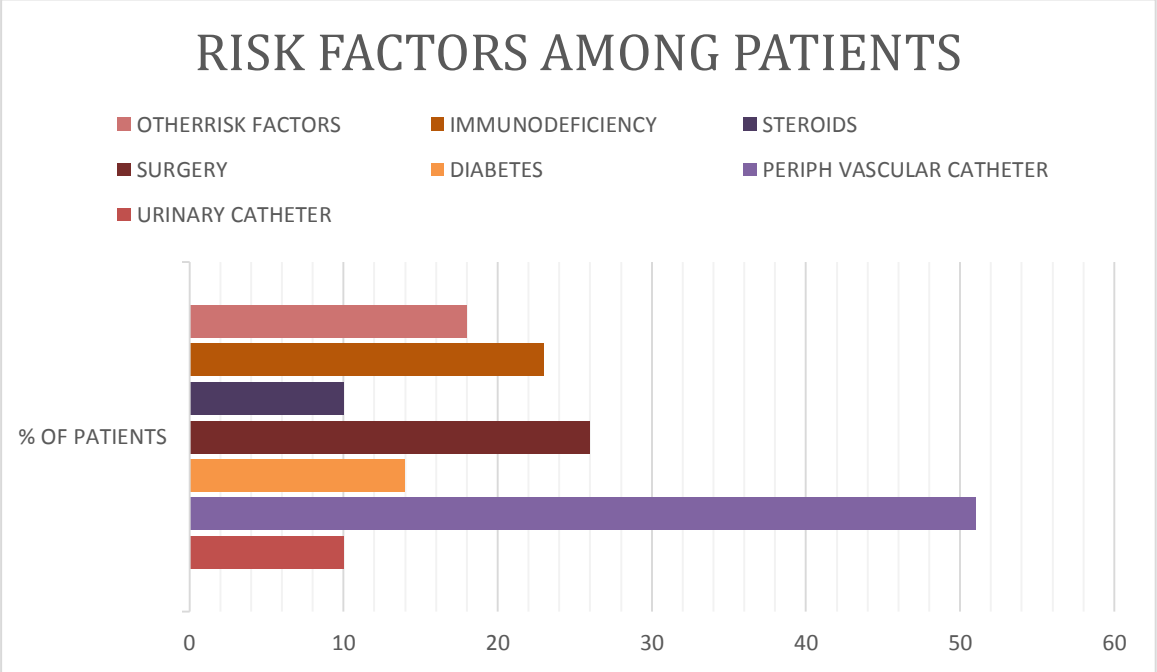
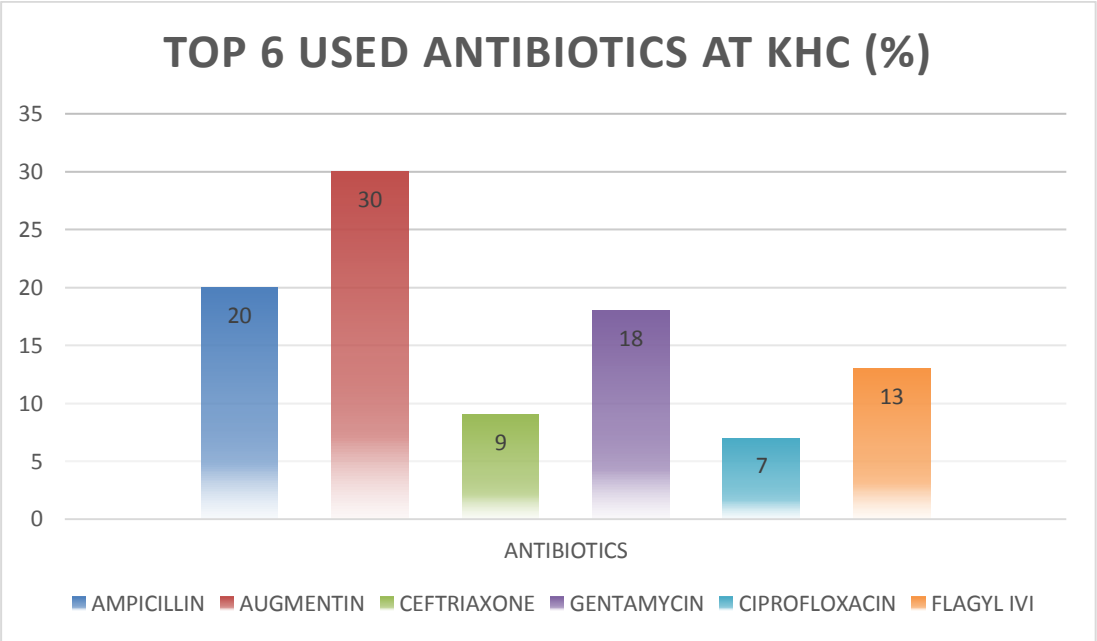


Table 23: PREVALENCE OF INDIVIDUAL INFECTIONS VS RISK FACTORS

RISK FACTORS vs INFECTIONS					
RISK FACTOR	SSI	UTI (5)	BSI (3)	LRTI (3)	TOTAL (25)
URINARY CATHETER (34)	3	2	0	0	5
PERIPHERAL VASCULAR CATHETER (166)	9	3	2	2	16
CENTRAL INTRAVASCULAR CATHETER (5)	0	0	0	0	0
MECHANICAL VENTILATION (1)	0	0	0	0	0
NEUTROPENIA (11)	1	0	0	0	1
DIABETES (46)	3	0	0	0	3
SURGERY (85)	14	0	0	0	14
STEROIDS (31)	0	1	0	0	1
BLOOD TRANSFUSION (25)	1	0	0	0	1
CHEMOTHERAPY/CYTOTOXIC (7)	0	0	0	0	0
IMMUNODEFICIENCY (74)	4	0	1	1	6
PARENTERAL NUTRITION (9)	0	0	0	0	0

Among the patients who had HCAIs, 64% had a PVC inserted, 20% had a urinary catheter in situ, 23% were immunodeficient and 56% were post-surgery. These risk factors were reflective of the HCAI types that had the highest prevalence (57% SSIs and 19% UTI)

Figure 7: MOST COMMON ANTIBIOTICS PRESCRIBED TO THE SURVEYED PATIENTS



Overall, 137 (42%) out of 326 of the surveyed patients were prescribed one or more antimicrobials. 41 of these patients were on Augmentin (30%). This was followed by Ampicillin, Gentamycin and Flagyl.

Table 24: RESISTANCE AMONG ANTIBIOTIC GROUPS IN MICROBIOLOGICALLY IDENTIFIED HCAI'S

TOP 3 RESISTANT ANTIBIOTIC GROUPS			
ANTIBIOTIC GROUP	**RESISTANT ORGANISMS**	**MICROBIOLOGICALLY IDENTIFIED HCAIS**	**%**
PENICILLINS	**6**	**11**	**54.55**
CEPHALOSPORINS	**4**	**11**	**36.36**
AMINOGLYCOSIDES	**3**	**11**	**27.27**

A total of 11 organisms were isolated among the patients who had an HCAI present and had specimens sent off for microbiological evaluation. Among these isolated organisms, 55% (6/11) were resistant to Penicillins, 36% (4/11) were resistant to Cephalosporins and 27% (3/11) were resistant to Aminoglycosides. The most prevalent microorganisms were *Klebsiella pneumoniae* (36%) followed by *Pseudomonas aeruginosa* (18%) (Table 24). Seven out of the eleven microorganisms were isolated from patients who had an SSI present with the above 2 above mentioned microorganisms being the dominant ones.

Table 25: MICROORGANISM PROFILE AND ANTIBIOGRAM OF IDENTIFIED MICROORGANISMS

MICROORGANISM PROFILE						
CODE	PATHOGEN NAME	INFECTION TYPE	INFECTION SUBTYPE	SENSITIVE	RESISTANT	TREATMENT PATIENT IS ON
STAAUR	STAPH AUREUS	SSI	SUPERFICIAL	TRIMETHOPRIM **VANCOMYCIN**	AZITHROMYCIN CIPROFLOXACIN CLINDAMYCIN CLOXACILLIN ERYTHROMYCIN PENICILLIN	**VANCOMYCIN** (IV)
PSEAER	PSEUDO AEROGENISA	SSI	SUPERFICIAL	CEFTAZIDIME **CIPROFLOXACIN** GENTAMYCIN IMIPENEM MEROPENEM	PIP-TAZ TRIMETHOPRIM	**CIPROFLOXACIN**
CANALB	CANDIDA ALBICANS	UTI	SYMPT UTI	NO INFO GIVEN	NO INFO GIVEN	FLUCONAZOLE
KLEPNE	KLEBS PNEUMO	UTI	SYMPT UTI	CEFOTAXIME CEFTRIAXONE **CEFUROXIME** CIPROFLOXACIN AUGMENTIN GENTAMYCIN	AMPICILLIN COTRIMOXAZOLE	**CEFUROXIME**
ACIBAU	ACINETOBACTER BAUMANNI	SSI	DEEP	AMIKACIN COLISTIN IMIPENEM MEROPENEM TOBRAMYCIN	CEFTAZIDIME CIPROFLOXACIN GENTAMYCIN	**ERTAPENEM**
PSEAER	PSEUDO AEROGENISA	SSI	SUPERFICIAL	AMIKACIN CIPROFLOXACIN **IMIPENEM** MEROPENEM PIP-TAZ	CEFTAZIDIME COTRIMOXAZOLE	**IMIPENEM**
KLEPNE	KLEBS PNEUMO	BSI	PRIMARY	AMIKACIN **CIPROFLOXACIN** ERTAPENEM IMIPENEM MEROPENEM	AMOXICILLIN AMPICILLIN CEFTAZIDINE CEFTRIAXONE CEFUROXIME COTRIMOXAZOLE GENTAMYCIN PIP-TAZ	**CIPROFLOXACIN**
ENBCLO	ENTEROBACTER CLOACAE	UTI	SYMPT UTI	CIPROFLOXACIN **MEROPENEM**	AMOXICILLIN AMPICILLIN CEFIXIME CEFOTAXIME CEFTAZIDINE CEFTRIAXONE CEFUROXIME GENTAMYCIN	**MEROPENEM**
KLEPNE AEMSPP	KLEBS PNEUMO AEROMONAS SPP	SSI	SUPERFICIAL	CEFOTAXIME CEFTRIAXONE CEFUROXIME CIPROFLOXACIN GENTAMYCIN	AMIKACIN AMPICILLIN	TOPICAL TREATMENT ONLY
STAAUR	STAPH AUREUS	SSI	SUPERFICIAL	AMOXICILLIN AMPICILLIN CEFOTAXIME CEFOXITIN CEFUROXIME CIPROFLOXACIN GENTAMYCIN		CLINDAMYCIN
KLEPNE	KLEBS PNEUMO	SSI	SUPERFICIAL	CLARITHROMYCIN **CLINDAMYCIN** CLOXACILLIN ERYTHROMYCIN	AMPICILLIN	CLINDAMYCIN

8. DISCUSSION

This was the first point prevalence study of HCAI conducted at Kimberley hospital. The study was able to determine the burden of HCAI in the hospital with antimicrobial use patterns as well as the identification of the causative microorganism/s and their antimicrobial susceptibility data when it was available.

Summary of the key findings were:
The overall prevalence rate was found to be 7.76% and varied significantly between the units with the best bed occupancy, ranging from 4.54% to 16.67%. The prevalence of HCAI between the males and females were similar. Among the individual infection types studied, the highest prevalence was for surgical site Infections at 4.60% followed by urinary tract infection (1.53%) with primary bloodstream infection and pneumonia (both 0.92%).having the same rate. Among the SSI's, superficial Incisional subtype made up almost 67% of the infections. The paediatric HCAI prevalence was 6.12%.

Sixty-seven percent of patients with BSI had a vascular access device (peripheral) in the 48 hours prior to the onset of infection. Forty percent of patients with UTI had a urinary catheter present within seven days prior to the onset of infection. The most common microorganism isolated was Klebsiella pneumoniae which was prevalent in 37 % of the infections. 137 (42%) patients were receiving at least one antimicrobial agent and the most common antibiotic prescribed in the hospital was amoxicillin/clavulanic acid (Augmentin). The most prominent resistance profile was to the Penicillin antibiotics (55% of the isolated organisms).

As this was the first PPS to be conducted at Kimberley hospital, it was not possible to compare it to any previous survey done at the hospital. The survey was conducted in summer months (February and March 2016) and may have been affected the prevalence of seasonal pathogens.

The prevalence of infection was highest in the 31 year to 50 year age group at 13.3%.This finding was different from many studies where the very young (<5 years) and the very old (>70 years) were more vulnerable. This is an interesting finding that that can warrant further investigation in the future.

As expected, UTI and BSI were the significant Device associated Infections (DAI). Ventilator associated pneumonias (VAP) were not present as ICUs and areas where patients are ventilated were excluded. Also of interest was that patients who were on steroid treatment and those who received blood transfusions had lower HCAI rates than those without them but the number of patients with this risk factor was very small compared to those without these factors.

Kimberley hospital had a comparable overall HCAI rate to many first world national prevalence surveys. The UK have been forerunners in the conduct of HCAI prevalence surveys (as shown in Table 1) having done the first one in 1980 and already finished with 3 massive surveys involving multiple countries. Table 2 explores the variability in HCAI prevalence in many countries with Germany having a rate of 3.5% while countries with lower socioeconomic back grounds such as Tunisia having rates as high as 17.9%. One must keep in mind that our survey was a single hospital survey while other surveys involved many hospitals. So in a South African context, if many hospitals were involved with variable prevalence rates, the overall rate may be much higher. However we are still far at present from conducting a national prevalence survey but the many regional studies being conducted is a step in the right direction.

The bed occupancy of the various units was variable with paediatrics and gynaecology wards being the most full, however, in the context of this study it must be emphasized that paediatrics and general surgery made up almost 55% of the total beds surveyed. So the infections may be biased towards the nature of the patients surveyed.

Wards A2 and A1 were the wards that stood out when ward HCAI prevalence was calculated. So these wards may be areas to consider for audit by the infection control team in the hospital to identify if there were any factors that may be targeted in reducing the infection rate in these wards.

The less than 1 month infants had a similar rate to the overall prevalence rate (7.32% vs 7.67%) and not higher as was expected and this was a positive finding considering the gestational age at birth for these children ranged from 27 weeks to 40 weeks and the birth weights were variable from 850 grams to 3580 grams making those with lower end of each category more susceptible to pick up HCAIs in the ward.

Less than half the patients were admitted with an antibiotic prescribed and Augmentin was the prominent drug of choice and this was uniform among the various disciplines. 16% (53/137) of patients on antimicrobials received it as specific treatment while 17% (56/137) patients received empirical treatment and 8% were on surgical prophylaxis. The number of patients on surgical prophylaxis appears low and since we did not look at how many patients were awaiting surgery, this might be an area to investigate further especially since SSI was the prominent HCAI in the hospital.

The most prevalent microorganism was Klebsiella pneumoniae (36% of isolates in patients with HCAI). This is a concern in that the principal pathogenic reservoirs for transmission of Klebsiella are the gastrointestinal tract and the hands of hospital personnel. The ability of this organism to spread rapidly often leads to nosocomial outbreaks, especially in neonatal units. Strict adherence to basic epidemiological standards for the management of urinary catheters, intravenous drips, tracheostomies, wounds, maintenance and care of equipment, and good hand-washing practices all help to prevent the spread of nosocomial Klebsiella infections. These measures can be implemented or reinforced in the hospital from the finding of this survey[12].

Our study showed that SSI was the most common HCAI. This finding has been supported in many other studies. In a study done also for the first time in Iran in 2004/2005, the HCAI prevalence rate varied from 3.9% to 34% in the various units but SSI was shown to be the most common infection[11]. In a large study in the USA involving 183 hospitals and 11,282 patients, pneumonia and SSI were the most common infections[50]. In the first HCAI prevalence survey done in Argentina, the overall prevalence rate was 11.30% with SSI being the most prominent infection[3]. Furthermore, studies done in England, Northern Ireland, Wales and Republic of Ireland show similar trends with SSI being the most prominent HCAI, even though the overall prevalence rates varied between the different countries[3]. The only study that had similar number of patients as the Kimberley study was done at the University Hospital “Paolo Giaccone” in Palmero Italy. They surveyed 328 patients and had 14 infections identified giving an overall prevalence rate of 3.6%. However in their study, BSI made up the majority of the infections as most of the patients were from critical care units. Their overall rates were also low as this study was a follow up study after the implementation of effective prevention and control interventions[51].

9. LIMITATIONS OF THE STUDY

Our study has some limitations. Indeed the point prevalence study design has some inherent limits, including reduced periods of observation and the possibility of obtaining biased results. Criticisms of the point-prevalence methodology include the inability to capture outbreaks of HCAI occurring between surveillance time-points, and the possibility that there may have been important demographic differences among the patients surveyed which were not identified as a result of the limited dataset collected, and therefore not controlled for in the risk factor analyses. In addition, we were not able to capture specific outcomes in relation to HCAI. Yet the methodology we used is the most common methodology used to conduct such surveys worldwide that is internationally validated with standardised definitions and the most cost-effective means to conduct such surveys in resource limited settings.

Prevalence surveys are cross-sectional and therefore lead to possible bias towards identifying HCAI and antimicrobial use for those infections with a longer duration of illness and longer inpatient stays. This can lead to an overestimation in these patient groups; however as the objective of this survey was to estimate the burden (total prevalence) of HCAI, the result is valid in this context. Public reporting, especially when it is voluntary, risks incomplete data collection, poor data quality and underreporting of infections but in our study we did not encounter problems regarding refusal to participate in the survey.

The confidence intervals for the sub-strata were wide and in many cases overlapping suggesting large variability in HCAI data. This was due to the small sample size in this study compared to national studies with much bigger number of patients. The p-values were also high due to this but as we were conducting a prevalence survey which was mostly descriptive, the findings we believe were still relevant.

The exclusion of ICUs from the survey has a significant impact on the overall HCAI prevalence rate as critical care units contribute highly or often are the areas of hospital with the highest prevalence of HCAIs. We believe that as the bed occupancy of the adult and paediatric ICUs were less than 30% at the time of the survey, the impact on this exclusion would have been minimal and maybe even not representative. These units can certainly be included in bigger studies done in the facility in the future.

10. CONCLUSIONS

In conclusion, our findings highlight that SSI at Kimberley hospital is of significant concern and that further studies are needed to identify risk factors and preventative interventions. We hope that these findings will encourage the Northern Cape Department of Health and the Kimberley Hospital management to support further larger provincial hospital wide surveillance and to facilitate strategies for the prevention and control of HCAI in Kimberley Hospital as well as the Northern Cape as a whole.

This survey has provided a baseline for Kimberley hospital against which future prevalence surveys can be compared.

11. RECOMMENDATIONS

Surgical site infections are reported to be the most preventable of the health-care associated infections. Despite the widespread international introduction of level I Evidence-based guidelines for the prevention of SSIs, such as that of the National Institute for Clinical Excellence (NICE) in the UK and the surgical care improvement Project (SCIP) of the USA, SSI rates appear not to have reduced in a measurable way.

The care bundle approach is an accepted method of packaging measures into routine care for all patients and includes methods for preoperative removal of hair (where appropriate), rational antibiotic prophylaxis, avoidance of perioperative hypothermia, management of perioperative blood glucose and effective skin preparation[52].

Feedback from consultants in the department of surgery at Kimberley hospital suggests that the patients who presented to the hospital were quite ill on arrival and did not receive adequate antibiotic management at the peripheral setting such that in spite of taking preventative measures, the risk for patients developing SSI in the wards were high. So one of factors recommended was better management of these patients prior to referral to the hospital. Also one of the challenges is that even if existing morbidities could be eliminated, new diagnostic and surgical techniques may emerge, which result in new risk factors for the development of SSI.
Some general recommendations proposed are:

1. Recognition and encouragement of operating theatre discipline/team work should be emphasized and mandated through clinical governance. This may likely require a significant behavioral change by all members who work in theatre.
2. Patients can be informed about the measures that will be taken to keep them safe before, during and after surgery and help reduce their risk of SSI. Patient information can be drafted and incorporated into consent forms, and this may empower patients to ask questions and thereby increase compliance.
3. Repeated point-prevalence surveys are needed to trace the changes of HCAI epidemiology in different years or seasons.
4. Sustained education of all clinical staff on the methods of prevention of HCAI.

5. Education of clinical staff to ensure they document an accurate reason for antimicrobial prescribing.
6. Implementing standard precautions, particularly best hand hygiene practices at the bedside.
7. Patients about to undergo surgery need to be administered pre-operative antibiotics 1-2 hours prior to incision especially if surgery involves high risk of contamination. (e.g. bowel surgery with rupture)
8. Patients with communicable diseases that may spread to other patients need to be identified early and isolated.
9. Future surveys that are bigger involving ICUs, and inclusion of other facilities in the Northern Cape.

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13. APPENDICES

APPENDIX 1: INFORMATION LEAFLETS AND CONSENT FORM

PATIENT / PARTICPANT'S INFORMATION LEAFLET & INFORMED ASSENT FORM FOR CLINICAL SURVEY / NON-INETRVENTION SURVEY FOR CHILDREN

TITLE OF SURVEY: **KIMBERLEY HOSPITAL HEALTH-CARE ASSOCIATED INFECTION PREVALANCE SURVEY 2015/2016**

Consent and Assent:

If there are children younger than 7 years in your survey, the parents give consent on behalf of their child.

For children between 7 and 18 years, parents give consent for their child to participate in the survey and the child gives assent.

Dear Parent/Guardian date …… / ……. / …….

1) INTRODUCTION

Your child is invited to volunteer for a research survey. This information leaflet is to help you to decide if you would like to participate. Before you agree to take part in this survey you should fully understand what is involved. If you have any questions, which are not fully explained in this leaflet, do not hesitate to ask the surveyor. You should not agree to take part unless you are completely happy about all the procedures involved.

2) THE NATURE AND PRUPOSE OF THIS SURVEY

Your child is invited to take part in a research survey. The aim of this survey is to evaluate the prevalence of hospital acquired infections in this hospital today. By doing so, we wish to learn more about specific infections in this hospital.

3) EXPLANATION OF PROCEDURE TO BE FOLLOWED

This survey involves reviewing your child's healthcare records, nursing notes, observation charts, prescription chart, laboratory results, x-rays and radiology reports. No tests or examinations will be done. No questions will be asked of you or your child and no invasive interventions will be used to obtain data. Each patient's data records will be surveyed only once. Patient information will be anonymous. Your child's hospital number will be used for logistical purposes; however no patient identifying information will appear on the data sheet.

4) RISK AND DISCOMFORT INVOLVED

There is no risk or discomfort involved.

5) POSSIBLE BENEFITS OF THIS SURVEY

The survey will help us to plan our infection prevention and control strategies in the future, resulting in improved patient care.

6) HAS THE SURVEY RECEIVED ETHICAL APPROVAL?

This Protocol has been submitted to the Human Research Ethics Committee, University of the Free State, Bloemfontein and is awaiting approval by the Committee. The survey has been structured in accordance with the **Declaration of Helsinki**, which deals with the recommendations guiding doctors.

7) INFORMATION

If you have any questions concerning this survey, you should contact either:
Dr A. Nair tel. **053 8022111** or **Dr H. Saeed, HOU** on **053 8022351**

8) CONFIDENTIALITY

All records obtained whilst in this survey will be regarded as confidential. Results will be published or presented in such a fashion that patients remain unidentifiable.

9) CONSENT TO PARTICIPATE IN THIS SURVEY

I have read or had read to me in a language that I understand, the above information, before signing this consent form. The content and meaning of this information have been explained to me. I have been given the opportunity to ask questions and am satisfied that they have been answered satisfactorily. I understand that if I do not participate it will not affect my child's medical management in any way I also understand that I shall not receive any remuneration for participating in this survey. I hereby volunteer my child to take part in this survey.

…… …….
Patient / Guardian's signature date

…… …….
Person obtaining informed consent date

…… ……
Witness date

VERBAL PATIENT INFORMED CONSENT [applicable when patient cannot read or write]

I, the undersigned

,……,
Have read, and have explained fully to the patient, named

……

And/or his/her relative, the patient information leaflet, which has indicated the nature and purpose of the survey in which I have asked the patient to participate. The explanation I have given has mentioned both the possible risks and benefits of the survey. The patient indicated that he/she understands that he/she will be free to withdraw from the survey for any reason without jeopardizing his/her treatment and that he/she will not receive any remuneration for participating in this survey.

I hereby certify that the patient has agreed to participate in this survey.

Patient's Name: *(please print)* _____

Investigator's Name :*(please print)* _____

Investigator's Signature: _____ Date: _____

Witness's Name :*(please print)*_____

Witness's signature: _____Date: _____

[Witness signs that he/she has witnessed the process of informed consent]

ASSENT FORM FOR 7 – 18 YEARS
FOR CLINICAL SURVEY / NON INTERVENTION RESEARCH

Assent Form for Protocol Title: KIMBERLEY HOSPITAL HEALTH-CARE ASSOCIATED INFECTION PREVALANCE SURVEY 2015/2016

We wish to know if you would like to volunteer to be part of a research survey. The survey will help us to gather information on hospital-acquired infections in patients in this hospital.

During this survey, no tests will be done on you. The information we require will be taken from your patient records, the nursing notes, observation charts, prescription chart, laboratory results and X-ray reports. No tests or examinations will be done. We do not even have to ask you any questions – all the information we need is in your hospital records already. We will only be here today to do the survey – it is a one-day survey.

If you do not want to allow the surveyors to look at your records, you may refuse. No one will be cross or upset with you if you don't want to give your permission, and your doctor will still look after you. You don't have to give your answer now, take your time and read the rest of this form before you decide.

When you sign at the bottom it will mean that you have read this paper, and that you give your permission for your information to be included in the survey.

THE AIM OF THE SURVEY
This survey is to find out how many patients in this hospital today have an infection that is hospital acquired.

PROCEDURES FOLLOWED
This survey involves looking at your healthcare records, nursing notes, observation charts, prescription chart, laboratory results and radiology reports. No tests or examinations will be done. You will not be asked any questions and we will not do anything to you. Your records will be surveyed only once. Your information will be anonymous. Your hospital number will be used but we will not record your name, address or any other personal identification information.

RISK AND DISCOMFORT INVOLVED
There is no risk or discomfort involved.

POSSIBLE BENEFITS OF THIS SURVEY
The survey will help us to plan our infection prevention and control strategies in the future, so that all patients can get better care in future.

HAS THE SURVEY RECEIVED ETHICAL APPROVAL?

This Protocol has been submitted to the Human Research Ethics Committee, University of the Free State, Bloemfontein and is awaiting approval by the Committee. The survey has been structured in accordance with the **Declaration of Helsinki**, which deals with the recommendations guiding doctors.

INFORMATION

If you have any questions concerning this survey, you should ask any questions you like of the surveyor now. Or contact either:
Dr A. Nair tel. **053 8022111** or **Dr H. Saeed, HOU** on **053 8022351**

CONFIDENTIALITY

All information we get from this survey is confidential and your name will not appear in any report. Please note that you shall not receive any remuneration for participating in this survey.

Please print	Your name	Person Obtaining Consent	Parent / Guardian / Nurse [as Witness]
Name			
Signature			
Date			

INFORMATION LEAFLET & INFORMED CONSENT FORM FOR NON INTERVENTIONAL SURVEY - ADULTS

TITLE OF SURVEY: KIMBERLEY HOSPITAL HEALTH-CARE ASSOCIATED INFECTION PREVALANCE SURVEY 2015/2016

Dear Patient

1. INTRODUCTION

We invite you to participate in a research survey. This information leaflet is to help you to decide if you would like to participate. Before you agree to take part in this survey you should fully understand what is involved. If you have any questions, that this leaflet does not fully explain, please do not hesitate to ask the surveyor.

2. THE NATURE AND PRUPOSE OF THIS SURVEY

The aim of this survey is to obtain information about four major hospital acquired infections in this hospital. Your healthcare records are the source of information that we will be reviewing.

3. EXPLANATION OF PROCEDURE TO BE FOLLOWED

This survey involves reviewing your healthcare records for information pertaining to hospital-acquired infections. Your healthcare record includes nursing notes, observation charts, prescription chart, laboratory results and radiology reports. No tests or examinations will be done. You do not need to answer any questions. No invasive interventions will be employed to obtain data. Your data records will be surveyed only once and only today. Your information will be anonymous. Your hospital number will be used for logistical purposes; however no patient identifying information (e.g. name, ID number or address, etc) will appear on the data sheet.

4. RISK AND DISCOMFORT INVOLVED

There are no risks or discomfort in participating in the survey, as we will only be reviewing your records.

5. POSSIBLE BENEFITS OF THIS SURVEY

The results of this survey will form the baseline for us to report on four major hospital acquired infections and to plan our infection prevention and control strategies in the future.

6. WHAT ARE YOUR RIGHTS AS A PARTICIPANT?

Your participation in this survey is entirely voluntary. You can refuse to participate. Your withdrawal will not affect you or your treatment in any way.

7. HAS THE SURVEY RECEIVED ETHICAL APPROVAL?

This Protocol has been submitted to the Human Research Ethics Committee, University of the Free State, Bloemfontein and is awaiting approval by the Committee. The survey has been structured in accordance with the **Declaration of Helsinki**, which deals with the recommendations guiding doctors.

8. INFORMATION AND CONTACT PERSON

If you have any questions concerning this survey, you should ask any questions you like of the surveyor now. Or contact either:
Dr A. Nair tel. **053 8022111** or **Dr H. Saeed, HOU** on **053 8022351**

9. COMPENSATION

Your participation is voluntary

10. CONFIDENTIALITY

All information that you give will be kept strictly confidential. Once we have analysed the information no one will be able to identify you. Research reports and articles in scientific journals will not include any information that may identify you.

CONSENT TO PARTICIPATE IN THIS SURVEY

I confirm that the person asking my consent to take part in this survey has told me about the nature, process, risks, discomforts and benefits of the survey. I have also received, read and understand the above written information (Information Leaflet and Informed Consent) regarding the survey. I am aware that the results of the survey, including personal details, will be anonymously processed into research report. I am participating willingly. I have had time to ask questions and have no objection to participate in the survey. It has been explained to me that I shall not receive any remuneration for participating in this survey. I understand that there is no penalty should I wish to discontinue with the survey and my withdrawal will not affect any treatment.

…… ……..
Patient's signature date

…… ……..
Person obtaining informed consent date

…… ……..
Witness date

VERBAL PATIENT INFORMED CONSENT [applicable when patient cannot read or write]

I, the undersigned, …….. , have read, and have explained fully to the patient, named

……

and/or his/her relative, the patient information leaflet, which has indicated the nature and purpose of the survey in which I have asked the patient to participate. The explanation I have given has mentioned both the possible risks and benefits of the survey. The patient indicated that he/she understands that he/she will be free to withdraw from the survey for any reason without jeopardizing his/her treatment and that he/she will not receive any remuneration for participating in this survey.

I hereby certify that the patient has agreed to participate in this survey.

Patient's Name: *(please print)* _____

Investigator's Name :*(please print)* _____

Investigator's Signature: _____ Date: _____

Witness's Name :*(please print)* _____

Witness's signature: _____ Date: _____

[Witness signs that he/she has witnesses the process of informed consent]

APPENDIX 2: BUDGET FOR THE STUDY

The study cost involved the following costs:

TYPE OF COST	ESTIMATED AMOUNT	
SA-HISC	Questionnaire sheets:	3000 ZAR
	Printing costs:	500 ZAR
	Software Operator costs:	1000 ZAR
Operational costs	Courier (tracking) to and from Jhb:	1000 ZAR
	Filing costs:	500 ZAR
	Final report costs:	500 ZAR
Recurrent costs	Pens:	200 ZAR
	Paper for documentation and letters:	800 ZAR
	Printing costs-pt. info and consent forms:	2000 ZAR
	Telephone costs:	500 ZAR
Total estimate		10000 ZAR

The entire costs were covered by the principal investigator.

APPENDIX 3: PAGE 1 OF DATA COLLECTION FORM

A. SURVEY DETAILS

Hospital/ Centre: ☐☐ Service: ☐☐☐☐ Ward: ☐☐☐

Date of survey: d d / m m / y y Interviewer code: ☐☐

B. PATIENT DETAILS:

Patient Identification: ☐☐☐☐☐☐☐☐☐☐ Gender ☐ Male ☐ Female

Date of birth (DOB): d d / m m / y y **OR** if DOB is not available ⇨ Age: ☐☐ Enter D, M or Y: ☐

If patient is less than one month old enter Birthweight (grams) ☐☐☐☐ ⇨ Gestational age (weeks): ☐☐

Date of admission: d d / m m / y y

Main diagnosis: ☐☐

C. RISK FACTORS - *Please indicate 'Y' or 'N' for all risk factors by placing X in relevant box.*

	Yes	No		Yes	No
Urinary catheter	☐	☐	Surgery	☐	☐
Peripheral vascular catheter	☐	☐	Steroids	☐	☐
Central intravascular catheter	☐	☐	Blood transfusion	☐	☐
Mechanical ventilation	☐	☐	Chemotherapy/ Cytotoxic	☐	☐
Neutropenia	☐	☐	Immunodeficiency	☐	☐
Diabetes	☐	☐	Parenteral nutrition	☐	☐

	Yes	No	
D. Is patient currently on antimicrobials?	☐	☐	**If 'Yes' complete Page 3**
E. Does this patient have SSI, Respiratory, VAP or UTI infection?	☐	☐	**If 'Yes' complete Page 4**

If the answer to either of questions D and E are Yes please complete remainder of questionnaire.

If the answer to questions D and E are both NO the form is complete for this patient.

APPENDIX 4: PAGE 2 OF DATA COLLECTION FORM

F. Antimicrobials: *Record all antimicrobials (up to 4 antimicrobial) patient is on at time of survey.*

Antimicrobial 1: ☐☐☐☐☐☐☐ ⇨ Indication 1: ☐ Specific ☐ Empirical ☐ Surgical prophylaxis ☐ Other

Antimicrobial 2: ☐☐☐☐☐☐☐ ⇨ Indication 2: ☐ Specific ☐ Empirical ☐ Surgical prophylaxis ☐ Other

Antimicrobial 3: ☐☐☐☐☐☐☐ ⇨ Indication 3: ☐ Specific ☐ Empirical ☐ Surgical prophylaxis ☐ Other

Antimicrobial 4: ☐☐☐☐☐☐☐ ⇨ Indication 4: ☐ Specific ☐ Empirical ☐ Surgical prophylaxis ☐ Other

G. Surgical Site Infection (SSI) ⇨ ☐ Yes ☐ No

Date of operation: d d / m m / y y *Date of SSI at least 2 days after operation* Date of SSI: d d / m m / y y

Was SSI present at admission: ☐ Yes ☐ No SSI type ☐ Superficial ☐ Deep ☐ Organ / Space

SSI culture result ☐ *Enter 1 - 4* **1**=Positive **2**=Negative **3**=Not done **4**=Culture requested but no Laboratory information available on the time of the survey

H. Bloodstream Infection (BSI) ⇨ ☐ Yes ☐ No

Date of BSI d d / m m / y y BSI type ☐ Primary ☐ Secondary

Relevant device *in situ* before onset ☐ Yes ☐ No

BSI culture result ☐ *Enter 1 - 4* **1**=Positive **2**=Negative **3**=Not done **4**=Culture requested but no Laboratory information available on the time of the survey

I. Urinary tract infection (UTI) ⇨ ☐ Yes ☐ No

Date of UTI d d / m m / y y UTI type ☐ Symptomatic UTI-A ☐ Symptomatic UTI-B

Relevant device *in situ* before onset ☐ Yes ☐ No

UTI culture result ☐ *Enter 1 - 4* **1**=Positive **2**=Negative **3**=Not done **4**=Culture requested but no Laboratory information available on the time of the survey

J. Pneumonia (PN) ⇨ ☐ Yes ☐ No

Date of PN d d / m m / y y PN type ☐ PN1 ☐ PN2 ☐ PN3 ☐ PN4 ☐ PN5

Relevant device *in situ* before onset ☐ Yes ☐ No

PN culture result ☐ *Enter 1 - 4* **1**=Positive **2**=Negative **3**=Not done **4**=Culture requested but no Laboratory information available on the time of the survey

APPENDIX 5: ISOLATE AND ANTIBIOGRAM FORM

This page refers to 1-system infection, the related pathogen and the related antibiogram.

If patient has a second system infection record infection culture results on Page 4.

If patient has more than 2 system infections use additional extension sheet.

K. Culture relates to: ☐ Surgical site ☐ Bloodstream ☐ Urinary tract ☐ Pneumonia

Enter only 2 clinically significant pathogens isolated for this infection. See protocol Page 28 for ESKAPE rules.

	1st Pathogen isolated		**2nd Pathogen isolated**	
	S	**R**	**S**	**R**
Amikacin	☐	☐	☐	☐
Amoxicillin	☐	☐	☐	☐
Amphotericin B	☐	☐	☐	☐
Ampicillin	☐	☐	☐	☐
Azithromycin	☐	☐	☐	☐
Cefazolin	☐	☐	☐	☐
Cefixime	☐	☐	☐	☐
Cefotaxime	☐	☐	☐	☐
Cefoxitin	☐	☐	☐	☐
Ceftazidime	☐	☐	☐	☐
Ceftriaxone	☐	☐	☐	☐
Cefuroxime	☐	☐	☐	☐
Chloramphenicol	☐	☐	☐	☐
Ciprofloxacin	☐	☐	☐	☐
Clarithromycin	☐	☐	☐	☐
Clindamycin	☐	☐	☐	☐
Cloxacillin	☐	☐	☐	☐
Colistin	☐	☐	☐	☐
Co amoxyclav	☐	☐	☐	☐
Co trimoxazole	☐	☐	☐	☐
Doxycycline	☐	☐	☐	☐
Ertapenem	☐	☐	☐	☐
Erythromycin	☐	☐	☐	☐
Fluconazole	☐	☐	☐	☐
Fusidic acid	☐	☐	☐	☐
Gentamycin	☐	☐	☐	☐
Imipenem	☐	☐	☐	☐
Itraconazole	☐	☐	☐	☐
Linezolid	☐	☐	☐	☐
Meropenem	☐	☐	☐	☐
Metronidazole	☐	☐	☐	☐
Ofloxacin	☐	☐	☐	☐
Penicillin	☐	☐	☐	☐
Pip Taz	☐	☐	☐	☐
Rifampicin	☐	☐	☐	☐
Teicoplanin	☐	☐	☐	☐
Tobramycin	☐	☐	☐	☐
Trimethoprim	☐	☐	☐	☐
Vancomycin	☐	☐	☐	☐

APPENDIX 6: ISOLATE & ANTIBIOGRAM FORM FOR 2ND INFECTION IF PRESENT

This page refers to 2nd system infection, the related pathogen and the related antibiogram.

If patient has more than 2 system infections use additional extension sheet.

L. Culture relates to: ☐ Surgical site ☐ Bloodstream ☐ Urinary tract ☐ Pneumonia

Enter only 2 clinically significant pathogens isolated for this infection. See protocol Page 28 for ESKAPE rules.

1st Pathogen isolated ☐☐☐☐☐☐ **2nd Pathogen isolated** ☐☐☐☐☐☐

	1st Pathogen isolated S	1st Pathogen isolated R	2nd Pathogen isolated S	2nd Pathogen isolated R
Amikacin	☐	☐	☐	☐
Amoxicillin	☐	☐	☐	☐
Amphotericin B	☐	☐	☐	☐
Ampicillin	☐	☐	☐	☐
Azithromycin	☐	☐	☐	☐
Cefazolin	☐	☐	☐	☐
Cefixime	☐	☐	☐	☐
Cefotaxime	☐	☐	☐	☐
Cefoxitin	☐	☐	☐	☐
Ceftazidime	☐	☐	☐	☐
Ceftriaxone	☐	☐	☐	☐
Cefuroxime	☐	☐	☐	☐
Chloramphenicol	☐	☐	☐	☐
Ciprofloxacin	☐	☐	☐	☐
Clarithromycin	☐	☐	☐	☐
Clindamycin	☐	☐	☐	☐
Cloxacillin	☐	☐	☐	☐
Colistin	☐	☐	☐	☐
Co amoxyclav	☐	☐	☐	☐
Co trimoxazole	☐	☐	☐	☐
Doxycycline	☐	☐	☐	☐
Ertapenem	☐	☐	☐	☐
Erythromycin	☐	☐	☐	☐
Fluconazole	☐	☐	☐	☐
Fusidic acid	☐	☐	☐	☐
Gentamycin	☐	☐	☐	☐
Imipenem	☐	☐	☐	☐
Itraconazole	☐	☐	☐	☐
Linezolid	☐	☐	☐	☐
Meropenem	☐	☐	☐	☐
Metronidazole	☐	☐	☐	☐
Ofloxacin	☐	☐	☐	☐
Penicillin	☐	☐	☐	☐
Pip Taz	☐	☐	☐	☐
Rifampicin	☐	☐	☐	☐
Teicoplanin	☐	☐	☐	☐
Tobramycin	☐	☐	☐	☐
Trimethoprim	☐	☐	☐	☐
Vancomycin	☐	☐	☐	☐

APPENDIX 7: WARD TYPE AND CORRESPONDING CODES

Ward type	**Ward code**
Critical care specialities (ICU):	
Medical	MICU
Surgical	SICU
Mixed General	GICU
Paediatric	PICU
Neonatal	NICU
Neurosurgery	EICU
Other	OICU
High care Specialities (HICU)	
Multi-disciplinary high care unit	HMDC
Surgical Specialities (Ward): Applicable to both adults and specialist paediatric hospitals	
General surgery	GSWA
Digestive tract/bowel surgery	DSWA
Orthopaedics	ORWA
Cardiac surgery	CSWA
Thoracic surgery	TSWA
Vascular surgery	VSWA
Neurosurgery	NSWA
Transplantation surgery	TSWA
Surgery for cancer	CSWA
ENT	ENWA
Ophthalmology	OPWA
Maxilla-facial surgery	MFWA
Burn care	BCWA
Urology	URWA
Plastic and reconstructive surgery	PRWA
other	OSWA
Medical specialities (Ward) Applicable to both adult and specialist paediatric hospitals	
General medicine	GMWA
Gastroenterology	GAWA
Hepatology	HEWA
Endocrinology	ENWA
Oncology	ONWA
Haematology	HAWA
Bone Marrow Transplantation (BMT)	BMWA
Cardio or coronary care	CAWA
Dermatology	DEWA
Nephrology	NEWA
Paediatric Specialities:	
Paediatric ward	PAWA
Other Specialities:	
Obstetrics/Maternity	MAWA
Gynaecology	GYWA
Psychiatric	PSWA
Rehabilitation	REWA
Other	OTWA

APPENDIX 8: STEP BY STEP INSTRUCTION FOR FILLING THE DATA COLLECTION FORM

Data field	Instructions for data collection
B Patient Details Patient identification	Record code supplied by local coordinator to identify ward.
Gender	Select Male or Female to indicate the gender of the patient.
Date of birth (DOB)	Enter the date of birth using this format: DD/MM/YY.
Age	Write age in years and if the date of birth is not available please fill in the age.
Birth weight	Must be filled in if the patient is less than 1 month old.
Gestational age	Must be filled in as weeks only if the patient is less than a month.
Main diagnosis	Enter main diagnosis at the time of the survey. Select from codes listed below
Date of admission	Enter date patient admitted to this hospital using this format: DD/MM/YY
D/M	This blocks are used for recording the patient age in: D-days or M-months or Y- years

Data field	Instructions for data collection
C. Risk factors	The following risk factors will be recorded if they are present on the day of the survey, except for those having a hospital-acquired infection likely to be a device-related infection (UTI, Lower Respiratory Tract, Bloodstream infection), in which case the patient will be considered exposed also if he/she was exposed to the factor in some moment of the four days before the survey.
Urinary catheter in-situ	Record if the patient currently has an indwelling catheter in the urinary tract (Yes/No)
Peripheral vascular catheter in situ	Record any catheter inserted by peripheral access whether a line is attached or not (Yes/No)
Central intravascular catheter in situ	Record any kind of Central Intravascular Catheter (e.g. Sub-clavian, Jugular or Femoral) (Yes/No)
Mechanical ventilation	Record the appropriate box if the patient is undergoing Mechanical ventilation (Yes/No)
Parenteral nutrition	Record in the appropriate box if the patient is receiving parenteral nutrition. (Yes/No)
Immunodeficiency	Patients with this risk factor are those with the diagnosis of any kind of immune disease regardless of whether it is primary or secondary. The diseases to be included are: Leukaemia, Lymphoma, AIDS, HIV positive with a CD4 account of equal or less than 500, among other diseases.
Neutropenia	Defined as the total number of neutrophils < 1000/mm3 obtained in the last haematology account.
Diabetes	Record in the appropriate box if the patient is diagnose as a diabetic. (Yes/No)

Surgery	Definition of an operation: Takes place in an operating room during a single trip to the operating theatre (OR) where the surgeon makes at least one incision through the skin or mucous membrane, including laparoscopy and closes the incision before the patient leaves the operating room. An OR includes an operating room, C-section room, interventional radiology, cardiac catheterization lab. An implant includes any non-human foreign body that is permanently placed in a patient, including screws, mesh, wires that are left permanently.
Steroids	Report therapy given at any time during this admission. These questions should be answered by marking an "X" inside the appropriate boxes (Yes/No). Steroid therapy: Treatment with corticosteroid drugs to reduce swelling, pain, and other symptoms of inflammation.
Blood transfusion	Blood transfusion: The introduction of blood or blood plasma into a vein or artery. Include transfusion of whole blood or packed cells Do not include white cell, platelet or immunoglobulin transfusions.
Chemotherapy/ Cytotoxic	Chemotherapy/Cytotoxic: Record treatment with substances that are toxic to cells given at any time during this admission

Code	**Main ICD-9 MC diagnoses codes**
01	Infectious and parasitic diseases
02	Neoplasms
03	Endocrine, nutritional and metabolic diseases, and immunity disorders
04	Diseases of the blood and blood-forming organs
05	Mental disorders
06	Diseases of the nervous system and sense organs
07	Diseases of the circulatory system
08	Diseases of the respiratory system
09	Diseases of the digestive system
10	Diseases of the genitourinary system
11	Complications of pregnancy, childbirth, and the puerperium
12	Diseases of the skin and subcutaneous tissue
13	Diseases of the musculoskeletal system and connective tissue
14	Congenital anomalies
15	Certain conditions originating in the perinatal period
16	Symptoms, signs, and ill-defined conditions
17	Injury and poisoning

Is the patient currently on antimicrobials? If "Yes" complete Page 2

Does this patient have a surgical site (SSI) and/or Respiratory/Pneumonia (VAP/PN) and/or urinary tract (UTI) and or bloodstream infection (BSI)? If "Yes" complete page 2.

APPENDIX 9: ANTIMICROBIAL GENERIC NAME AND CORRESPONDING CODES

Antimicrobial generic name	**CODE**
Amikacin	J01GB06
Amoxicillin	J01CA04
Amoxicillin and enzyme inhibitor – co-amoxiclav	J01CR02
Amphotericin B (parenteral)	J02AA01
Ampicillin	J01CA01
Azithromycin	J01FA10
Penicillin	J01CE08
Cefazolin	J01DB04
Cefixime	J01DD08
Cefotaxime	J01DD01
Cefoxitin	J02AX06
Ceftazidime	J01DD02
Ceftriaxone	J01DD04
Cefuroxime	J01DC02
Chloramphenicol	J01BA01
Ciprofloxacin	J01MA02
Clarithromycin	J01FA09
Clindamycin	J01FF01
Cloxacillin	J01DB01
Colistin (injection, infusion, oral)	J01XB01
Doxycycline	J01AA02
Ertapenem	J01DH03
Erythromycin	J01FA01
Fluconazole	J02AC01
Fusidic acid	J01XC01
Gentamicin	J01GB03
Imipenem	J01DH51
Itraconazole	J02AC02
Linezolid	J01XX08
Meropenem	J01DH02
Metronidazole (parenteral/IV)	J01XD01
Ofloxacin	J01MA01
Piperacillin and enzyme inhibitor – piperacillin-tazobactam	J01CR05
Sulfamethoxazole and trimethoprim (co-trimoxazole)	J01EE01
Teicoplanin	J01XA02
Tobramycin	J01GB01
Trimethoprim	J01EA01
Vancomycin parenteral (IV)	J01XA01
Voriconazole	J02AC03

APPENDIX 10: USING THE HCAI DEFENITIONS (ECDC) TO ASSESS IF PATIENT HAS HCAI OR NOT

A definition of infection with every case definition is taken from the European Centre for Disease Control and Prevention (ECDC), as used for the surveillance.

The infection definitions used are the following:

- Surgical site infection
- Pneumonia
- Bloodstream infection
- Central vascular catheter related infection
- Urinary tract infections

A list with details of all infections is incorporated in the description on how the questionnaire must be filled in.

This Survey is concerned with active infections acquired during or as a consequence of admission to an acute hospital. Data will be collected on active HAI at the time of survey.

HAI will be considered active on the basis of the following:

- Patient met one of the HAI case definitions on the day of survey.

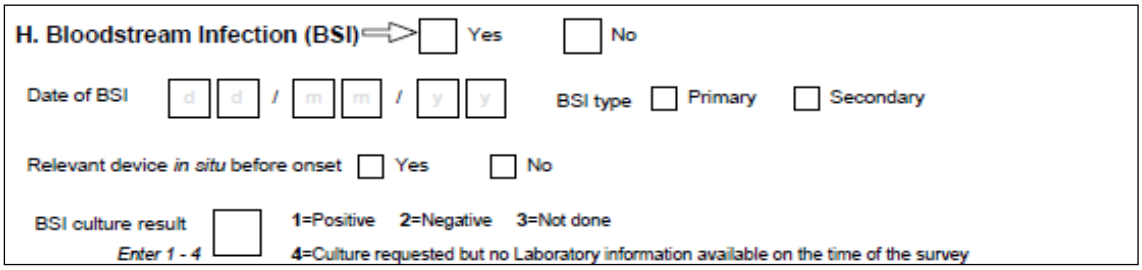
Or

- Patient is receiving antimicrobials for a HAI on the day of survey and the HAI had previously met one of the case definitions between day 1 of antimicrobial treatment and day of survey.

In addition, onset of HAI must have occurred within one of the following time frames:

- Day 3 of current admission onwards (day of admission is Day 1);
- Present on admission (or presenting on Day 1 or 2) in patients discharged from hospital (acute or non-acute) in previous 2 days;
- Surgical site infection present on admission (or presenting on Day 1 or 2);
- Device-associated infection [Pneumonia- Ventilator Associated Pneumonia (VAP), Urinary Tract Infections (UTI), Bloodstream Associated Infection specific Device related for example Central Line Related Bloodstream Infection (CLRBI)] following insertion of device (including Day 1 or 2 of admission).

Infections originating in other hospitals will be included but those originating in long-term care facilities, care homes, or nursing homes will be excluded. Data will be recorded for each HAI including: type, date of onset and origin of infection. Infections that were present on admission to the survey hospital will be identified. Additional data will be collected to identify whether a relevant device was in situ in a defined period prior to onset of infection; specifically central vascular catheter in context of bloodstream infections, intubation in context of pneumonia and urinary catheter in context of urinary tract infections.



Major Infection Site: BLOODSTREAM INFECTIONS

Bloodstream infection (BSI): This question should be answered by marking an "X" inside the appropriate boxes (Yes/No).

Date of BSI: Date of onset of Bloodstream infection' or the date whether the specimen was send away for culture. (DD/MM/YY)

BSI: Laboratory-confirmed bloodstream infection
• ONE positive blood culture for a recognised pathogen (e.g., Staphylococcus aureus, Escherichia coli, Candida albicans etc.) [If any doubt regarding what constitutes a recognised pathogen, please discuss with microbiology]
or
• Patient has at least ONE of the following signs or symptoms: fever (>38°C), chills or hypotension
and
TWO positive blood cultures for a common skin contaminant** (the same organism must have been isolated from two separate blood culture samples, usually taken within a 48 hour period).
**Skin contaminants = Coagulase-negative staphylococci, Micrococcus spp., Propionibacterium acnes, Bacillus spp., Corynebacterium spp.

Primary BSI:
Catheter-related BSI: Primary BSI due to infection of either a Peripheral Vascular Catheter (PVC) or Central Vascular Catheter (CVC).

Secondary BSI:
These are BSI arising secondary to an infection elsewhere in the body.
When the same micro-organism was cultured from both the blood and another infection site or strong clinical evidence exists that the patient's BSI developed secondary to another infection site, invasive diagnostic procedure or foreign body.
Pulmonary infection resulting in BSI (S-PUL)
Urinary tract infection resulting in BSI (S-UTI)
Surgical site infection resulting in BSI (S-SSI)

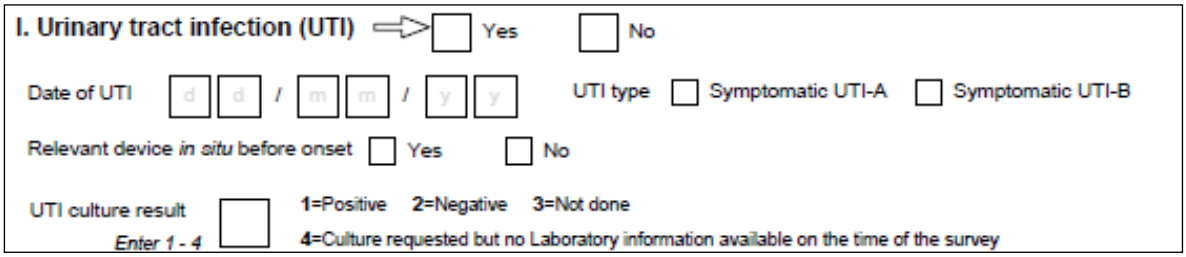
Note: Secondary BSI is reported as a separate HAI, in addition to the primary infection, if the primary infection matches the relevant HAI case definition.

Relevant devices in situ before onset:
HAI which occurs in a patient with a relevant device that was used within a defined period before the onset of clinical signs or symptoms of infection (even intermittently)

Notes:
The term "device-related" is used only for BSI:
Catheter-related infection, where the relevant device is peripheral or central vascular catheter and the vascular catheter was in situ within 48 hours of the onset of signs and symptoms of catheter related infection

Note that other HAI related to devices (e.g. ventriculitis due to external ventricular drain) are recorded as BSI but are not recorded as device associated)

Bloodstream Culture:- Report :
1=Positive culture; 2=Negative culture; 3=Culture not done; 4=Culture requested but no laboratory information available on time of the survey.



Major Infection Site: URINARY TRACT INFECTION

Urinary tract infection (UTI): This question should be answered by marking an "X" inside the appropriate boxes (Yes/No).

Date UTI: Date of onset of urinary tract infection. The date the specimen was sent for culture. (DD/MM/YY)

UTI-A: microbiologically confirmed symptomatic UTI

Patient has at least ONE of the following signs of symptoms with no other recognised cause: fever (>38°C), urgency, frequency, dysuria, or suprapubic tenderness and patient has a positive urine microbiology culture report. That is, ≥ 105 microorganisms per ml of urine with no more than two species of microorganisms detected in the same urine sample.

UTI-B: not microbiologically confirmed symptomatic UTI

Patient has at least TWO of the following with no other recognised cause: fever (>38°C), urgency, frequency, dysuria, or suprapubic tenderness and at least ONE of the following:

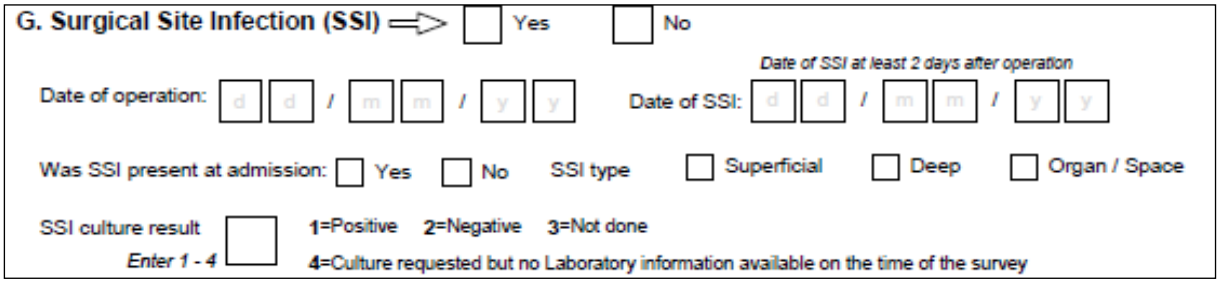
a. Positive dipstick for leukocyte esterase and/or nitrite
b. Pyuria – White blood cells (WBC) or pus cells seen on urine specimen microscopy with ≥10 WBC/ml or ≥ 3 WBC/high-power field of unspun urine
c. Organisms seen on Gram stain of unspun urine
d. At least two urine cultures with repeated isolation of the same uropathogen (Gram-negative bacteria or Staphylococcus saprophyticus)
e. ≤105 colonies/ml of a single uropathogen (Gram-negative bacteria or S. saprophyticus) in a patient being treated with effective antimicrobial agent for a urinary infection
f. Clinician clinical diagnosis of a urinary tract infection
g. Clinician institutes appropriate therapy for a urinary infection

Reporting instructions: For urinary tract infection, only fill in one subcategory (where more than one UTI definition is met by the patient), prioritise urinary tract infection as UTI-A>UTI-B.

Relevant devices in situ before onset:
UTI which occurs in a patient with a relevant device that was used within a defined period before the onset of clinical signs or symptoms of infection (even intermittently)

Notes:
The term "device-related" is used in UTI's:
UTI where the relevant device is urinary catheter and urinary catheter was in situ within seven days of the onset of the signs and symptoms of infection.

UTI Culture: Report:
1=Positive culture; 2=Negative culture; 3=Culture not done; 4=Culture requested but no laboratory information available on time of the study



Major Infection Site: SURGICAL SITE INFECTION

Surgical site infection (SSI): This question should be answered by marking an "X" inside the appropriate boxes (Yes/No).

Date of operation: Indicate the date of operation in the appropriate blocks provided. (dd/mm/yy)

Date of SSI: It refers to the date when the symptoms related to the SSI started, a minimum of two days after the operation. If this information is not available, fulfil with the day of sample withdraw. Still if this information is not available fulfil with the date of onset of antibiotic therapy for the SSI (no matter whether it was empirical or specific treatment). (dd/mm/yy)

Present on the time of admission: Signs and symptoms of SSI was present on admission to the hospital:
Notes:
The following SSI may be present on admission to hospital:
Any SSI type diagnosed in a patient admitted to his hospital having been discharged from an acute hospital in the preceding 48 hours.
SSI diagnosed in a patient admitted to this hospital and the infection is related to a non-implant surgery performed within 30 days prior to admission or implant surgery performed within 12 month prior to admission

Superficial incisional (SSI-S)
Infection occurs within 30 days after the operation and infection involves only skin and subcutaneous tissue of the incision and at least ONE of the following is present:
1. Purulent drainage with or without laboratory confirmation, from the superficial incision.
2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
3. At least ONE of the following signs or symptoms of infection: pain or tenderness, localised swelling, redness, or heat and superficial incision are deliberately opened by surgeon, unless incision is culture-negative.
4. Clinical diagnosis of superficial incisional SSI made by consultant clinician.

Deep incisional (SSI-D)
Infection occurs within 30 days after the operation if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operation and infection involves deep soft tissue (e.g., fascia, muscle) of the incision and at least ONE of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site.
2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (>38º C), localised pain or tenderness, unless incision is culture-negative.
3. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of deep incisional SSI made by consultant clinician.

Organ/Space (SSI-O)
Infection occurs within 30 days after the operation if no implant is left in place or within one year if implant is in place and the infection appears to be related to the operation and infection involves any part of the anatomy (e.g., organs and spaces) other than the incision which was opened or manipulated during an operation and at least ONE of the following:
1. Purulent drainage from a drain that is placed through a stab wound into the organ/space.
2. Organisms isolated from an aseptically-obtained microbiological culture of fluid or tissue in the organ/space.
3. An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination.

4. Diagnosis of organ/ space SSI made by consultant clinician.

CRITERIA FOR DEFINING NOSOCOMIAL PNEUMONIA

Pneumonia (PN): This question should be answered by marking an "X" inside the appropriate boxes (Yes/No).
Relevant devices in situ before onset: HAI which occurs in a patient with a relevant device that was used within a defined period before the onset of clinical signs or symptoms of infection (even intermittently)
Notes: The term "device-related" is used only for PN where the relevant device is intubation and the endotracheal tube was in situ within 48 hours of the onset of signs and symptoms of pneumonia.
Respiratory tract Culture:- Report : 1=Positive culture; 2=Negative culture; 3=Culture not done; 4=Culture requested but no laboratory information available on time of the survey

Pneumonia (PN):

Rx

Two or more serial chest X-rays or CT-scans of lungs with suggestive image of pneumonia for patients who have underlying cardiac or pulmonary disease. In patients without underlying cardiac or pulmonary disease, one definitive chest X-ray or CT-scan is sufficient.

Symptoms

And at least ONE of the following
Fever > 38 °C with no other cause
Leukopenia (<4000 WBC/mm3) or leucocytosis (≥ 12 000 WBC/mm3)
And at least ONE of the following
(Or at least TWO if clinical pneumonia only = **PN 4 and PN 5**)

New onset of purulent sputum, or change in character of sputum (colour, odour, quantity, consistency)
Cough or dyspnoea or tachypnoea
Suggestive auscultation (rales or bronchial breath sounds), rhonchi, wheezing
Worsening gas exchange (e.g., O2 desaturation or increased oxygen requirements or increased ventilation demand)
And according to the used diagnostic method

Microbiology

a – Bacteriologic diagnostic performed by:
Positive quantitative culture from minimally contaminated lower respiratory tract (LRT) specimen **(PN 1)**

Bronchoalveolar lavage (BAL) with a threshold of > 104 colony-forming units (CFU)/ml or ≥ 5 % of BAL obtained cells contain intracellular bacteria on direct microscopic exam (classified on the diagnostic category BAL).
Protected brush (PB Wimberley) with a threshold of >103 CFU/ml
Distal protected aspirate (DPA) with a threshold of > 103 CFU/ml

Positive quantitative culture from possibly contaminated LRT specimen **(PN 2)**
Quantitative culture of LRT specimen (e.g. endotracheal aspirate) with a threshold of 106 CFU/ml

b – Alternative microbiology methods **(PN 3)**
Positive blood culture not related to another source of infection
Positive growth in culture of pleural fluid
Pleural or pulmonary abscess with positive needle aspiration
Histologic pulmonary exam shows evidence of pneumonia
Positive exams for pneumonia with virus or particular microorganism detected: Legionella spp., Aspergillus spp., mycobacteria, Mycoplasma spp., and Pneumocystis spp.)
Positive detection of viral antigen or antibody from respiratory secretions (e.g., EIA, FAMA, shell vial assay, PCR)
Positive direct exam or positive culture from bronchial secretions or tissue
Seroconversion
Detection of antigens in urine (Legionella pneumophila, Streptococcus pneumoniae)
c – Others
Positive sputum culture or non-quantitative LRT specimen culture (PN 4)
No positive microbiology (PN 5)
Reporting instructions: For pneumonia, only fill one subcategory (where more than one PN definition is met by the patient, prioritise recorded pneumonia definition as: PN1>PN2>PN3>PN4>PN5)

MICROORGANISM LIST:

Choose from the list in below the relevant microorganisms to fill in these blocks. Do not enter results retrospectively and do not wait for final microbiology reports that were incomplete at the time of Survey.

Note: For each HCAI, there is room to specify up to two different causative microorganisms. The laboratory information system should be checked for relevant positive microbiology laboratory specimen results available for that patient at the time of PPS and relating to the HAI infection episode under treatment. Specimens may have been sent to microbiology in the days prior to initiation of antimicrobial therapy. Cross-check the date that antimicrobial therapy was commenced for an active HCAI when reviewing microbiology results for each patient

Remember if the Pathogen is Cloxacillin sensitive, the pathogen test is sensitive for Methicillin in the laboratory, therefore if the Pathogen is Cloxacillin resistant the test in the Laboratory should indicated resistant for Methicillin.

If there are more than one Pathogen cultured the following rule must be apply to identify which of the Pathogens are written down:

1. The most prominent organism
2. Clinical opinion as per treatment of the doctor
3. One of the ESKAPE organisms as prioritise
   E- *Enterococci faecium*
   S- *Staphylococcus aureus*
   K- *Klebsiella pneumonia*
   A- Acinetobacter spp
   P- *Pseudomonas* spp
   E- *Enterobacter* spp

Fill in all the relevant open blocks according to culture result. If the strain is coded intermediate, record the antibiogram as Resistant.

S=Sensitive for the specific antibiotic
R=Resistant for the specific antibiotic

APPENDIX 11: MICROORGANISM LIST

Family	Microorganism	MO-code
Gram-positive cocci	*Staphylococcus aureus*	STAAUR
	Coagulase negative staphylococci, include Coagulase-negative Staphylococci, Staphylococcus epidermidis, Staphylococcus haemolyticus and any other non-aureus species	STACNS
	Streptococcus pneumoniae or pneumococcus	STRPNE
	Streptococcus agalactiae or Group B streptococcus	STRAGA
	Streptococcus pyogenes or Group A streptococcus	STRPYO
	Other beta haemolytic streptococci – group B, Group C or Group G streptococcus	STRHCG
	Streptococcus spp. specified	STROTH
	Streptococcus spp.,	STRNSP
	Enterococcus faecalis	ENCFAE
	Enterococcus faecium	ENCFAI
	Enterococcus spp.,	ENCOTH
	Gram-positive cocci,	GPCNSP
	Other Gram-positive cocci specified	GPCOTH
Gram-negative cocci	*Moraxella catarrhalis*	MORCAT
	Moraxella spp., other	MOROTH
	Moraxella spp., not specified	MORNSP
	Neisseria meningitidis	NEIMEN
	Neisseria spp., other specified	NEIOTH
	Neisseria spp., not specified	NEINSP
	Gram-negative cocci, not specified	GNCNSP
	Other Gram-negative cocci	GNCOTH
Gram-positive bacilli	*Corynebacterium* spp.	CORSPP
	Bacillus spp.	BACSPP
	Lactobacillus spp.	LACSPP
	Listeria monocytogenes	LISMON
	Gram-positive bacilli, not specified	GPBNSP
	Other Gram-positive bacilli	GPBOTH
***Enterobacteriaceae* Gram-negative bacilli**	*Citrobacter freundii*	CITFRE
	Citrobacter koseri (previous diversus)	CITDIV
	Citrobacter spp., other	CITOTH
	Citrobacter spp., not specified	CITNSP
	Enterobacter cloacae	ENBCLO
	Enterobacter aerogenes	ENBAER
	Enterobacter agglomerans	ENBAGG
	Enterobacter sakazakii	ENBSAK
	Enterobacter gergoviae	ENBGER
	Enterobacter spp., other	ENBOTH

	Enterobacter spp., not specified	ENBNSP
	Escherichia coli	ESCCOL
	Klebsiella pneumoniae	KLEPNE
	Klebsiella oxytoca	KLEOXY
	Klebsiella spp., other	KLEOTH
	Klebsiella spp., not specified	KLENSP
	Proteus mirabilis	PRTMIR
	Proteus vulgaris	PRTVUL
	Proteus spp., other	PRTOTH
	Proteus spp., not specified	PRTNSP
	Serratia marcescens	SERMAR
	Serratia liquefaciens	SERLIQ
	Serratia spp., other	SEROTH
	Serratia spp., not specified	SERNSP
	Hafnia spp.	HAFSPP
	Morganella spp.	MOGSPP
	Providencia spp.	PRVSPP
	Salmonella enteritidis	SALENT
	Salmonella Typhi	SALTYP
	Salmonella Paratphi	SALTYM
	Salmonella spp., not specified	SALNSP
	Salmonella spp., other	SALOTH
	Shigella spp.	SHISPP
	Yersinia spp.	YERSPP
	Other *Enterobacteriaceae,* specified	ETBOTH
	Enterobacteriaceae, not specified	ETBNSP
Other Gram-negative bacilli	*Acinetobacter baumannii*	ACIBAU
	Acinetobacter calcoaceticus	ACICAL
	Acinetobacter haemolyticus	ACIHAE
	Acinetobacter lwoffii	ACILWO
	Acinetobacter spp., excluding above	ACIOTH
	Pseudomonas aeruginosa	PSEAER
	Stenotrophomonas maltophilia	STEMAL
	Burkholderia cepacia	BURCEP
	Pseudomonadaceae family, other	PSEOTH
	Pseudomonadaceae family, not specified	PSENSP
	Haemophilus influenzae	HAEINF
	Haemophilus parainfluenzae	HAEPAI
	Haemophilus spp., other	HAEOTH
	Haemophilus spp., not specified	HAENSP
	Legionella spp.	LEGSPP
	Achromobacter spp.	ACHSPP
	Aeromonas spp.	AEMSPP
	Agrobacterium spp.	AGRSPP
	Alcaligenes spp.	ALCSPP
	Campylobacter spp.	CAMSPP
	Flavobacterium spp.	FLASPP
	Gardnerella spp.	GARSPP
	Helicobacter pylori	HELPYL

	Pasteurella spp.	PASSPP
	Gram-negative bacilli, not specified	GNBNSP
	Other Gram-negative bacilli, specified and non-Enterobacteriaceae	GNBOTH
Anaerobic bacilli	*Bacteroides fragilis*	BATFRA
	Bacteroides other	BATOTH
	Clostridium difficile	CLODIF
	Clostridium spp. other	CLOOTH
	Propionibacterium spp.	PROSPP
	Prevotella spp.	PRESPP
	Anaerobes, not specified	ANANSP
	Other anaerobes specified	ANAOTH
Other bacteria	*Mycobacterium, atypical/non-tuberculosis*	MYCATY
	Mycobacterium tuberculosis complex TB is not reported in the PPS – Do not report *M. tuberculosis* complex or antimicrobial treatment for suspected or confirmed active or latent *M. tuberculosis* complex infection	MYCTUB
	Chlamydia spp.	CHLSPP
	Mycoplasma spp.	MYPSPP
	Actinomyces spp.	ACTSPP
	Nocardia spp.	NOCSPP
	Other bacteria	BCTOTH
Fungi	*Candida albicans*	CANALB
	Candida glabrata	CANGLA
	Candida krusei	CANKRU
	Candida parapsilosis	CANPAR
	Candida tropicalis	CANTRO
	Candida spp., other specified	CANOTH
	Candida spp., not specified	CANNSP
	Aspergillus fumigatus	ASPFUM
	Aspergillus niger	ASPNIG
	Aspergillus spp., other specified	ASPOTH
	Aspergillus spp., not specified	ASPNSP
	Other yeasts	YEAOTH
	Fungi other	FUNOTH
	Filaments other	FILOTH
	Other parasites	PAROTH

APPENDIX 12: UNIVERSITY RESEARCH COMMITTEE APPROVAL LETTER

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS UV

Research Division
Internal Post Box G40
☎(051) 4017795
Fax (051) 4444359

E-mail address: EthicsFHS@ufs.ac.za

Ms J Du Plessis

2014-10-20

REC Reference nr 230408-011
IRB nr 00006240

DR A NAIR
DEPT OF FAMILY MEDICINE
KIMBERLEY HOSPITAL
8301

Dear Dr Nair

ECUFS NR 175/2014
PROJECT TITLE: KIMBERLEY HOSPITAL HEALTH-CARE ASSOCIATED INFECTION PREVALENCE SURVEY 2015/2016

1. You are hereby kindly informed that the study was approved at the Ethics Committee meeting held on 16 October 2014.
2. Committee guidance documents: Declaration of Helsinki, ICH, GCP and MRC Guidelines on Bio Medical Research. Clinical Trial Guidelines 2000 Department of Health RSA; Ethics in Health Research: Principles Structure and Processes Department of Health RSA 2004; Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa, Second Edition (2006); the Constitution of the Ethics Committee of the Faculty of Health Sciences and the Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines.
3. Any amendment, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.
4. The Committee must be informed of any serious adverse event and/or termination of the study.
5. All relevant documents e.g. signed permission letters from the authorities, institutions, changes to the protocol, questionnaires etc. have to be submitted to the Ethics Committee before the study may be conducted (if applicable).
6. A progress report should be submitted within one year of approval of long term studies and a final report at completion of both short term and long term studies.

7. Kindly refer to the ETOVS/ECUFS reference number in correspondence to the Ethics Committee secretariat.

Yours faithfully

.....
PROF WH KRUGER
CHAIR: ETHICS COMMITTEE

Cc Prof WJ Steinburg

APPENDIX 13: NORTHERN CAPE PROVINCIAL RESEARCH ETHICS COMMITTEE APPROVAL LETTER

DEPARTMENT OF HEALTH
LEFAPHA LA BOITEKANELO
ISEBE LEZEMPILO
DEPARTEMENT VAN GESONDHEID

Department of Health
Private Bag X5049
KIMBERLEY
8301

Enquiries / Dipatlisiso / Imibuzo / Navrae : Prof. Yunus Ballim

Date / Letlha / Umhla / Datum : 28 April 2015

Reference / Tshupelo / Isalathiso / Verwysings :
Tel: 053 807 5300
Fax: 053 807 5313

Dr. Arun Nair
Principal Investigator
Kimberley Hospital Complex
144-148 Du Toit Span Road
Kimberley 8301

Dear Dr. Arun Nair

***TITLE:* Kimberley Hospital Health-Care Associated Infection Prevalence Survey 2015/16**

Reference Number: NC_2015RP26_707

The application to conduct the study was received and has been reviewed by the Provincial Health Research and Ethics Committee (PHREC)

Approval is hereby granted to conduct the above-mentioned study in the Northern Cape Province

Please note: This approval is valid for a period of one year from the date of approval.

Comments by the committee:

1. Edit work and check spelling
2. Do thorough statistical analysis of the current problem

The following conditions have to be noted:

1. The research project shall be conducted at no cost to the Northern Cape Department of Health.

We are committed to achieving our vision through a decentralized, accountable, accessible and constantly improving health care system within available resources. Our caring, multi-skilled, effective personnel will use evidence-based, informative health care and maturing partnerships for the benefit of our clients and patients.

2. The approval is limited to the research proposal as submitted in the application.
3. Variation or modification on the research must be notified formally to PHREC for further consideration.
4. The PHREC may monitor the project at any time.
5. At the completion of your study a copy of the final report must be submitted to the Research and Development Directorate.
6. The Northern Cape Senior Management Committee will be briefed on the outcome of the study prior to publishing.

Furthermore, after the completion of you project, you may be requested to do a presentation on the final findings of your study.

The committee wishes you success on your study

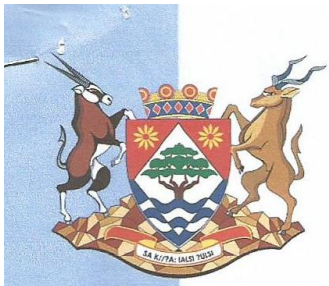
Yours Faithfully

29/04/2015

Prof. Yunus Ballim
Acting Chairperson: PHREC
E-mail: yunus.ballim@spu.ac.za
Tel: 053 807 5300

Date

APPENDIX 14: KIMBERLEY HOSPITAL MANAGEMENT APPROVAL LETTER



DEPARTMENT OF HEALTH
LEFAPHA LA BOPHELO BO BOTLE
DEPARTEMENT VAN GESONDHEID
ISEBE LENKONZO ZENTLALONTLE

Office of Head Clinical Manager: Medical
Private Bag x 5021
Kimberley, 8300

Tel: 053 802 2147 Fax: 053 832 9435

Reference / Tshupelo / Verwysings / Isalathiso :
Date / Leshupelo / Datum / Umhla : 11th September 2014
Enquiries / Dipatlisiso / Imibuzo / Navrae : Dr S Joubert
Email: sjoubert@ncpg.gov.za

Dr A Nair

Re: Permission to do research

Permission is hereby granted to conduct a medical research project at Kimberley Hospital Complex, title proposed: "Kimberley Hospital Health-Care associated infection prevalence survey 2015/2016".

Please submit proof of ethics clearance, before commencing with the research.
Kindly submit research protocol to the Northern Cape Provincial Health Research and Ethics Committee for approval:

Contact Details:
Ms P Baitsiwe
Email address: PBaitsiwe@ncpg.gov.za
Tel: (053) 830 0529

Kind regards,

Joubert

DR S JOUBERT
HEAD CLINICAL MANAGEMENT: MEDICAL
SJ/mmc

APPENDIX 15: LETTER OF PERMISSION FROM SA-HISC WITS UNIVERSITY

NATIONAL HEALTH LABORATORY SERVICE
UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

SCHOOL OF PATHOLOGY
Department of Clinical Microbiology and Infectious Diseases

7 York Road Parktown
Room 3T11 3rd Floor
Faculty of Health Sciences
PO Box 2115 Houghton,2041 Tel: (011) 489-8510 Fax: (011) 489-8530

FROM: Professor A G Duse

HOD: Department of Clinical Microbiology and Infectious Diseases

Director: The Michael A Emmerson SA Healthcare Infection Surveillance Centre (SA-HISC)

School of Pathology of the NHLS and University Of The Witwatersrand, Johannesburg

DATE: 11-11-2014

LETTER OF PERMISSION REGARDING THE RESEARCH PROJECT ENTITLED: KIMBERLEY HOSPITAL HCAI (HEALTH-CARE ASSOCIATED INFECTION) PREVALENCE SURVEY 2015/2016

TO WHOM IT MAY CONCERN:

Dear Colleague

This letter serves to confirm that I have granted permission to allow Dr Arun Nair (Registrar in the Department Of Family Medicine, University of the Free State) to use the methodology (surveillance definitions and questionnaires) to collect HCAI data at Kimberley Hospital (Northern Cape Province) for his research report in partial fulfilment of his MMed degree.. All data will be processed by SA-HISC on condition that Dr Nair uses the same protocol and follows the exact methodology that SA-

HISC has employed for the 2013-14 NHI pilot sites healthcare-associated infection survey.

SA-HISC specialises in HCAI prevalence surveys conducted in keeping with international standardised methodologies. SA-HISC shall assist with the printing of the specialised serialised questionnaires and subsequently, after completion of the data collection, processing of forms and providing data that can be analysed in SPSS format by the primary researcher. By ensuring the consistency of the methodology used, Dr Nair's findings shall be comparable to other surveys being done in South Africa as well as internationally.

Yours sincerely,

PROFESSOR ADRIANO G DUSE
MBBCh, DTM&H, MScMed, MMed (Microbiology), FCPath (SA) (Microbiology)
Chief Specialist, Chair & Academic Head: Department of Clinical Microbiology & Infectious Diseases
School of Pathology of the NHLS & University of the Witwatersrand

APPENDIX 16: UNIVERSITY DISSERTATION ASSESSMENT FORM

Name of student.....

Title.....

Component	Marks	Comments
1. Topic and title Accurate, concise, relevant to the field of Family Medicine	/5	
2. Abstract All aspects covered, clear and accurate	/10	
3. Introduction/Background Problem stated well and justification for the study is clear	/5	
4. Literature review Relevant, current, well interpreted and connected to study	/10	
5. Problem statement, Aim and objectives Clearly formulated, focused, feasible and logical	/10	
6. Method Study design, sampling, measurement, errors and pilot study well described, logic and justified	/20	
7. Ethical considerations Informed consent, approval and confidentiality addressed	/5	
8. Data analysis, management and presentation Clear and accurate presentation, in context with research question/s?	/15	
9. Discussion Accurate interpretation and supported by literature	/10	
10. Conclusion and recommendations Accurate and justified from findings, logic, limitations described	/10	
11. Style, language and layout Grammatically correct, consistent style and numbering, neat presentation	/10	
12. References Good sources, Correctly referenced, up to date	/10	
Total	/120	

Global rating

Fail ☐

Needs improvement ☐

Pass ☐

Distinction ☐

%

General remarks .....

.....

.....

.....