

**AN EVALUATION OF THE CAPABILITY OF GAUTENG'S PROVINCIAL
ACADEMIC / TERTIARY HOSPITALS TO MANAGE AN INFECTIOUS
DISEASE OUTBREAK**

By

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DECLARATION

I declare that the dissertation hereby submitted to the University of Limpopo, for the degree of Master of Medicine (Community Health) has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

A handwritten signature in black ink, appearing to read 'B. M. M.', is written over a horizontal dotted line.

Signature

20 February 2009

Date

ACKNOWLEDGEMENT

- 1 Thank you to my pillars of strength, dad (Joe Nathan) and my late mum (Pushpavathy Nathan) for nurturing and providing me with a strong foundation in life to be a success. Both of you have given me the most precious gifts that a parent can give a child, the gifts of unconditional love and an education. You'll are my anchor and rock.
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ABSTRACT

Background

The threat posed by infectious diseases is progressively growing on a global scale. With 2010 rapidly approaching, when South Africa will host the Soccer World Cup, there will be a massive influx of foreigners into the country. The purpose of the study was evaluate to the status of Gauteng tertiary academic hospitals with respect to outbreak response and, with the help of existing local and international policies and research, to develop a generic model that can be used by hospitals in developing outbreak response policies and standard operating procedures.

Methods

A descriptive cross-sectional survey using a semi-structured questionnaire was utilized to evaluate the preparedness of tertiary health care facilities in South Africa. The target population consisted of Clinical Directors, Senior Clinical Executives/ Medical Superintendents, Infection Control Nurses and / or Quality Assurance Managers and Infection Control Nurses. These categories of health professionals were targeted as they are normally delegated responsibility for outbreak response activities.

Results

Twelve tertiary academic hospitals were included in the survey and nine responded to the survey questionnaire giving a 75% response rate. Other significant findings were:

- 71% of the responding hospitals had clear terms of reference for their response team.

- 43% of the responding hospitals had a functional preparedness and response strategy / plan for priority diseases.
- The most frequent point of entry in the tertiary academic hospitals is the casualty / emergency unit, followed by the trauma and OPD areas
- There are very few 'protective environment wards' and 'airborne infection isolation rooms' in Gauteng Province.
- Only 15% of responding hospitals have infection control compatible ventilation and only 42% could manage a patient that requires quarantine in the casualty/ emergency unit area. Most hospitals did not have the capacity to quarantine large number of patients.

The study has also illustrated that there is no model easily available, suitable for the South African context, that can be used by hospital management in facility specific planning for infectious disease outbreaks.

Conclusions

It can be concluded from the findings of this study that academic hospitals in Gauteng, as well as in other areas of South Africa, are not adequately prepared for the management of an infectious disease outbreak.

There is need for a generic planning tool to assist institutions to develop outbreak policies and standard operating procedures tailored to their specific institution.

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LIST OF ABBREVIATIONS

AEIIR	Airborne infection isolation room
CBOs	Community-based organizations
CDC	Centers for Disease Control and Prevention
DGMH	Dr George Mukhari Hospital
EPI	Expanded Program of Immunisation
HEICS	Hospital Emergency Incident Command System
HEPA	High Extraction Particulate matter Air (Filtration Systems)
IEC	Information, Education and Communication
NDOH	National Department of Health
NORT	National Outbreak Response Team
NGO's	Non-governmental organizations
PEW	Protective Environment Ward
PPE	Personal Protective Equipment
SADC	South African Development community
SARS	Severe Acute Respiratory Syndrome
SPU	Special Pathogens Unit
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The threat posed by infectious diseases is progressively growing on a global scale. This is largely due to the dramatic changes in human behaviour, travel, broader social, economic and technological developments, mutations in pathogens and the emergence of new diseases and zoonoses. The Department of Health in South Africa concedes that this growing threat to the health system has never been accorded the attention it deserves.¹

With 2010 rapidly approaching, when South Africa will host the Soccer World Cup, there will be massive influx of foreigners into the country. The question that remains to be answered is, are Gauteng Health Departments' tertiary Institutions able to cope with a possible infectious disease outbreak?

When a patient with an infectious disease arrives at a hospital, the health care workers are usually placed at risk since they are first responders to the patient. Hospitals usually receive little or no warning before such patients arrive. It is therefore imperative that all health care workers know how to respond in these circumstances, hence the need for outbreak response policies, strategies, guidelines and standard operating procedures.

Each health care facility, with the involvement of the infection control committee, administration, building engineering staff, emergency department, laboratory directors and nursing directors, should clarify in advance how they will best be able to deliver care in the event of many patients being admitted or many contacts being in the hospital.²

The question that arises is: Should all tertiary hospitals have an emergency unit that has patient isolation rooms, infection control compatible ventilation and design that can be rapidly converted into a quarantined area where screening and observation can be performed should an outbreak occur? This question poses significant challenges for the hospital community in the event of an outbreak, and therefore necessitates an investigation into outbreak readiness of the tertiary hospitals in the province with the aim of creating awareness and developing a generic approach that will assist hospitals with the development of outbreak response policies and operating procedures.

Initial rapid assessment by telephone indicated that Pretoria Academic Hospital, Johannesburg General Hospital and Chris Hani Baragwaneth Hospital do not have customized policies in place to manage infectious disease outbreaks. Dr George Mukhari Hospital's outbreak manual, from the Gauteng Department of Health, dates back to 2002 and only deals with (Expanded Program of Immunisation) (EPI) diseases. This initial assessment indicated a need for more detailed evaluation of outbreak response readiness in these tertiary hospitals.

The National Department of Health recognizes the devastating effect that international outbreaks such as SARS, haemorrhagic fevers and the numerous national Klebsiella outbreaks in neonatal units have had in terms of morbidity and mortality and the accompanying financial burden placed on individuals, families, and society at large.¹

Each hospital environment is unique (i.e. the infrastructure, point of first entry, resources available etc.) and it is thus quite logical that outbreak response policies need to be tailor made to suit each individual institution.

1.2 AIM OF THE STUDY

The aim of this study was evaluate to the status of Gauteng tertiary academic hospitals with respect to outbreak response; and to develop a generic model that

can be used by hospitals in developing outbreak response policies and standard operating procedures.

1.3 OBJECTIVES OF THE STUDY

The objectives of this study were:

- To determine the preparedness of tertiary health care facilities using the criteria stated in the National Guidelines on Epidemic Preparedness and Response.³
- To determine international experience and evaluate applicability of existing available international policies and guidelines.
- To develop a generic approach that could be utilized by other institutions to develop an outbreak response policy and standard operating procedures.

1.4 DEFINITION AND CLARIFICATION OF TERMS

'Academic health complexes' are complexes which may consist of one or more health establishments at all levels of the national health system, including peripheral facilities, and one or more educational institutions working together to educate and train health care personnel and to conduct research in health services.

'AEIIR (Airborne Infection Isolation Room)' is a room that is fitted with flutter strips on doors to reduce air leakage; has negative pressure (2.5 to 20 Pascal's) with a pressure gauge to confirm this; increased exhaust air volume fans; HEPA filtration systems and ventilation units; an anteroom for use by health care workers to put on and take off PPE; a digital analogue pressure manometer mounted outside the door; a hard rather than suspended ceiling; walls that extend from the floor to the ceiling. An ultraviolet light for germicidal irradiation is optional.⁴

'Constitution' means the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996).⁵

'Hazardous Substance' is any substance to which exposure may result in adverse effects on the health or safety of employees. This includes substances and biological or disease-causing agents that may reasonably be anticipated to cause death, disease, or other health problems.

'Health care personnel' means health care providers and health workers as defined in the National Health Act, Act 61 of 2003.⁶

'Health care provider' means a person providing health services in terms of any law, including in terms of the:⁶

- Allied Health Professions Act, 1982 (Act No. 63 of 1982);
- Health Professions Act, 1974 (Act No. 56 of 1974);
- Nursing Act, 1978 (Act No. 50 of 1978);
- Pharmacy Act, 1974 (Act No. 53 of 1974); and
- Dental Technicians Act, 1979 (Act No. 19 of 1979).

'Health worker' means any person who is involved in the provision of health services to a user, but does not include a health care provider.⁶

'Hospital' means a health establishment that is classified as a hospital by the Minister in terms of section 35 of the National Health Act, Act 61 of 2003.⁶

'Hospital Emergency Incident Command System (HEICS)' An example of an optional incident command system tailored specifically for use by hospitals and designed to function in conjunction with other common incident command systems used by emergency response organizations (e.g., Fire Service Incident Command System).⁷

‘Hospital Decontamination Zone’ is a zone that includes any areas where the type and quantity of hazardous substance is unknown and where contaminated victims, contaminated equipment, or contaminated waste may be present. It is reasonably anticipated that employees in this zone might have exposure to contaminated victims, their belongings, equipment, or waste. This zone includes, but is not limited to, places where initial triage and/or medical stabilization of possibly contaminated victims occur, pre-decontamination waiting (staging) areas for victims, the actual decontamination area, and the post-decontamination victim inspection area. This area will typically end at the emergency department door. In other documents, this zone is sometimes called the ‘Warm Zone’, ‘contamination reduction zone’, ‘yellow zone’, or ‘limited access zone’.⁷

‘Hospital Post-decontamination Zone’ is an area considered uncontaminated. Equipment and personnel are not expected to become contaminated in this area. At a hospital receiving contaminated victims, the Hospital Post-decontamination Zone includes the emergency department (unless contaminated). This zone is sometimes called the ‘Cold Zone’ or ‘Clean Area’.⁷

‘Military health establishment’ means a health establishment that is, in terms of the Constitution and the Defence Act, 2002 (Act 42 of 2002), the responsibility of and under the direct or indirect authority and control of the President, as Commander in Chief, and the Minister of Defence, and includes:

- the Institutes for Aviation and Maritime Medicine;
- the Military Psychological Institute;
- military laboratory services; and
- military training and education centres.⁶

‘Municipal health services’ includes:

- water quality monitoring;
- waste management;
- health surveillance of premises;

- surveillance and prevention of communicable diseases, excluding immunisations;
- vector control;
- environmental pollution control;
- disposal of;
- chemical safety;

but excludes port health, malaria control and control of hazardous substances.⁶

‘Municipality’ means a municipality as defined in section 1 of the Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000).⁶

‘National department’ means the National Department of Health.⁶

‘National Health Council’ means the Council established by section 22(1) of the National Health Act.⁶

‘Personal Protective Equipment (PPE)’ Examples include protective suits, gloves, foot covering, respiratory protection, hoods, safety glasses, goggles, and face shields.⁷

‘Protective Environment Wards’ (PEWS) are wards that provide high-level isolation consisting of two or more beds.

Standard Precautions are steps taken to prevent direct contact with all body fluids (including blood), secretions, excretions on non-intact skin (including rashes), and mucous membranes. Standard Precautions routinely practised by healthcare providers include:

Hand washing - Hands are washed after touching blood, body fluids, excretions, secretions, or items contaminated with such body fluids, whether or not gloves are worn. Hands are washed immediately after gloves are removed, between patient contacts, and as appropriate to avoid transfer of micro-organisms to other

patients and the environment. Either plain or antimicrobial-containing soaps may be used according to facility policy.⁸

Gloving - Clean, non-sterile gloves are worn when touching blood, body fluids, excretions, secretions, or items contaminated with such body fluids. Clean gloves are put on just before touching mucous membranes and non-intact skin. Gloves are changed between tasks and between procedures on the same patient if contact occurs with contaminated material. Hands are washed promptly after removing gloves and before leaving a patient care area.⁸

Masks / Eye Protection or Face Shields - A mask and eye protection (or face shield) are worn to protect mucous membranes of the eyes, nose, and mouth while performing procedures and patient care activities that may cause splashes of blood, body fluids, excretions, or secretions.⁸

Gowns - A gown is worn to protect skin and prevent soiling of clothing during procedures and patient-care activities that are likely to generate splashes or sprays of blood, body fluids, excretions, or secretions. Selection of gowns and gown materials should be suitable for the activity and amount of body fluid likely to be encountered. Soiled gowns are removed promptly and hands are washed to avoid transfer of micro-organisms to other patients and environments.⁸

‘Triage’ The process of screening and classifying sick, wounded, or injured persons to determine priority needs in order to ensure the efficient use of medical personnel, equipment, and hospitals.⁷

Categories of hospitals

There are three categories of hospitals in South Africa i.e. Level 1, 2 and 3 hospitals. Each of these levels of hospitals offers a different level of service. However, the Department of Health has never formally adopted any indicators, norms or standards, or definition of the services that should be available to assess the level of care that each of these hospitals provide.⁹

Table 1 Specialties classified as level 3 services ⁹

Group 1 Specialties	Group 2 Specialties	Group 3 Specialties
Anaesthetics	Cardiology	Hepatology
Burns	Cardiothoracic Surgery	Liver Transplant
Clinical Pharmacology	Clinical Immunology	
Critical Care & ICU	Craniofacial Surgery	
Dermatology	Endocrinology	
Diagnostic Radiology	Geriatrics	
Ear Nose & Throat	Haematology	
Gastroenterology	Human Genetics	
Infectious diseases	Medical & Radiation Oncology	
Mental Health	Neurology	
Neonatology	Neurosurgery	
Nephrology	Nuclear Medicine	
Obstetrics & Gynaecology	Paediatric Sub- Specialties	
Ophthalmology	Renal Transplant	
Orthopaedics	Rheumatology	
Paediatric Medicine	Spinal Injuries	
Paediatric Surgery		
Paediatric ICU		
Plastic & Reconstructive Surgery		
Rehabilitation Centre		
Respiratory Medicine		
Trauma		
Urology		

Vascular Surgery		
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The definitions, norms and standards for hospitals are based on draft recommendations that have been made to the Department. To use scarce resources more efficiently, government has introduced a hierarchy of health services. Patients using the public health system are now only able to access higher levels of care once they have been assessed and referred upwards by health workers at a lower level. The exception to this is medical emergencies.

Primary level services are supposed to cover a comprehensive range of preventive, promotional, curative and rehabilitation services. Both clinics and health centres are to offer services such as mother and child care, immunisation, family planning, treatment for sexually transmitted infections (STIs), minor trauma and care for those with chronic illnesses (e.g. diabetes and hypertension). The hospital revitalisation programme is focusing on improving the infrastructure, equipment, management and quality in 27 hospitals and on modernising tertiary services.

Of the 388 public hospitals in South Africa, 64% are district hospitals, 16% are Secondary and specialised hospitals, and less than 4% are Level 3 in the public sector. A Level 3 facility provides specialist and sub-specialist care.⁹

According to the National Department of Health draft recommendations, tertiary hospitals (Level 3) may be classified as: ⁹

(a) Provincial Tertiary Hospitals (Tertiary 1)

These hospitals receive patients from, and provide sub-specialist support to, a number of Regional Hospitals.^{9,10} Most of the care should be level 3 care that requires the expertise of clinicians working as sub-specialists or in rarer specialties (e.g., within surgery for example, sub-specialties such as urology, neurosurgery, plastic surgery and cardiothoracic surgery) .

A general level 3 hospital will have sub-specialty representation in at least 50% of the range of the Group 1 specialties. A specialised level 3 hospital will only have one or two specialties represented in the hospital (e.g. cardiology and anaesthetics).

(b) National Referral Hospitals (Tertiary 2)

Some Tertiary 1 hospitals will also provide a defined range (package) of other specialised services (Group 2 specialties in Table 1 above. These are classified as Tertiary 2 hospitals (also called National Referral Hospitals)). The Nelson Mandela Hospital in Umtata would fall into this category.

(c) Central Referral Hospitals (Tertiary 3)

In a very small number of hospitals, currently 2, there will be an additional package of sub-specialties (Group 3 Specialties in Table 1). Inkosi Albert Luthuli Central Hospital in Durban is classified under this category.

These hospitals consist of very highly specialised national referral units that together provide an environment for multi-specialty clinical services, innovation and research. The services provided are generally of high cost and low volume, and ones that require high technology and/or multi-disciplinary teams of people with scarce skills to provide sustained care of high quality.

(d) Specialised Hospitals

There are wide a range of possible specialties that could be focused on in a hospital, including spinal injuries, maternity, cardiac, infectious diseases and so on. Two common specialised hospitals catering for high incidence chronic conditions that are found nationally are:

Psychiatric hospitals that provide long-term in-patient care for patients with chronic psychiatric conditions and tuberculosis (TB) hospitals, which provide long term in-patient, care for patients with chronic TB.

CHAPTER 2

LITERATURE REVIEW

The Literature Review was conducted using Med Line, library resources and the world-wide web over a 10 year period to determine what models exist with regard to hospital readiness in the event of an infective disease outbreak.

There is limited literature on this topic in respect of the South African context.

2.1 INTRODUCTION

Elimination of infectious diseases is often understood to mean the total absence of cases in a population¹¹. This situation can only occur on a sustainable basis if the entire population is immune as a result of either natural disease or vaccination. This is a costly and unrealistic scenario. More appropriate is a situation where sustained transmission cannot occur and secondary spread from importations of disease will end naturally without intervention.¹¹

Further, healthcare facilities may be the initial site of recognition and response to events. Four agents that have been recognized with a potential to be used in warfare include anthrax, botulism, plague and small pox. Additional agents that may be used include agents that cause Tularaemia, Brucellosis, Q fever, Viral Haemorrhagic Fevers, Viral encephalitis, and disease associated with staphylococcal enterotoxin B.⁸

Early detection and improvement of all the continents preparedness for emerging diseases has been brought into focus by the recent adoption of a treaty by the World Health Assembly of new International Health Regulations, which now compels countries to have more effective surveillance and reporting systems to improve the ability for early detection of global disease.²

The elimination of infectious diseases is virtually impossible and outbreaks may occur due to both natural occurrences and acts of terrorism. This necessitates the evaluation of outbreak response readiness and development of policies and standard operating procedures.

2.2 EXPERIENCES OF OUTBREAKS IN SOUTH AFRICA

According to the NICD's Special Pathogen's unit, Class 4 viruses known or considered likely to occur in Africa include Marburg, Ebola, Rift Valley Fever, Crimean Congo Haemorrhagic Fever, Lassa Fever-related arenaviruses.¹²

The Congo fever virus was first isolated in Africa from the blood of a febrile patient in Zaire in 1956.¹³ Congo Crimean Haemorrhagic fever was first observed in Crimea, by Russian scientists in 1944 and 1945.¹³

In February 1980, an outbreak of Marburg haemorrhagic fever was investigated by the NICD.¹²

In 1981, the first case of Crimean Congo Haemorrhagic fever was recognized in South Africa.¹⁴ The virus was isolated from a schoolboy who died after being bitten by a tick at a nature reserve in the North West Province.¹⁵

In May 1984, seven cases of Crimean Congo Haemorrhagic Fever were reported in South Africa. Four of these patients were exposed to a single cow. The fifth case was exposed to two additional cows from the same farm and the other two cases were unrelated. Only one patient died during this outbreak.¹⁶

In Oct-Nov 1996, an outbreak of Crimean Congo Haemorrhagic fever among ostrich farm workers at an ostrich abattoir was reported in Oudtshoorn, Western Cape Province. All 16 cases reported appeared to have resulted from common-source primary infection, and no secondary cases were identified.^{17,18} This resulted in the European Union banning importation of ostrich products from

South Africa. During the same period, Ebola haemorrhagic fever was diagnosed in a nurse in Johannesburg. Upon investigation, the source was found to be a doctor from Gabon who had sought treatment for his illness in South Africa.¹²

In 2002, five cases of Crimean-Congo Haemorrhagic fever were confirmed in Southern Africa. In three of the cases, the infection was a result of a tick bite. The other two cases occurred in farmers, one who was exposed to infection while slaughtering sheep on his farm in the district of Rehoboth in Namibia and the other who became ill after castrating a sheep on a farm in the Northern Cape.¹⁹

By the end of 2003, the SPU of the NICD had investigated 2788 suspected cases of viral hemorrhagic fever in South Africa.¹²

In 2003, the SPU was involved in performing diagnostic tests on suspected cases of SARS. Fortunately the disease was not confirmed in South Africa¹². The patient presented at Pretoria East Hospital where he was immediately isolated and managed under strict barrier nursing in a negative pressure isolation room as a probable SARS case. 3 pharmacists, 8 family members and 6 health care workers were also quarantined and followed up in their homes for two weeks. Fortunately, the patient recovered and was confirmed as not having the virus. However, the state of epidemic preparedness came under scrutiny.²⁰

On 5 October 2005, a farm worker from the Riversdale area was admitted to Groote Schuur Hospital. He died the same day after being diagnosed with Congo Haemorrhagic fever. Seven of his family and friends were quarantined under observation at the Riversdale Hospital Unit.²¹

According to the WHO, as of 4 February 2001, the Kwa-Zulu Natal Department of Health had reported 37204 cases and 85 deaths since the start of the cholera outbreak in Mid August 2000. By the 22 February 2001, 56 092 cases had been reported and there were 120 deaths.^{22, 23, 24}

2.3 PREPAREDNESS FOR AN INFECTIOUS DISEASE OUTBREAK

Infection control programs in South Africa range from non-existent to excellent and that in the majority of our health care facilities in South Africa, these programs are generally poor.²⁵ Where infection control policies are lacking, the containment of the spread of infectious organisms becomes extremely difficult.²⁵ It is also a well established fact that the quality of the health care facility's infection control programme is an overall reflection of the standard of care provided by that institution.²⁵

The first step to becoming outbreak prepared is to have an outbreak response plan or policy in place, so that a co-ordinated effort unfolds to curb the outbreak. Unexpected challenges may arise, but majority of the events that will unfold will have been planned for.

2.4 RESPONSIBILITY FOR THE OUTBREAK RESPONSE POLICY OR STRATEGY

In what amounted to an acknowledgment that all is not well in the country's hospitals, President Thabo Mbeki said in his State of the Nation address to Parliament on 3 February 2006,⁹ "To improve service delivery in our hospitals, by September this year we will ensure that hospital managers are delegated authority and held accountable for the functioning of hospitals, with policy issues regarding training, job grading and accountability managed by Provincial Health Departments which themselves will need restructuring properly to play their role."

Poor management at every level of the health department and a lack of proper guidelines for the different levels of government (including norms and standards for all levels of hospitals) are exacerbating problems in health facilities.⁹

According to the Department of Health's document on Guidelines for outbreak response and epidemic management, each sphere of governance has a responsibility in terms of the integrated outbreak investigation and control effort.²⁶

- **National Department of Health responsibilities**
 - Provision of support to the provincial departments
 - Development of guidelines for outbreak control.
 - Development of training programs.
 - Facilitation of communication among provinces.
 - Facilitation of national and international technical assistance.
 - Publishing of health information.

- **The National Outbreak Response Team (NORT) responsibilities:**
 - The management and co-ordination of outbreak control activities associated epidemiological investigations.
 - The NORT must be able to respond rapidly and institute rapid control efforts if required.

- **Provincial Department of Health responsibilities:**
 - Epidemic control is the responsibility of each province.
 - Reporting of suspected outbreaks of communicable diseases.
 - Maintenance of a directory consisting of the work and home telephone numbers of the Provincial outbreak control teams, additional provincial resources, other provincial outbreak control teams, the National Outbreak Coordinator and team and other national resources.

- **The Provincial Outbreak Coordinator is responsible for:**
 - The development of operational outbreak investigation and control guidelines.
 - Ensuring the development of a system for reporting suspected outbreaks in districts and regions.
 - Coordinating the outbreak response in accordance with general guidelines.

- Identifying and coordinating appropriate resources required for outbreak investigations
 - Establishing the outbreak response team.
 - Communicating with the National Outbreak Control Coordinator.
 - Ensuring the development of a Provincial Medic Plan utilizing national guidelines.
 - Ensuring the preparation of a preliminary report on outbreaks and that recommended prevention and control measures are instituted.
 - Ensuring the submission of a final report to the following persons: Provincial Health Authority; local and district health authorities concerned, the National Outbreak Control Coordinator and other organisations involved in each outbreak investigation.
- **District Health Authority Responsibilities**
 - Ensuring the development of district communication systems.
 - Participating in the developing of provincial outbreak investigation and control guidelines.
 - Participating in outbreak investigations and control efforts.
 - Communication with local public, health service providers and the Provincial Outbreak Control Coordinator.
 - Participation in the outbreak control media relations.
 - Participation in the preparation of the preliminary and final reports of outbreaks.

The Department of Health states that since the ultimate responsibility for the development of an effective infection prevention and control protocol rests with the Hospital manager or CEO in a hospital, it is imperative that this be done once awareness is created for the need of such protocol. ¹ In the local context, the CEO of the hospital usually delegates this responsibility to the Clinical Services Director, Clinical Manager or Senior Clinical Executive or Senior Superintendent, the Infection control nurse and or the Quality Assurance Manager.

According to the National Infection Prevention and Control Policy and Strategy, the different tiers of government and civil society have different roles to play in outbreak prevention and management as outlined below.²⁷

- **The National Department of Health, Directorate: Infection Prevention & Control**

- The national Department of Health establishes a national Infection Prevention & Control directorate within the Cluster: Office of Standards Compliance.

- The Directorate: Infection Prevention & Control is advised and assisted by a National Infection Prevention and Control Advisory Committee (NIPCAC), consisting of experts in the field of infection prevention and control. This formalized national structure is established in accordance with Section 23(5) of the National Health Act, 2003, making it a committee of the National Health Council.

- **The Provincial Infection Prevention & Control Committee/ Unit**

- In each province, a Provincial Infection Prevention & Control Committee or unit is established, preferably within existing provincial Quality Assurance structures. This committee meets at least quarterly with the district infection prevention and control committees.

- **The District Infection Prevention & Control Committee**

- Each health district establishes a District Infection Prevention & Control Committee that will comprise of the district infection prevention and control officer and facility-based officers in charge of infection prevention and control.

- The Committee meets at least quarterly or more frequently as need arises

- **The facility-based (institutional) Infection Prevention & Control Committee**
 - Each health care facility should establish a multidisciplinary Infection Prevention & Control Committee where appropriate. This committee should comprise of at least the officer in charge of infection prevention and control in the facility, a microbiologist, heads of all relevant medical disciplines, a pharmacist, a housekeeping supervisor, a food service manager, a laundry service manager, a maintenance manager, and the hospital manager.
 - Should the facility not have a medically trained microbiologist on its staff establishment, the committee should ensure easy access to the services of a medically trained microbiologist.
 - Should the facility (hospital) not have a hospital engineer on its staff establishment, the committee should arrange access to the services of such engineer with their provincial health department.

- **The Infection Prevention & Control Team (Unit)**
 - Each facility appoints an Infection Prevention and Control Team (unit), which will comprise of least a clinician (ideally a medically trained microbiologist) and a registered nurse, trained in infection prevention and control
 - The number of trained infection prevention and control nurses represented on this team should ideally be one nurse per 200 patient beds.
 - Where the availability of medical staff does not permit it, there should at least be an identifiable clinician allocated for providing medical input and direction to the infection prevention and control team.

The National Infection Prevention and Control Policy and Strategy, also lists in some detail the infection control roles and responsibilities of various stakeholders' right down to actual facility level including such diverse areas as the pharmacy and food services.²⁷ For completeness and easy reference these roles and responsibilities have been included in summary form in Annexure 1.

It is often assumed that outbreak management is the responsibility of all levels of hospitals, however, there still seems to be confusion about the official standards and norms for each level of care.⁹

Despite the classification of hospitals and levels of care, people with infectious diseases will usually walk-in to the nearest hospital to seek medical care. Therefore, it implies that all levels of hospital, need to be prepared should an outbreak occur. Since tertiary level hospitals in South Africa are usually also given an academic status, it follows that tertiary academic hospitals should be the most prepared in the event of an infectious disease outbreak. Tertiary Academic Hospitals focus mainly on training, research and treatment of patients with rare and difficult to treat illnesses. It is only natural to assume that these hospitals would have at least trained their personnel on infectious disease outbreak principles and have policies and strategies in place to share with, as well as provide support to their lower level hospitals.

2.5 INFRASTRUCTURAL LAYOUT AND BASIC REQUIREMENTS FOR DEALING WITH AN INFECTIOUS DISEASE OUTBREAK

Despite sophisticated care being given at hospitals, many hospitals lack the basic infrastructure to minimize the risk of spread of infection.⁸

The National Institute of Occupational Safety and Health (NIOSH) have guidelines for the design and evaluation of ventilation modifications to convert hospital rooms into isolation rooms. The conversion of hospital rooms into isolation rooms was done during the SARS outbreak in Taiwan. The NIOSH also has guidelines for the conversion of vacated facilities into screening and observation facilities.⁴

Infrastructural differences among hospitals necessitate the customization of hospital outbreak response policies according to their unique infrastructures to facilitate ease of workflow and logistics during an outbreak.

2.6 BASIC PRINCIPLES IN OUTBREAK MANAGEMENT

While the customized hospital infective disease outbreak policies are being developed, all patients presenting at a health care facility irrespective of their diagnosis must be treated using Universal Precautions to minimize the risk of transmission of micro organisms from patient to health care worker and vice versa.²⁵ These Standard Precautions include: hand washing, wearing of personal protective equipment as necessary, safe disposal of waste, appropriate cleaning, disinfection, or sterilization of equipment and patient care items as well as appropriate decontamination of linen and the environment. [Annexure 2]

There are four diseases with recognized bioterrorism potential i.e. anthrax, botulism, plague, and smallpox [Annexure 3]. Agents of bioterrorism are generally not transmitted from person to person and re-aerosolisation of these agents is unlikely. Therefore all patients in healthcare facilities, including symptomatic patients with suspected or confirmed bioterrorism-related illnesses, should be managed utilizing Standard Precautions [Annexure 2] and Universal Precautions [Annexure 4] are designed to reduce transmission from both recognized and unrecognized sources of infection in healthcare facilities, and are recommended for all patients receiving care, regardless of their diagnosis or presumed infection status.

There seems to be consensus among authors that Standard and Universal Precautions should be complied with at all times and that it is not negotiable, irrespective of whether there is an outbreak or not.^{25, 28}

2.7 DEVELOPMENT OF INFECTIOUS DISEASE OUTBREAK POLICIES OR STRATEGIES

Policy development can be based on the experience gained with the Taiwan Severe Acute Respiratory Syndrome (SARS) epidemic.²⁹ In 2003, during the SARS outbreak in Taiwan, the Centers for Disease Control and Prevention (CDC) sent out numerous specialists to investigate and develop guidelines for hospitals regarding patient isolation rooms, personal protective equipment, general infection control and hospital health and safety. Initially during the peak of the epidemic, focus was placed on isolation of the SARS patients, protection of the health care workers, provision of advice on disinfection, direct contact and airborne precautions. However, as the epidemic waned, the focus turned to strategies for handling future SARS patients, facility design for effective patient isolation and screening, personal protective equipment practices and the training of health care workers.⁴

2.8 TRAINING OF HEALTH PERSONNEL

Ongoing training and support are crucial ingredients of outbreak management.²⁶ When a SARS, avian influenza or any other infectious disease outbreak occurs, hospitals will be faced with similar circumstances and will have to respond swiftly and should anticipate that they will have to respond in an environment where there is often scientific uncertainty. Using the principles of industrial hygiene i.e. anticipation, recognition, evaluation and control, South African hospitals can learn from this experience in Taiwan and prepare and improve its readiness for the event of an outbreak like SARS or any other infectious disease.⁴ This would entail ongoing training of health personnel on infection control issues, including basic principles of Universal Precautions and use of personal protective equipment.

Being prepared for a pandemic will require a well-trained corps of epidemiologists. In a joint effort by WHO and Centers for Disease Control and Prevention rapid outbreak response teams are being trained in Sub-Saharan

African countries to recognize outbreaks, collect information and specimens, implement quarantine measures, if indicated, while using and distributing personal protective equipment and antiviral drugs. Training rapid response teams in each country is a relatively new concept for Africa; however such teams do exist in Asia. If these teams are functional, they will strengthen responses in Africa to a wide array of epidemics, enabling timely implementation of interventions to prevent illness and death.²

Further, education regarding infection control among medical students in South Africa is dismal.²⁵ The curriculum needs to be urgently reviewed and developed so that infection control is given more prominence.²³

Although legislative guidelines exist for the protection of health care workers, little is known about the protective measures available for and utilized by emergency care practitioners in the pre-hospital environment in South Africa.²⁸ Could this also be true for the hospital environment?

It is abundantly clear that all levels and categories of health workers require training on infection control and outbreak response and management. Arming health care workers with the knowledge, skills and expertise, as well as preparing them for the worst case scenarios will indeed go a long way in efficiently and effectively mounting the outbreak response.³⁰

2.9 RESOURCES (INPUTS) REQUIRED DURING AN OUTBREAK

In a report to the General Accounting office in 2003, numerous gaps were identified following the Anthrax bio-terrorist attacks, in the autumn of 2001 in the United States of America. Many of the hospitals lacked the capacity to respond to large-scale infectious disease outbreaks. Hospitals lacked disease surveillance systems, laboratory facilities, equipment, isolation facilities and staff to treat large numbers of patients.³¹

Hospitals are generally responsible for the initial response to a public health emergency, be it a bio-terrorist attack or a naturally occurring infectious disease.³¹ In the event of a large-scale infectious disease outbreak, hospitals and their emergency departments would be on the front line, and their personnel would take on the role as first responders. Therefore hospitals would need to have adequate staff, stores of equipment and supplies, including medications, personal protective equipment, quarantine and isolation facilities and air handling and filtration equipment.

The inputs mentioned in the report to the General Accounting office in 2003 for an effective outbreak response seem to be the basic inputs for any hospital to function optimally.³¹ It is therefore important that hospitals continuously assess and evaluate these basic inputs. Hospitals need to be prepared for the worst-case scenario at all times. Ensuring high quality and adequate amounts of all inputs are essential in curbing outbreaks. Not having the basic inputs will simply delay progress and stifle efforts to curb an outbreak.

2.10 WHO SHOULD BE NOTIFIED IN CASE OF AN INFECTIOUS DISEASE OUTBREAK?

According to the United States General Accounting Office, the following organisations have a role to play and need to be contacted in the event of an infectious disease outbreak:³²

- **The local and state authorities** - This may also involve emergency management personnel.
- **Law enforcement agencies** - should be notified if a case or series of cases have a suspicious origin e.g. a bioterrorism attack.
- **The CDC** - is available upon request to help state and local officials investigate the nature and origin of disease outbreaks. The CDC maintains several laboratories that identify unusual or exotic viruses and other pathogens when other laboratories are unable to do so. CDC is also the lead

agency for bioterrorism preparedness. According to the Centers for Disease Control and Prevention (2000), the President of the United States of America has become increasingly concerned about the threat of terrorists using weapons of mass destruction, including biological agents. Part of CDC's National Center for Infectious Diseases, the Bioterrorism Preparedness and Response Program is responsible for public health preparedness for potential acts of bioterrorism.³³

- **Public and Animal health agencies** - Links between the two agencies are important, as many emerging diseases, like West Nile Fever and Rift Valley fever, affect both animals and humans. Approximately three of every four emerging infectious diseases reach humans through animals. Many of the viruses or other pathogens considered most likely by CDC to be used in a bioterrorist incident are zoonotic, such as anthrax, plague, brucellosis, tularaemia, and the equine encephalitic viruses.³²
- **The military** - The army may have the capacity to identify certain viruses that may be used in bioterrorist attacks.
- **The Hospital Infection Control Practices Advisory Committee (HICPAC)** also recommends that each healthcare facility, with the involvement of the Infection Control committee, administration, building engineering staff, emergency department, laboratory directors and nursing directors, should clarify in advance how they will best be able to deliver care in the event of a large scale exposure.³³

In addition to making contacts with the above organisations, each health care facility should include a list containing the following telephone notification numbers in its readiness plan:

- **Pathology departments, clinical laboratories and mortuary** - should be informed of a potentially infectious outbreak prior to submitting any specimens for examination or disposal. All autopsies should be performed carefully using all personal protective equipment and standards of practice in accordance with Universal Precautions.

- **Funeral directors** - Instructions for funeral directors should also be developed and incorporated into the readiness plan for communication.⁸

The notification of certain medical conditions in South Africa is based on government's National Health Act, Act No.61 of 2003, coupled with regulations on the reporting of specific diseases to District, Provincial and / or National Health Department.⁶ The first health care professional that comes into contact with any of the notifiable conditions is required by law to notify. Currently there are 33 notifiable diseases, most of which have an outbreak potential. During an outbreak of a notifiable disease, all cases must be reported to the National Department of Health. Daily reporting of the cases need to be reported on the notification form (GW17/5) to the local health authority who must in turn report to Provincial Health and National Health authorities.³⁴

It is also recommended that the following organisations should be contacted for their roles in infection prevention and control:

- **The Public Works Department** - This department has an important role to play to ensure sufficiency of structural requirements such as hand washing facilities, efficient autoclaves and negative pressure rooms. Valuable input on building layouts that facilitate good infection prevention and control practices could be provided.
- **The South African Police Services** - Their services could be called upon for involuntary detentions when an infectious source (person with an epidemiologically significant condition) resists hospitalization and isolation, despite sufficient health education.
- **Department of Justice and Constitutional Development and the Human Rights Commission** - These institutions could provide guidance when:
 - The rights of an individual have to be weighed against the rights of a group/ population or community.
 - The constitutionality of an involuntary detention is disputed.
 - The constitutionality of warning systems and disclosure is questioned.

- **Department of Labour** - This department could assist in:
 - The development of disease management programmes for employees.
 - The development of policy on pre-employment testing and post exposure prophylaxis.
 - Strong partnerships should also be established with professional boards, councils and associations, academic institutions, and the National Health Laboratory Services.²⁷

2.11 LESSONS AND INTERNATIONAL EXPERIENCE THAT CAN BE USED TO FORMULATE CUSTOMISED HOSPITAL OUTBREAK RESPONSE MODELS

From the West Nile virus outbreak in the autumn of 1999, the following lessons were learned and challenges experienced:³²

- **Local surveillance and response capabilities** - The surveillance network was critical in speeding up the outbreak response.
- **Lack of ability of individual clinicians to identify, accurately diagnose, and effectively treat uncommon diseases** - An effective medical response to a bioterrorism incident depends largely on the ability of individual clinicians and their level of education about the threat posed. Therefore, a clinician's education on infectious diseases with outbreak potential deserves priority.
- **Inadequate staffing** - Epidemiologists reported inadequate staffing for generating and using laboratory data. The lab data was often considered more reliable for performing infectious disease surveillance than physician-reported data.
- **Poor laboratory infrastructure and technologies for responding to outbreaks of newly emerging infectious diseases** - Three common problems emerged i.e. broadening laboratory capabilities, ensuring adequate staffing and expertise, and improving ability to deal with work surges in testing needs. It became essential to know what the capabilities of each laboratory in the country are with regard to safely testing for unknown pathogens. The

CDC has the capacity to serve as the national and international reference laboratory for the diagnosis of infectious diseases.

- **Communication among public health agencies** - Rapid and reliable communication among public health agencies was essential to preparedness and coordination. In the West Nile outbreak there seemed to be a lack of sufficient and secure channels for communication among the large number of agencies involved. This prevented them from sharing information efficiently. The poor communication was exacerbated by the incompatibilities of communication technologies among the different agencies, as well as the varying differences of communication infrastructure among the different agencies. Some agencies had high-speed access to e-mail, Internet and broadcast facsimile transmission, while others did not.
- **Lack of leadership and clear reporting guidelines** - This led to confusion. Knowing who was in charge, who the agency spokesperson was, as well as which agency was responsible for what, would have allowed each agency to operate more effectively. It was also recommended that each hospital should have a Hospital Emergency Incident Command System (HEICS). This is an emergency management system that employs a logical management structure, defined responsibilities, clear reporting channels, and a common nomenclature to help unify hospitals with other emergency responders. It includes a predictable chain of management, flexible organizational chart allows flexible response to specific emergencies, prioritized response checklists, accountability of position function, improved documentation for improved accountability and cost recovery, common language to promote communication and facilitate outside assistance, cost effective emergency planning within health care organizations.
- **Distinguishing the difference between bioterrorism events versus a natural outbreak** - CDC's current recommended protocols are to notify. The need to involve these agencies may not be evident at the start. According to the Federal Bureau of Investigation in the United States of America, there has been only one act of terrorism in the United States in which a biological agent

was used. The cause was unknown until long after the outbreak had passed. The event occurred in September 1984, when 751 persons in Oregon became ill with gastroenteritis, an inflammation of the stomach and intestines. The FBI, with assistance from CDC discovered a year later that food at salad bars had been contaminated with *Salmonella typhimurium* by a religious cult.

2.12 DISSEMINATION OF INFORMATION

Lessons from the plague outbreak in India in 1994 can also be used. When the outbreak occurred, the CDC prepared six documents to assist public health officials and other agencies i.e. 1) A general plague outbreak notice, 2) a plague alert notice for international travellers from India, 3) a plague advisory for persons travelling to India, 4) Plague treatment and prophylaxis guidelines for physicians, 5) guidelines on the diagnosis and bio-safety for persons handling samples from patients with suspected plague, 6) an article in the CDC's MMWR.³⁵

During the SARS outbreak in 2003, the international community had learned many lessons. Particularly, rapid and transparent information sharing between countries was critical to prevent international spread of the disease.²⁹

The WHO provides the following guidelines on outbreak communication:

- **Trust.** The overriding goal for outbreak communication is to communicate with the public in ways that build, maintain or restore trust.
- **Announcing Early.** The parameters of trust are established in the outbreaks first official announcement. This message's timing, candour and comprehensiveness may make it most important of all outbreak communications.
- **Transparency.** Maintaining the public's trust throughout an outbreak requires transparency. Transparency characterizes the relationship between the outbreak managers and the public. It allows the public to "view" the information gathering, risk assessing and decision making process associated with the outbreak control.

- **The Public.** Understanding the public is critical to effective communication. It is usually difficult to change pre-existing beliefs unless those beliefs are explicitly addressed.
- **Planning.** The decisions and actions of public health officials have more effect on trust and public risk perception than communication. There is risk communication impact in everything outbreak control managers do, not just in what is said. Therefore risk communication is most effective when it is integrated with risk analysis and risk management. Risk communication should be incorporated into preparedness planning for major events and in all aspects of an outbreak response.³⁶

CHAPTER 3

RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

A descriptive cross-sectional survey using a semi-structured questionnaire was utilized to evaluate the preparedness of Tertiary Health Care facilities.

A Quantitative design was selected for the questionnaire to minimize bias and provide for ease of comparison.

3.2 TARGET POPULATION

The Clinical Directors, Senior Clinical Executives/ Medical Superintendents, Infection Control Nurses and or Quality Assurance Managers and the Infection Control Nurses were targeted for participation in this study. These categories of health professionals were targeted as they are normally delegated responsibility for outbreak response activities.

3.3 SAMPLING

An attempt was made to obtain as broad a cross-section as possible by including all tertiary academic hospitals in South Africa in the sample. A list of all the tertiary academic hospitals was obtained from the National Department of Health website. The tertiary academic hospitals that were included in this study are listed in the Table 2 below.

These hospitals were then stratified according to the provinces.

Table 2: List of tertiary academic hospitals in South Africa

PROVINCE	HOSPITAL
Gauteng	1. Dr George Mukhari Hospital
	2. Pretoria Academic Hospital
	3. Johannesburg General Hospital
	4. Chris Hani Baragwaneth Hospital
Kwa Zulu Natal	1. Greys Hospital
	2. iNkosi Albert Lethuli Hospital
	3. Ngwelezana Hospital
Eastern Cape	1. Mandela Academic Hospital – Mthatha Hospital Complex
Western Cape	1. Tygerberg Academic Hospital
	2. Groote Schuur Hospital
Free State	1. Universitas Academic Hospital
Limpopo Province	1. Pietersburg-Mankweng Hospital Complex

Thereafter, contact details were obtained for each of these hospitals using the Telkom telephone directory services.

The hospital CEO's and Personal Assistants were contacted telephonically by the researcher, requesting e-mail addresses or fax numbers to which a covering letter requesting permission for the participation in this study [Annexure 5], a copy of the research proposal, questionnaire [Annexure 6], research ethics approval from the University of Limpopo, and an informed consent form [Annexure 7], were sent. During this telephonic discussion, the researcher also requested the names and contact details of the possible respondents.

The researcher then made follow up telephone calls to the CEO and or CEO's personal assistant depending on the availability of the CEO, to ascertain whether or not permission was granted for participation. Confirmation of permission or

refusal was requested in writing. If permission was not granted, this was the last contact that the researcher made with the specific hospital in question.

If permission was granted, the researcher confirmed the names and contact details of the respondents either with the Hospital CEO or personal assistant of the CEO. In some cases, the CEO or the CEO's personal assistant forwarded the questionnaire and proposal to the respondent. However, in some instances the researcher had to forward these documents to the respondents via fax or e-mail, once again. This resulted in delays in the response.

The researcher then arranged with the respondents for telephonic interviews. This was left to the discretion of the respondent. This was done to allow the respondent time to read through the proposal and find the information requested on the questionnaire. During the telephonic interview the questions were posed to the respondents and the researcher documented the answers. Where the respondents requested to answer the questionnaire by themselves, they were permitted to do so by submitting a written response. The researcher phoned the respondents where clarity on responses was needed. After the interview or questionnaire was completed, the respondent would either fax or e-mail the specific documents requested in the questionnaire by the researcher.

If a respondent chose to answer the questions themselves in writing, they would fax or e-mail the completed questionnaire to the researcher, together with all the required documents.

In all instances the respondents were required to fax or e-mail the informed consent form to the researcher. Informed consent was accepted if the respondent either wrote this on the questionnaire, filled out the informed consent form or wrote that informed consent was given in any correspondence with the researcher.

3.4 THE RESEARCH INSTRUMENT [ANNEXURE 5]

The research instrument took the form of a semi-structured questionnaire. Both open ended and closed ended questions were used in the instrument. The research instrument was tested for errors in language, user-friendliness, and practicability of administration by means of a pilot study. The respondent of the pilot study was asked to comment verbally on the above-mentioned aspects.

3.4.1 Questionnaire construction

The questionnaire was structured with emphasis on achieving the aims of the study. There was no one particular instrument in the literature that could be used to measure the infectious disease outbreak preparedness. In developing the research instrument, ideas and experiences obtained from the international literature were utilised. Some thought was also given to experiences at Dr George Mukhari Hospital.

The questions focused on five specific aspects:

(a) Outbreak preparedness

- Presence of an outbreak response team with clear roles and responsibilities and terms of reference for each member/ unit at all levels.
- Lists of priority diseases (epidemic prone infectious diseases, diseases targeted for elimination and eradication, and those of public health concern).
- Presence of a functional epidemic preparedness and response strategy / plan for the priority diseases.

(b) Experiences of outbreaks in the past five years

(c) Infrastructural layout and requirements for outbreaks

- Point of first entry at the hospital.

- Presence of any protective environment wards /airborne infection isolation rooms (AEIIR).
- Number of patients that can be accommodated in the protective environment wards / isolation rooms.
- Presence of infection control compatible ventilation in the emergency room.
- Presence of design compatibility of the emergency room area to enable ease of isolation and workflow in the case of an outbreak.

(d) *Outbreak response policies or strategies*

- Existence of a policy on the disposal of hazardous waste.
- Existence of a policy on the management of laboratory specimens from suspects of infectious diseases.
- Management of laboratory specimens of suspected cases of infectious diseases.

(e) *Training of health personnel*

- Training of health care workers on personal protective equipment occurs formally or informally.
- Training of health care workers on infection control occurs formally or informally.

3.4.2 Pilot study

The study was piloted with the help of a Senior Clinical Executive at Dr George Mukhari Hospital after ethics approval had been obtained from the University of Limpopo. The pilot study was done to test the logistics, validity of the measurement tool and acceptability of the study to the research population. It was also used to time the duration that it takes a respondent to answer the questionnaire. The research questionnaire was finalised using the information obtained from the pilot study.

The pilot study provided the following information:

- A completion time of approximately 18 minutes over the telephone.
- It was essential to provide the respondent with the questionnaire prior to administration. This was necessary, as the respondent had to search for some pieces of information that were required by the questionnaire.
- Some degree of flexibility was required in the way in which the respondent returned the relevant documents to the researcher.
- There was also no difficulty in comprehending the language that was used in the questionnaire.

3.5 THE RESEARCH PROCESS

Questionnaires were administered to the respondents identified at each tertiary academic hospital. Communication occurred by either fax, e-mail or over the telephone depending on the availability of the different means of communication for each respondent. This was done to encourage participation and accommodate the varying preferences as well as schedules of the respondents.

3.5.1 Administration of the questionnaires

Questionnaires were administered during the study period the study by the researcher to the respondents nominated by the CEO. The researcher administered some questionnaires telephonically. However some respondents chose to answer the questionnaire by themselves and return it to the researcher either by fax or e-mail. Responses received after the cut-off date was excluded from the study.

After administration of the questionnaires, supporting data were collected over a period of three months.

3.5.2 DATA ANALYSIS

The data were captured on an EXCEL spread sheet for further analysis by the researcher. Graphs and tables were used to draw relevant conclusions from the data collected. Based on the findings and analysis of documents received, a

generic approach for development of an outbreak policy and standard operating procedures was drawn up.

CHAPTER 4

RESULTS

4.1 FINDINGS

The 12 tertiary academic hospitals included in this study were stratified according to Provinces. Of the 12 tertiary academic hospitals in South Africa, only 9 responded. Of the 9 hospitals that responded, only 7 chose to answer the questionnaire. One hospital opted out due to renovations that were taking place within the hospital during the study period. The other hospital opted out with the following response: "We are a tertiary hospital and will not deal with outbreaks of infectious diseases. This can be done at a regional level." Informed consent was obtained from 100% of participating hospitals.

The response rate was therefore 75%. Among the responders the participation rate was 77%. The ranks of the participants in the study were as follows Table 1:

Table 3: Participant ranks

RANK	NUMBER	PERCENTAGE OF RESPONDENTS
CEO	2	14,3%
Clinical Director	2	14,3%
Clinical Manager/ Senior Clinical Executive	3	21,4%
Infection Control Nurse	5	35,7%
Quality Assurance Manager	1	7,1%
Occupational Health and Safety officer	1	7,1%
TOTAL	14	100%

Of the 7 hospitals that chose to respond to the questionnaire, there were on average 2 respondents per hospital. The study revealed that person selected most, to be the respondent was the infection control Nurse, followed by the clinical manager, clinical director and CEO, quality assurance manager and occupational health and safety officer.

The findings of the study are presented in graphic and tabular form. Responses are dealt with under the question used in the questionnaire.

Q1. Does your hospital have an outbreak response team with clear roles and responsibilities including terms of reference of each member/ unit at all levels?

Figure 1: Hospitals with outbreak response teams

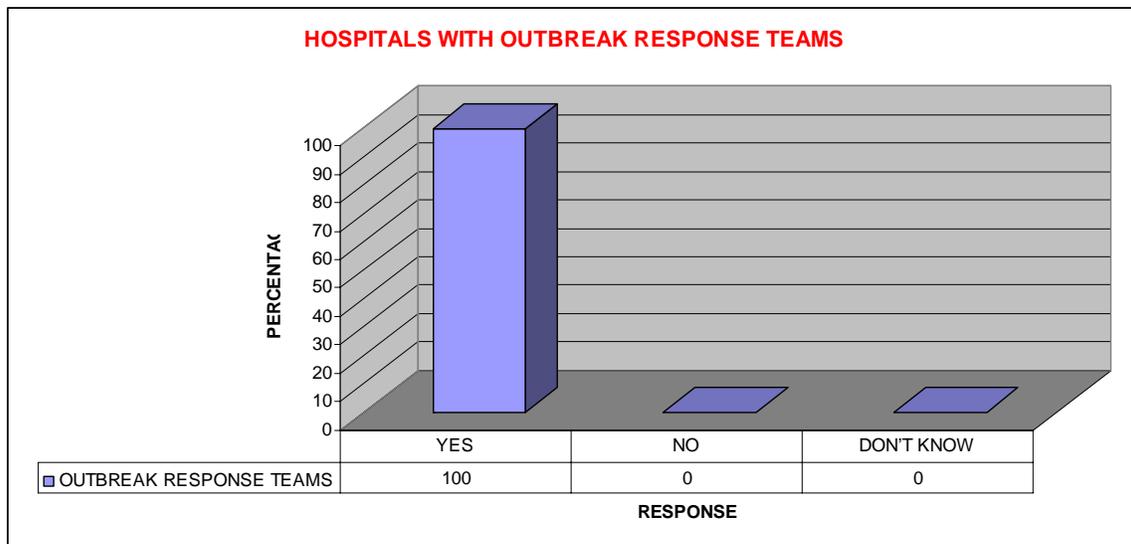


Figure 2: Hospitals with clear roles and responsibilities

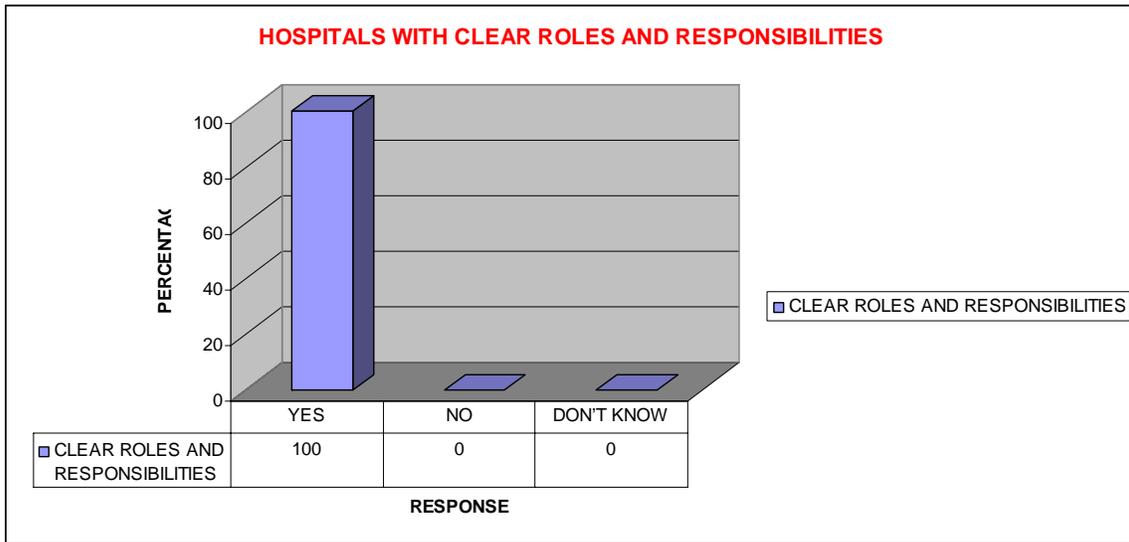
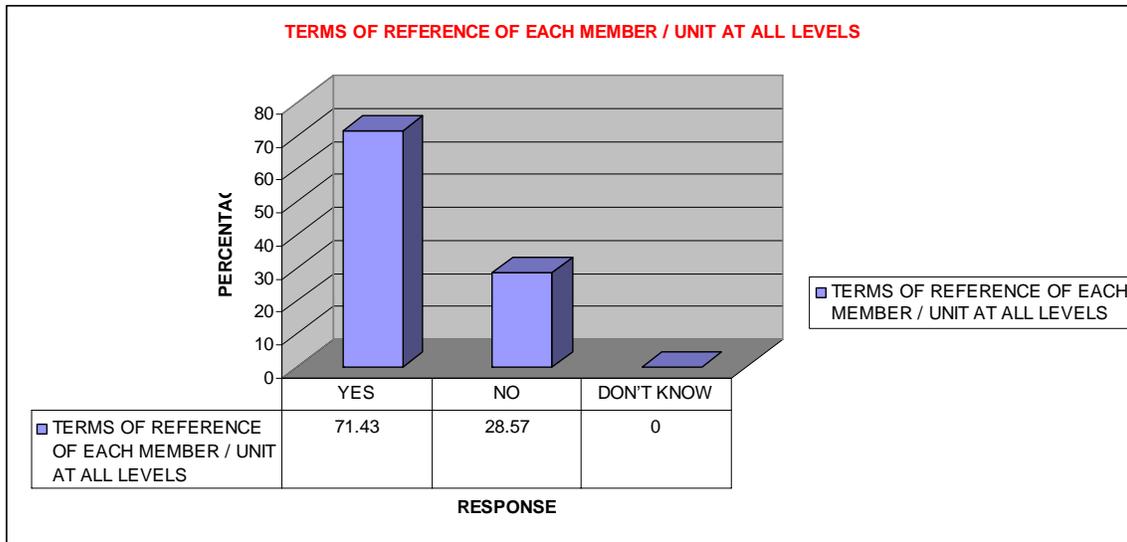


Figure 3: Terms of reference of each member/unit at all levels



Findings: All the hospitals that responded had outbreak response teams, with clear roles and responsibilities. However, only 71.43% of the hospitals had clear terms of reference for each member / unit at all levels.

Q2. Does your hospital have a list of priority diseases (epidemic prone infectious diseases, diseases targeted for elimination and eradication, and those of public health concern)?

Figure 4: Hospital with a list of priority diseases

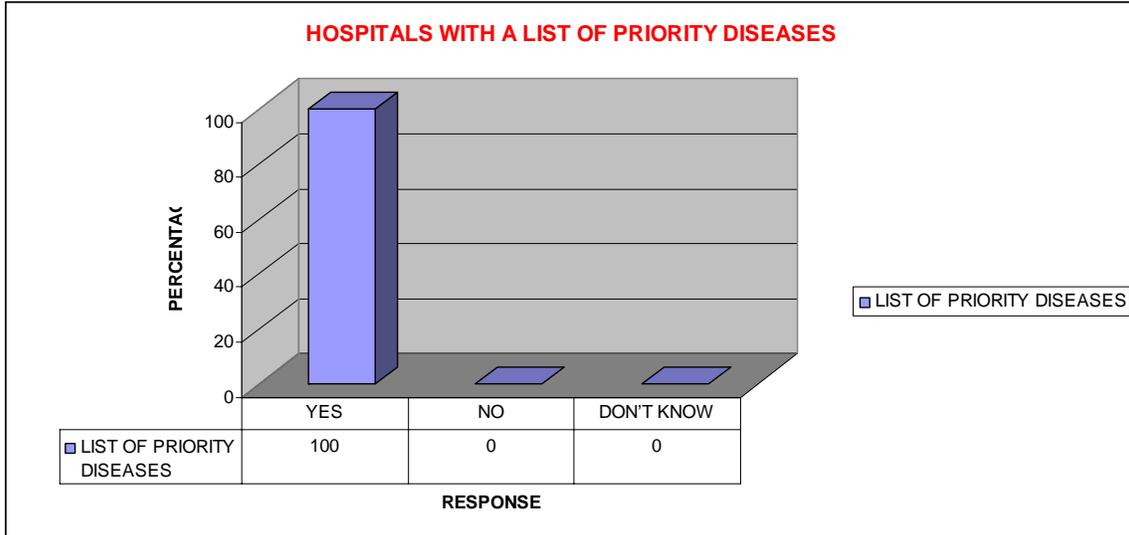


Figure 5: Hospitals with a list of epidemic prone diseases

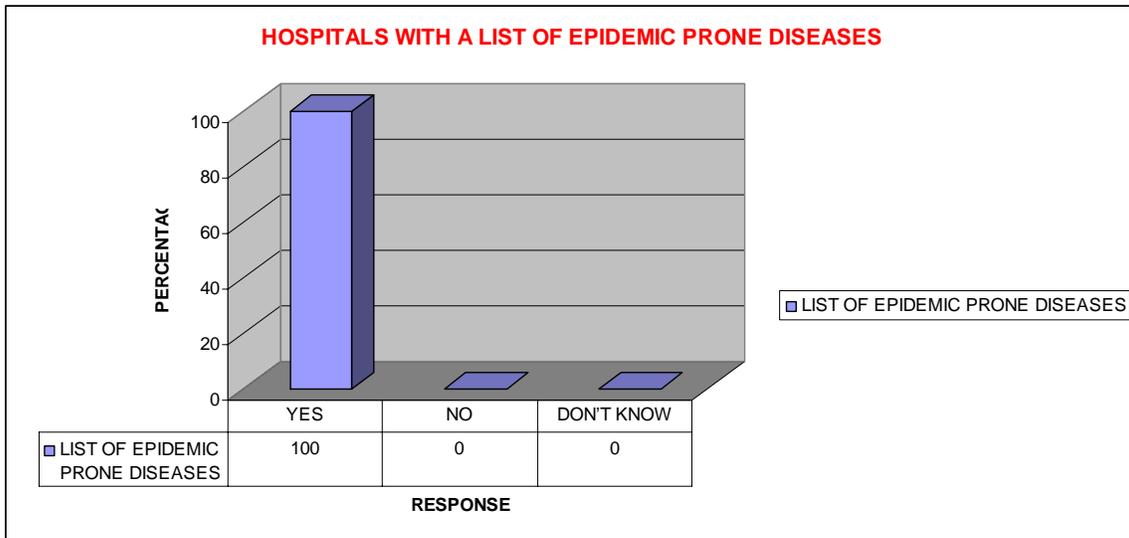


Figure 6: Hospitals with a list of diseases targeted for eradication

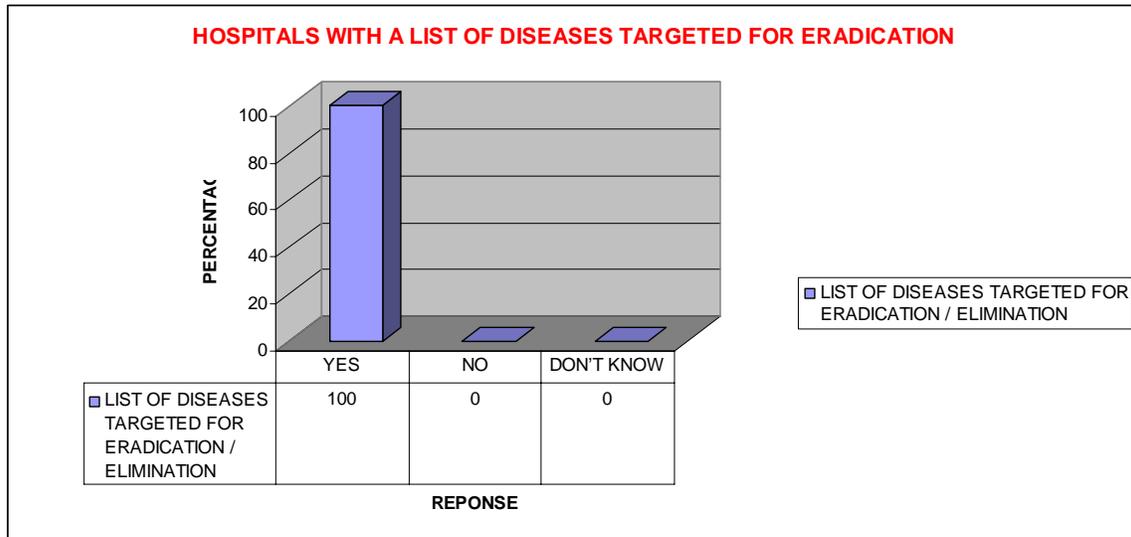
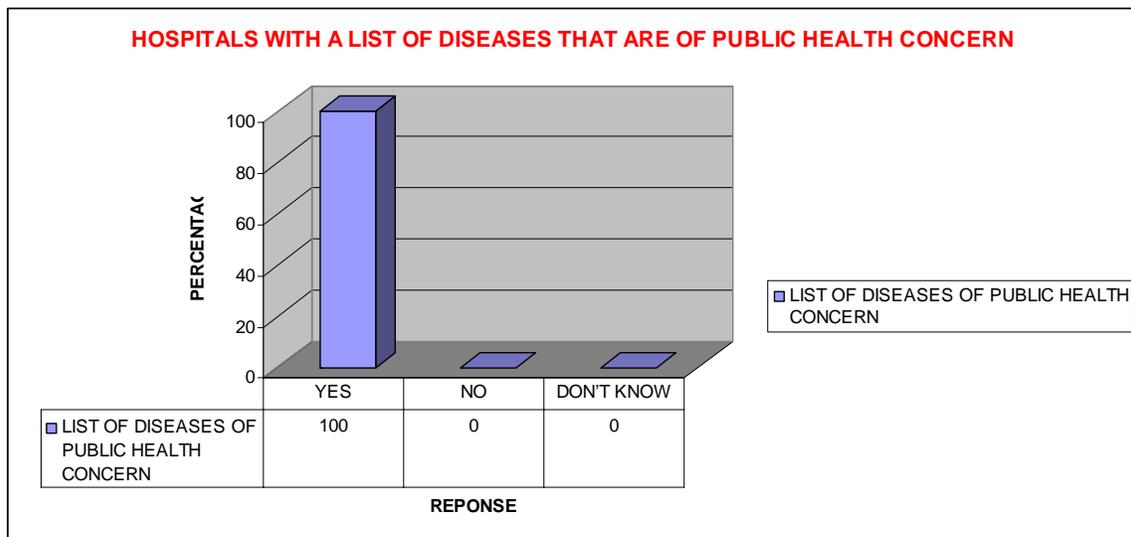


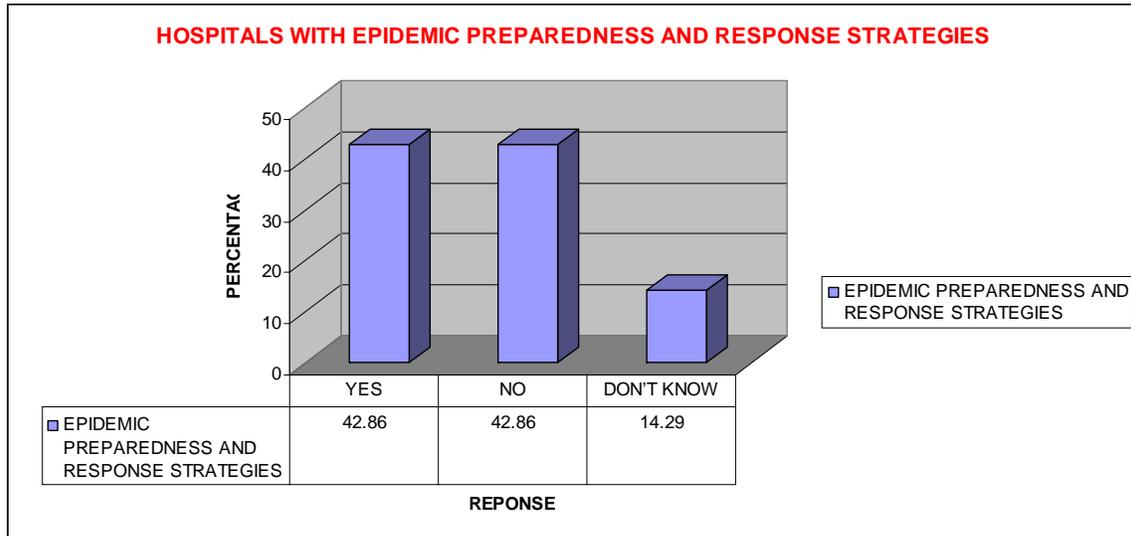
Figure 7: Hospitals with a list of diseases that are of public health concern



Findings: 100% of respondent hospitals have lists of priority diseases, epidemic prone infectious diseases, diseases targeted for eradication / elimination and diseases that are of public health concern.

Q3. Does your hospital have a functional epidemic preparedness and response strategy / plan for the priority diseases?

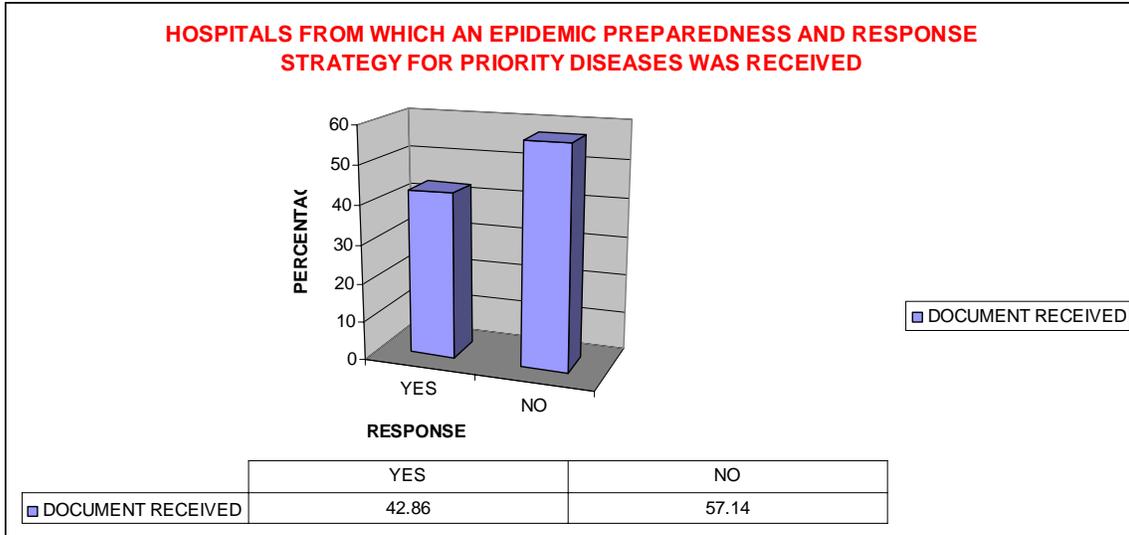
Figure 8: Hospitals with epidemic preparedness and response strategies



Findings: Only 42.86% of the tertiary academic hospitals have a functional preparedness and response strategy / plan for priority diseases. 42.86% of the hospitals have no plan, and 14.29% are unsure whether a plan exists.

Q4. If answer to question 3 is YES, please fax the document.

Figure 9: Hospitals from which an epidemic preparedness and response strategy for priority disease was received



Findings: It was verified by means of a faxed document that all 42.86% of the hospitals that claimed to have a functional preparedness and response strategy/plan for priority diseases, did indeed have one.

Q5. How many infectious diseases outbreak did you document / experience in the past 5 years?

Figure 10: Hospitals experiences of infectious disease outbreak

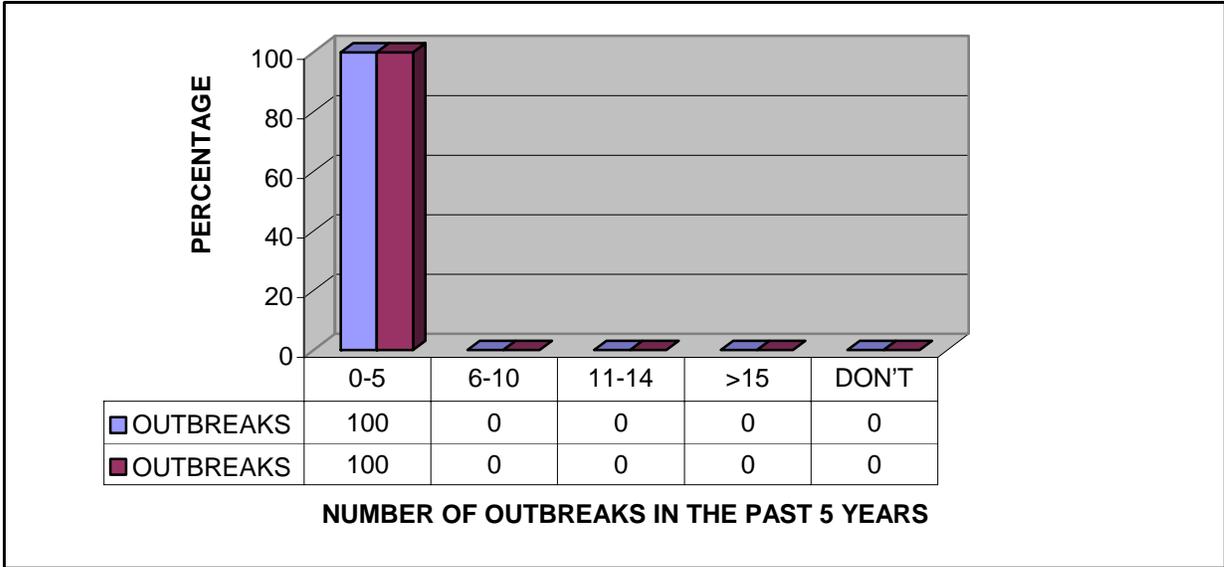
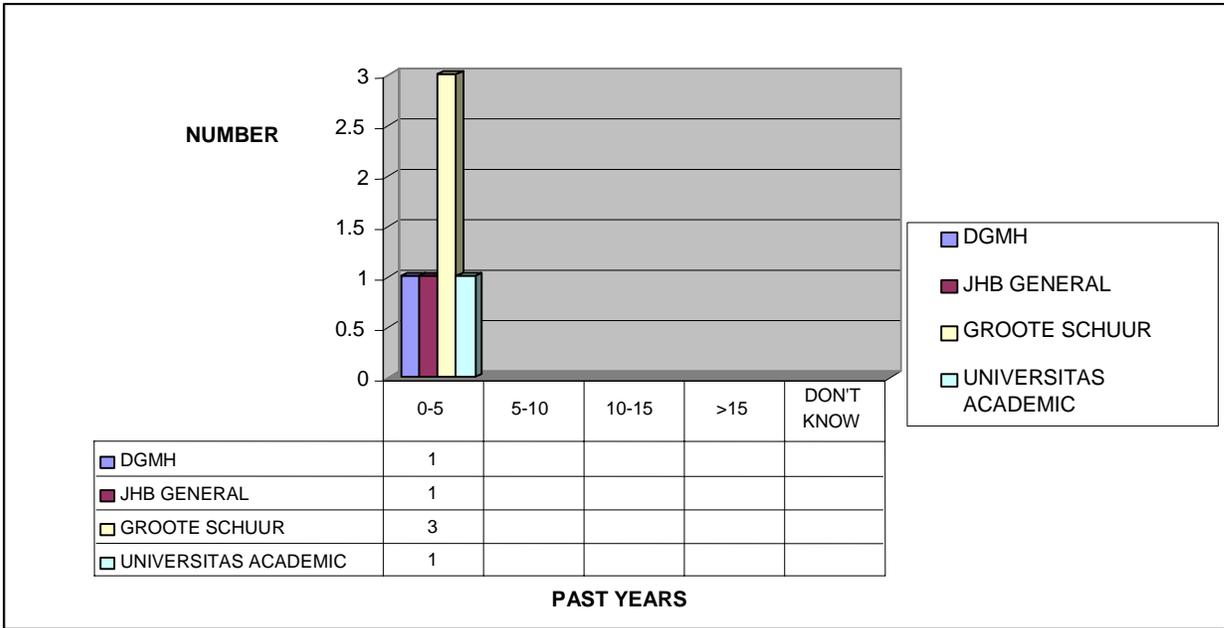


Figure 11: Number of outbreaks experienced by hospitals



Findings: All the respondent hospitals experienced 0-5 outbreaks in the past five years. DGMH, Johannesburg General Hospital and Universitas Academic Hospital reported only 1 outbreak each, while Groote Schuur Hospital reported 3 outbreaks in the last five years. The remaining 3 hospitals i.e. Pretoria Academic Hospital, Greys Hospital and Tygerberg Hospital did not report any occurrence of outbreaks.

Q6. Please provide details of the various outbreaks?

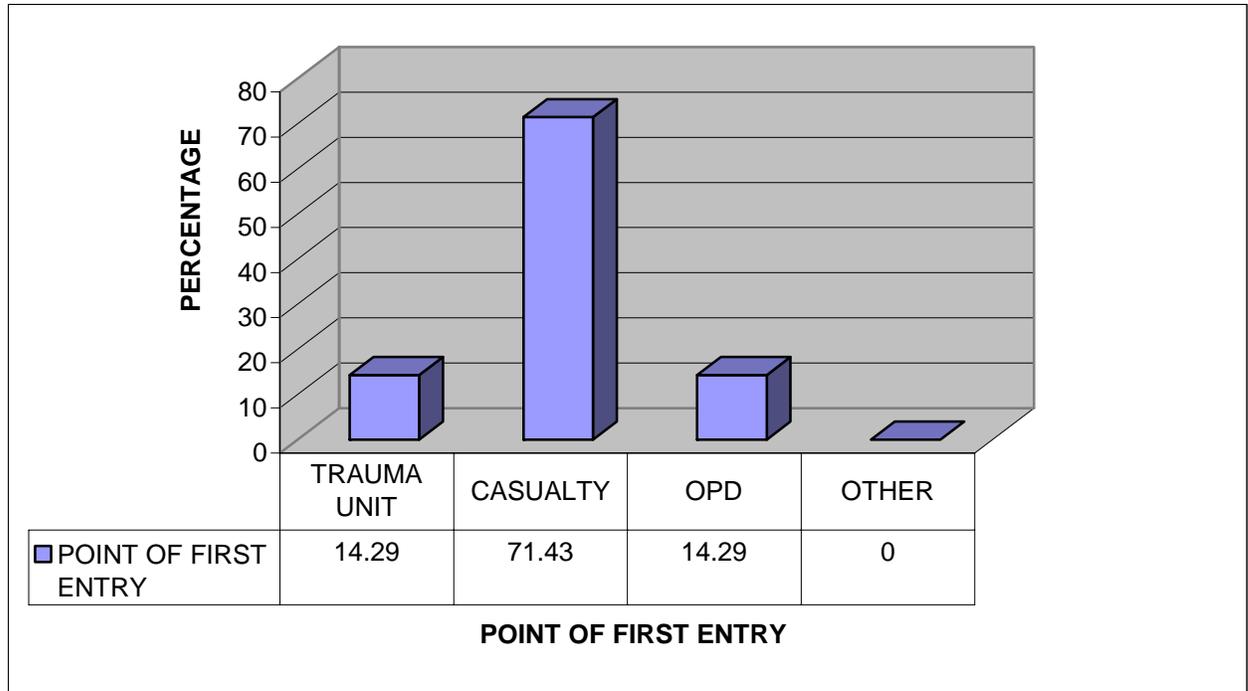
Table 4: Outbreak data

HOSPITAL	TYPE OF OUTBREAK	DURATION OF OUTBREAK (FROM – TO)	NUMBER OF CONFIRMED CASES	NUMBER OF DEATHS	SOURCE
DGMH		2007	unknown	unknown	unknown
JHB GEN	Congo Fever	2007	1	1	unknown
GROOTE SCHUUR	Klebsiella pneumoniae	January 2008	6	2	Baseline infection and general hygiene, problem with air-conditioning due to electricity supply
	Acinetobacter Baumannii	unknown	unknown	unknown	unknown
	MRSA	unknown	unknown	unknown	unknown
UNIVERSI TAS	Klebsiella pneumonia	unknown	unknown	unknown	unknown

Findings: Both Groote Schuur and Universitas reported Klebsiella pneumonia infections. The other hospitals had a variety of infections ranging from Malaria, Congo Fever, Acinetobacter Baumannii and MRSA as indicated in Table 2.

Q7. Which area in the hospital is the first point of entry?

Figure 12: Hospitals points of first entry



Findings: The most frequent point of entry in the tertiary academic hospitals is the casualty / emergency unit (71.43%), followed by the trauma and OPD areas (14.29%).

Q8. Are there any protective environment wards (PEW) /airborne infection isolation rooms (AEIIR)? And if so how many patients can it accommodate?

Table 5: PEW's and AEIIR's

HOSPITAL	NUMBER OF PEW'S	MAXIMUM PATIENTS PER PEW	NUMBER OF AEIIR'S	MAXIMUM PATIENTS PER AEIIR
Dr George Mukhari Hospital	0	0	0	0
Pretoria Academic Hospital	0	0	0	0
Johannesburg General Hospital	1	4	4	4
GAUTENG TOTAL	1	4	4	4

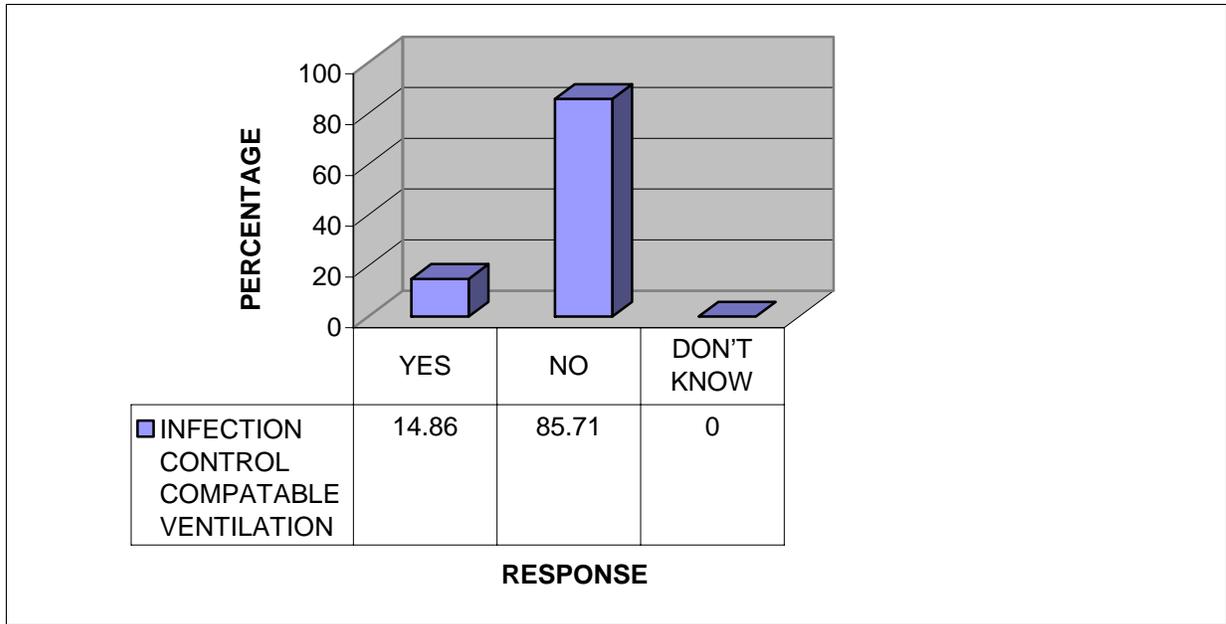
Tygerberg Academic Hospital	2	8	8	8
Groote Schuur Hospital	1	30	30	30
WESTERN CAPE	3	38	38	38
Greys Hospital	81	81	1	8
KWAZULU - NATAL	81	81	1	8
Universitas	32	64	64	64
FREE STATE	32	2	64	1

Findings:

- In the Gauteng Province, the only Tertiary Academic Hospital that has a PEW is Johannesburg General Hospital that can accommodate 4 patients.
- The Western Cape, Free State and KwaZulu-Natal seem to be better equipped; having 3, 32 and 81 PEW's respectively that can accommodate 38, 64 and 81 patients respectively.
- In the Gauteng Province, only Johannesburg General Hospital has 4 AEIIR's that can accommodate 4 patients.
- The Free State, Western Cape, and KwaZulu-Natal seem to be better equipped; having 64, 38, and 1 AEIIR's respectively that can accommodate 64, 38, and 8 patients respectively.

Q9. Does the casualty area have infection control compatible ventilation?

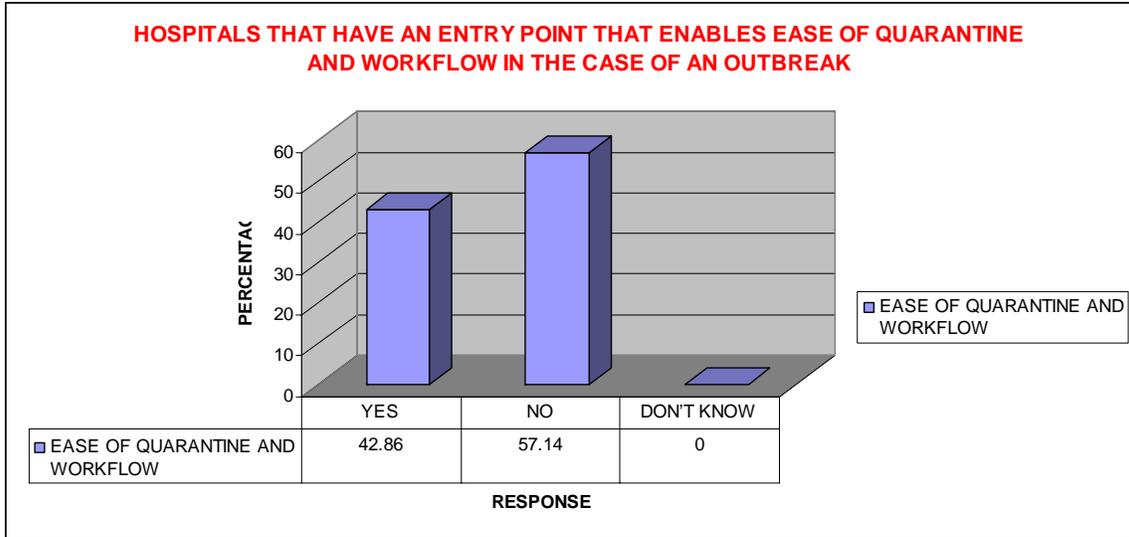
Figure 13: Hospitals with infection control compatible ventilation



Findings: 14.86% of Tertiary Academic Hospitals have infection control compatible ventilation and the remaining 85.71% do not have infection control compatible ventilation.

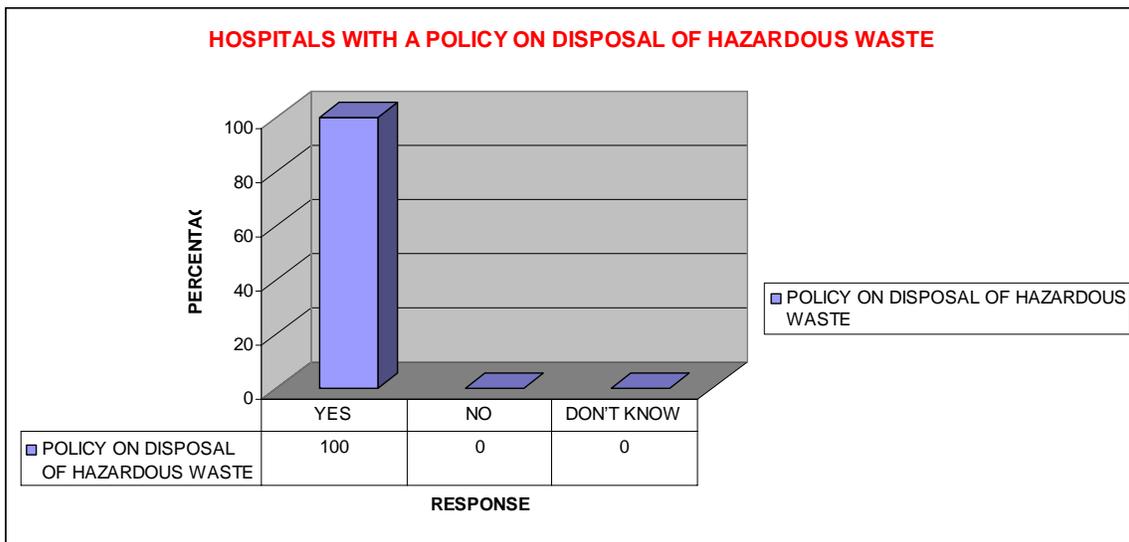
Q10. Does the design of the casualty area enable ease of quarantine and workflow in the case of an outbreak?

Figure 14: Hospitals that have an entry point that enables ease of quarantine and work flow in the case of an outbreak



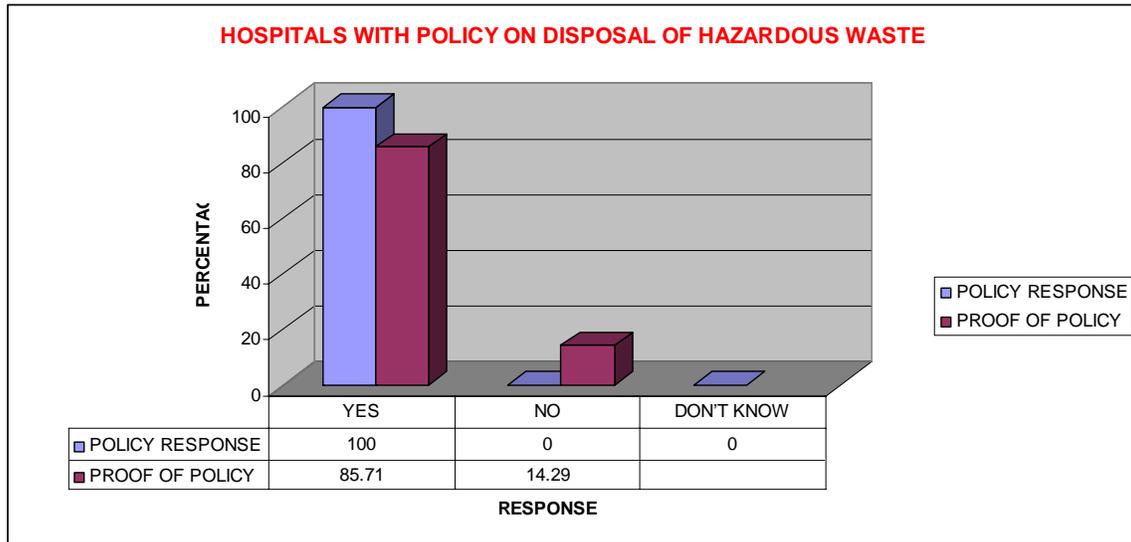
Findings: 42.86% of the hospitals will be able to manage a patient that requires quarantine in the casualty / emergency unit area. 57.14% of hospitals will not be able to manage this easily.

Q11. Does the hospital have a policy on the disposal of hazardous waste?



Q12. If answer to question 11 is YES, please fax policy.

Figure 15: Hospitals with a policy on disposal of hazardous waste and hospitals that faxed a copy of the document



Findings:

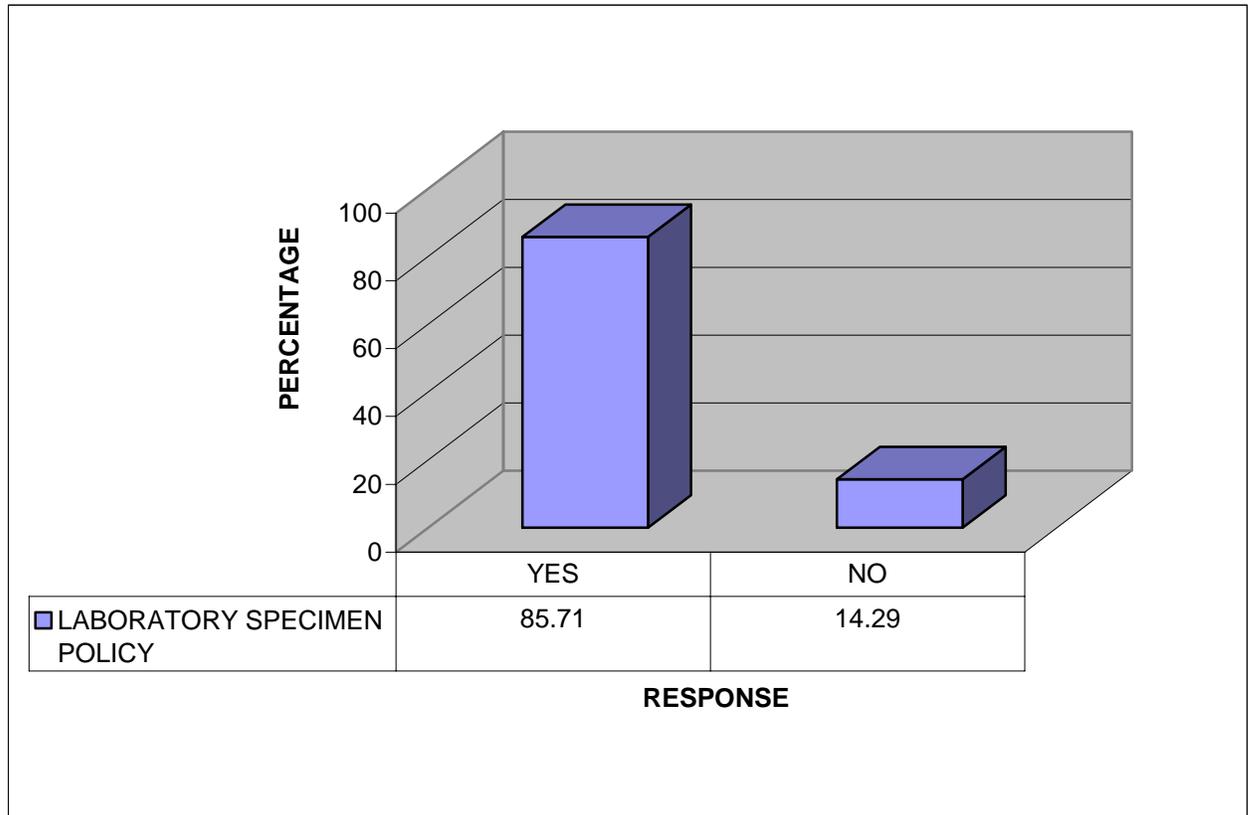
- All the respondent hospitals have a policy on the disposal of hazardous waste
- Despite all the hospitals claiming to have policies on the disposal of hazardous waste, only 85.71% of these hospitals were showed evidence of the policy.

Q13. If no, how do you dispose of hazardous waste?

Findings: Since all the responding hospitals claimed to have policies on the disposal of hazardous waste, there was no need for any of them to respond to this question.

Q14. Does the hospital have a policy on the management of laboratory specimens from suspects of infectious diseases?

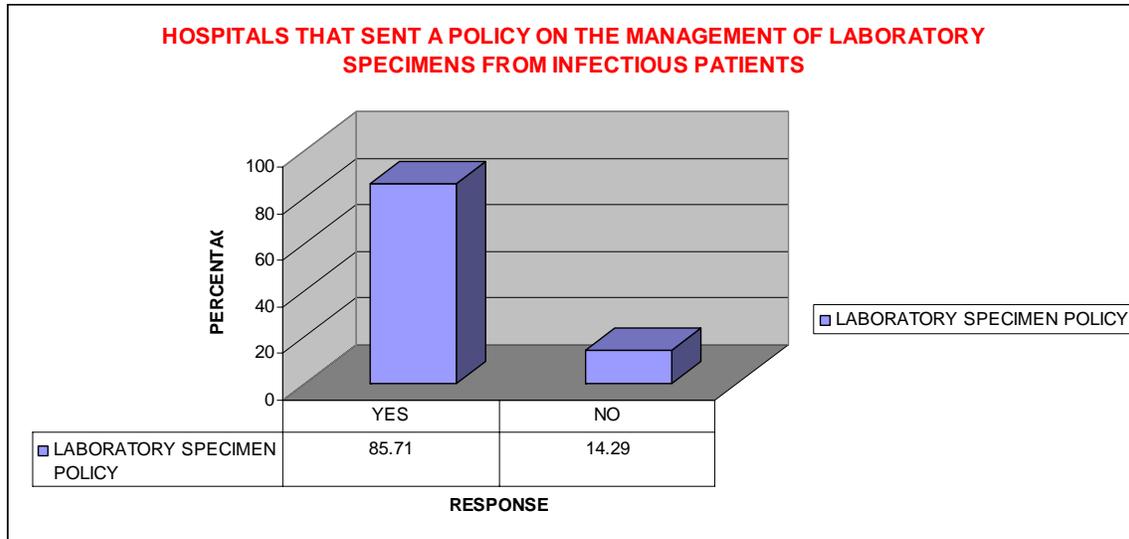
Figure 16: Hospitals with a policy on the management of laboratory specimens from infectious patients



Findings: All the responding hospitals had a policy on the management of laboratory specimens from suspects of infectious diseases.

Q15. If answer to question 14 is YES, please fax policy.

Figure 17: Hospitals with that faxed a policy on the management of laboratory specimens from infectious patients



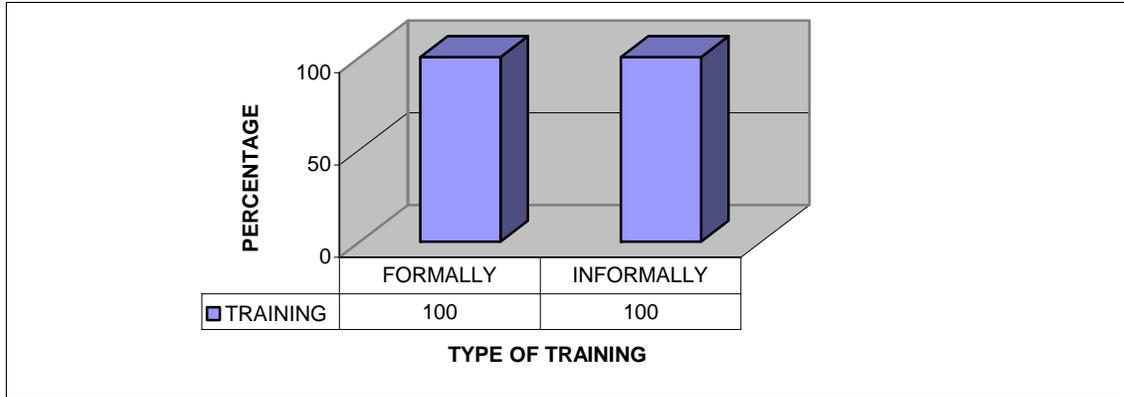
Findings: Despite all the responding hospitals claiming to have a policy on the management of laboratory specimens from suspects of infectious diseases, again only 85.71% provided the evidence.

Q16. If no, how do you manage specimens of suspected cases of infectious diseases?

Findings: Since all the responding hospitals claim to have a policy on the management of laboratory specimens from suspects of infectious diseases, there was no need for any of the hospitals to answer this question.

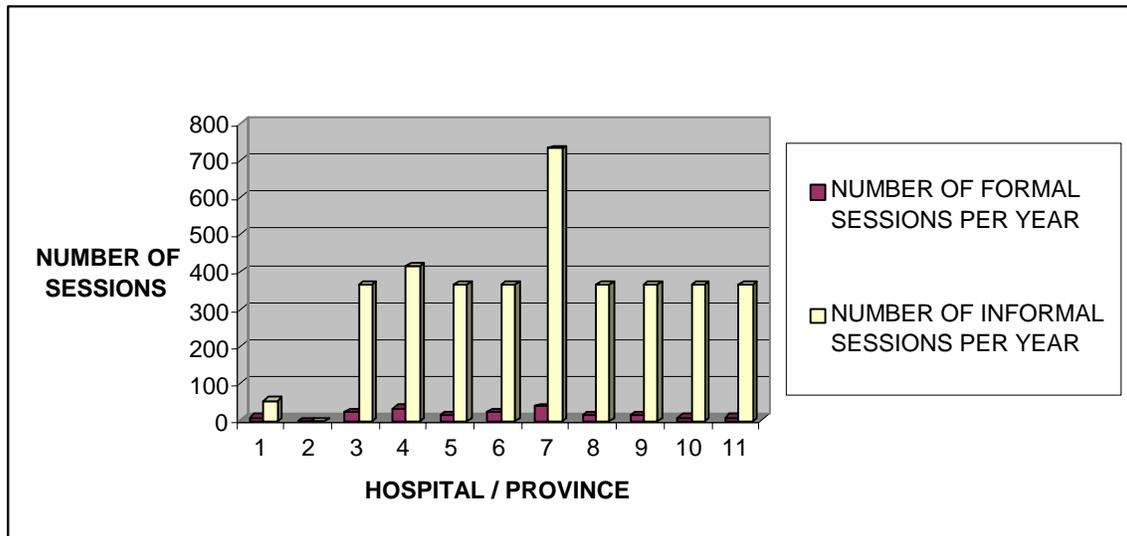
Q17. Does the training of health care workers on personal protective equipment (PPE) occur formally or informally? Please state how many times in the year does it occur formally as well as informally?

Figure 18: Hospitals conducting training on PPE's



Findings: All the hospitals claim to have both formal and informal training sessions on the use of personal protective equipment (PPE).

Figure 19: Number of training sessions conducted on PPE's



KEY: 1 - George Mukhari Hospital 2- Pretoria Academic Hospital 3-Johannesburg General Hospital
 4- GAUTENG PROVINCE 5- Tygerberg Academic Hospital 6- Groote Schuur Hospital
 7- WESTERN CAPE 8- Universitas Academic Hospital 9- FREE STATE 10- Greys Hospital
 11- KWA ZULU NATAL

Findings:

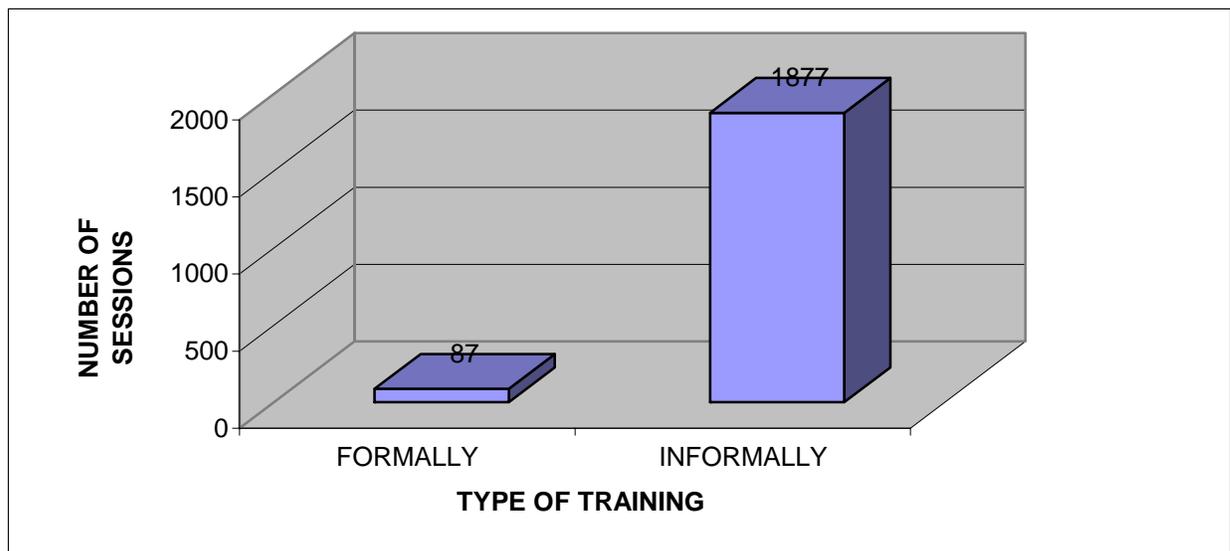
- Johannesburg General Hospital and Groote Schuur Hospital conduct the most number of formal sessions on Personal Protective equipment (24 each per year), followed by Universitas Academic Hospital (12 sessions per year), Tygerberg Hospital (11 sessions per year), Greys Hospital (6 sessions per year) and Dr George Mukhari Hospital (10 sessions per year). The average

number of formal training sessions on personal protective equipment by tertiary academic hospitals is 12.43 sessions per year.

- All the tertiary academic hospitals conduct informal training sessions 365 days per year, with the exception of DGMH which conducts 52 informal sessions per year and Pretoria Academic Hospital that does not keep record of the informal sessions. The average number of informal sessions conducted per year is 268 sessions.

Q18. Does the training of health care workers on infection control occur formally or informally? Please state how many times in the year does it occur formally as well as informally?

Figure 20: Hospitals conducting training on infection control



Findings:

1. DGMH conducts the most number of formal sessions on infection control (52 each per year), followed by Universitas Academic Hospital (32 sessions per year), Groote Schuur Hospital and Johannesburg General Hospital (24 sessions per year), Tygerberg Hospital (11 sessions per year), Greys Hospital

(6 sessions per year) and PAH (0 or unknown number of sessions per year). The average number of formal training sessions on infection control by tertiary academic hospitals is 21.29 sessions per year.

2. All the tertiary academic hospitals conduct informal training sessions on Infection control, 365 days per year, with the exception of DGMH which conducts 52 informal sessions per year and Pretoria Academic Hospital that does not keep record of the informal sessions. The average number of informal sessions conducted per year is 268sessions.

CHAPTER 5

DISCUSSION OF FINDINGS

The findings will again be discussed according to the order of the questions in the questionnaire.

5.1 THE RESPONDENTS

The study revealed that person selected most, to be the respondent to the survey was the infection control nurse. This was followed by the clinical manager, clinical director and CEO, quality assurance manager and occupational health and safety officer. This seems to indicate that these persons generally are the most knowledgeable persons to contact in the event of an infectious disease outbreak. It also illustrates the fact that hospitals vary in the approach to infectious disease management, emphasising the need for customised policies and procedures.

5.2 INTERPRETATION AND DISCUSSION OF RESULTS

Q1 Does your hospital have an outbreak response team with clear roles and responsibilities including terms of reference of each member/ unit at all levels?

While all the respondent hospitals have outbreak response teams, with clear roles and responsibilities only 67% of the hospitals have clear terms of reference of each member / unit at all levels. The lack of clear terms of reference for each member or unit at all levels may result in confusion during the outbreak response. Learning from the West Nile experience in 1999, this may result in poor communication.³² This in turn will result in reduced information sharing and a slowing down of the outbreak response. Further, omissions of certain activities may result as each member or unit may assume that the other has conducted the specific activity. This can be detrimental to the overall outbreak response and may even result in failure to curb the outbreak timeously.

Q2 Does your hospital have a list of priority diseases (epidemic prone infectious diseases, diseases targeted for elimination and eradication, and those of public health concern)?

All the respondent hospitals have lists of priority diseases, epidemic prone infectious diseases, diseases targeted for eradication / elimination and diseases that are of public health concern. This implies that there is awareness among the health care providers of what diseases have a high outbreak potential.

However, this does not necessarily imply that health care workers will be able to readily diagnose and treat these diseases, as some of the diseases on these lists e.g. small-pox, Viral Haemorrhagic fevers are rare and uncommon diseases. A high index of suspicion may be required. Despite these lists of diseases being available, notification of some of the infectious diseases still remains a challenge in most hospitals. Since the outbreak response relies heavily on the clinicians ability to diagnose, treat the patients, increased levels of education regarding the diseases on these lists are essential and should be given priority.

The lines of reporting and systems of disease notification also need to be taught to health care workers. Reinforcement is necessary and the availability of the disease notification forms is essential so that the process is streamlined. A clinician's focus is mainly on the individual patient. However, in terms of the public health response the entire community needs to be considered, hence the importance on reporting to initiate and activate the public health response.

Q3 Does your hospital have a functional epidemic preparedness and response strategy / plan for the priority diseases?

Only 43% of the tertiary academic hospitals have a functional preparedness and response strategy/plan for priority diseases. 43% of the hospitals have no plan, and 14% are unsure whether a plan exists. This is indeed alarming, especially for tertiary academic hospitals.

If only 43% of the hospitals have a functional epidemic response strategy for the priority diseases, the potential for chaos in the event of an infectious disease outbreak is high. Even though, 43% of hospitals have plans in place, it does not necessarily mean that the outbreak response will be implemented without any challenges. None the less, the hospitals that do have a plan in place should fare better in the outbreak response as compared to those with none at all, or those that cannot find their plan. Being unable to find the outbreak response plan is as good as not having one at all. The question that remains is: How many of the hospitals, with plans in place, are actually outbreak ready?

Q4 If answer to question 3 is YES, please fax the document.

It was verified that all 43% of the hospitals, that claimed to have a functional preparedness and response strategy / plan for priority diseases, were in fact able to supply the document.

Q5 How many infectious diseases outbreaks did you document / experience in the past 5 years?

Dr George Mukhari Hospital, Johannesburg General Hospital and Universitas Academic Hospital reported only 1 outbreak each, while Groote Schuur Hospital reported 3 outbreaks in the last five years. The remaining 3 hospitals i.e. Pretoria Academic Hospital, Greys Hospital and Tygerberg Hospital did not report any occurrence of outbreaks.

The question that needs to be asked here is whether it is really possible that these hospitals experienced such few outbreaks, or whether this is indicative of poor documentation, reporting and record keeping capabilities? None of the hospitals reported outbreaks that were older than 5 years. This too seems highly unlikely. Institutional memory may also play a role here.

Q6 Please provide details of the various outbreaks?

Both Groote Schuur and Universitas had *Klebsiella pneumonia* infections. The other hospitals had a variety of infections ranging from Malaria, Congo Fever, *Acinetobacter Baumannii* and MRSA.

It is significant to note that only Dr George Mukhari and Johannesburg General reported diseases that were actually notifiable diseases. The other infections appear to have been nosocomial in nature.

Tables 9 and 11 affirm that record keeping and outbreak investigation in the tertiary academic hospitals is poor and lacking. Despite these hospitals having knowledge of the outbreaks reported, they are unsure about the relevant facts pertaining to the outbreaks viz. duration of the outbreak, number of confirmed cases, number of deaths, and the source. These are essential fields of information that should be recorded in any outbreak.

Q7 Which area in the hospital is the first point of entry?

The most frequent point of entry in the tertiary academic hospitals is the Casualty or Emergency unit (71%), followed by the trauma and OPD areas (14%). These frequencies of points of entry provide a basis on which areas structural changes should be prioritized in an effort to become outbreak prepared. It is necessary that these areas be equipped with infection control compatible ventilation, scrub units and Protective Environment Wards or Airborne Infection Isolation Rooms.

Q8 Are there any protective environment wards (PEW) /airborne infection isolation rooms (AEIIR)? And if so how many patients can it accommodate?

In the Gauteng Province, the only Tertiary Academic Hospital that has a PEW is Johannesburg General Hospital that can accommodate 4 patients. This is indicative of the poor infrastructure within Gauteng Province and its inability to deal with a large scale outbreak where more than 4 cases occur. It also implies

that should cases of airborne infectious diseases be diagnosed in Gauteng, Johannesburg General Hospital may serve as a referral hospital to provide assistance to the other hospitals in Gauteng Province.

It also raises concerns about the logistics and travel arrangements should there be an outbreak of more than 4 cases at any given time. What would be the referral route once Gauteng Province has maximally utilized its capacity to deal with the infected cases?

As far as PEWs are concerned the Western Cape, Free State and KwaZulu - Natal seem to be better equipped having 3, 32 and 81 PEWs respectively that can accommodate 38, 64 and 81 patients respectively.

As far as AEIRs are concerned the Free State, Western Cape, and KwaZulu-Natal also seem to be better equipped having 64, 38, and 1 AEIR's respectively that can accommodate 64, 38, and 8 patients respectively.

Q9 Does the casualty area have infection control compatible ventilation?

Only 14% of Tertiary Academic Hospitals have infection control compatible ventilation. All hospitals are obliged to deal with emergencies according to the National Health Act. Patients that require emergency medical services therefore cannot be turned away. This is affirmed by the both the Constitution of the Republic of South Africa (Section 27(3)) and the National Health Act , Act 61 of 2003, which state that no one may be refused emergency medical treatment.

This finding is indicative of the low level of preparedness of these tertiary academic hospitals in the event of an outbreak of infectious diseases. The lack of infection control compatible ventilation at the hospital's first points of entry also places the health care workers at risk of contracting these infectious diseases. In terms of Section 24(a) of the Constitution, everyone has the right to an environment that is not harmful to their health or well-being.⁵

Q10 Does the design of the casualty area enable ease of quarantine and workflow in the case of an outbreak?

Only 43% of the hospitals will be able to manage a patient that requires quarantine in the casualty / emergency unit area. An alarming 57% of hospitals will thus not be able to manage this easily. This obviously places the other patients visiting the emergency area, for whatever purpose, at risk. Not having ease of workflow may result in cross-infections and exacerbation of the outbreak.

Q11 Does the hospital have a policy on the disposal of hazardous waste?

All of the hospitals have a policy on the disposal of hazardous waste.

Q12 If yes, please fax policy.

Despite all the hospitals claiming to have policies on the disposal of hazardous waste, only 86% of these hospitals produced evidence of the policy. This may have been the result of either apathy in sending policy, inability to find the policy or not actually having a policy.

Q13 If no, how do you dispose of hazardous waste?

Since all of the hospitals claimed to have policies on the disposal of hazardous waste, there was no need for any of them to respond to this question.

Q14 Does the hospital have a policy on the management of laboratory specimens from suspects of infectious diseases?

Again all the hospitals claimed to have a policy on the management of laboratory specimens from suspects of infectious diseases.

Q15 If yes, please fax policy.

Only 86 % sent through a policy. Again this may be due to apathy, inability to trace the policy or not actually having one. It is essential that all personnel need to know how to deal with such specimens and more importantly, where to send these specimens for analysis.

Q16 If no, how do you manage specimens of suspected cases of infectious diseases?

Again there was no need for any on the hospitals to answer this question.

Q17 Does the training of health care workers on personal protective equipment (PPE) occur formally or informally? Please state how many times in the year does it occur formally as well as informally?

On average 12 formal training sessions per year are held on the use of personal protective equipment by Tertiary Academic Hospitals. All tertiary hospitals surveyed conducted informal training sessions on an ongoing basis. The average number of informal sessions conducted was 268 per year. If one looks at these findings it again illustrates the individual approach of the various hospitals.

Q18 Does the training of health care workers on infection control occur formally or informally? Please state how many times in the year does it occur formally as well as informally?

The average number of formal training sessions on infection control by Tertiary Academic Hospital is 21 sessions per year.

All the Tertiary Academic Hospitals conduct informal training sessions on infection control on a continuous basis throughout the year. The average number of informal sessions conducted per year is 268 sessions. The number of formal session that is conducted would tend to indicate that infection control is seen as a priority by the tertiary hospitals.

5.3 GENERALISABILITY OF THE FINDINGS

The study findings are only internally valid in South Africa and cannot be generalized to other countries, since hospitals from other countries were not included in this study.

CHAPTER 6

CONCLUSIONS, RECOMMENDATIONS AND LIMITATIONS

Having discussed the findings of the survey in general we can now consider, more specifically, the situation in Gauteng academic hospitals.

6.1 SPECIFIC CONCLUSIONS AND RECOMMENDATIONS

6.1.1 Finding: All academic hospitals in Gauteng Province have clear terms of reference for each member / unit at all levels.

Recommendation: That provincial department of health assist other hospitals in creating outbreak response teams with clear terms of reference where these do not exist.

6.1.2 Finding: Even though the Gauteng academic hospitals have lists of priority diseases, epidemic prone infectious diseases, diseases targeted for eradication / elimination and diseases that are of public health concern, it does not necessarily imply that health care workers will be able to readily diagnose and treat these diseases, as some of the diseases on these lists e.g. viral haemorrhagic fevers, are uncommon diseases.

Recommendation: That there is ongoing training of health care workers on these diseases with visual aids so that there is a high index of suspicion maintained. Further early diagnosis and treatment can be initiated. Health care workers also need to be continually reminded of the notifiable medical conditions and how to notify a disease as well as the lines of reporting and systems of disease notification.

6.1.3 Finding: Only a third of responding hospitals in Gauteng have a functional preparedness and response strategy / plan for priority diseases. This is indeed alarming, especially for tertiary academic hospitals.

Recommendation: That the Gauteng Provincial Department of Health place some emphasis on ensuring that all hospitals have a functional preparedness and response strategy / plan for priority diseases in place. This could be enforced by checking for these plans when audits are done on hospitals and it should be one of the duties listed on the performance management contract of the Chief Executive officers.

6.1.4 Finding: Even though it was verified that all of the hospitals in Gauteng that claimed to have a functional preparedness and response strategy / plan for priority diseases, did indeed have one, the quality and content of the plans were questionable. These hospitals all adopted the National Health Strategy, which is clearly inadequate for the local hospital setting, as it does not clearly spell out the level of detail that is required at a hospital level to mount an effective and efficient outbreak response.

Recommendation: That all hospitals customize their outbreak preparedness and response strategy / plan to their individual hospital. A proposed model that may assist in accomplishing this is presented in Appendix 9.

6.1.5 Finding: Gauteng academic hospitals reported very few outbreaks in the past five years. None of these hospitals reported outbreaks that were older than 5 years. It seems unlikely that these hospitals experienced such few outbreaks. Perhaps this is indicative of inadequate record keeping and loss of institutional memory.

Recommendation: All hospitals should critically examine their record keeping, especially as regards communicable diseases. Further the National and Provincial Departments of Health should embark upon a process and allocate resources to make hospital record keeping a uniform system countrywide to enable ease of comparability and access to clinical and statistical data.

It is a requirement of Section 13 (Obligation to keep record) of the National Health Act, subject to National Archives of South Africa Act, 1996 (Act No. 43 of

1996), and the Promotion of Access to Information Act, 2000 (Act No. 2 of 2000), that the person in charge of a health establishment must ensure that a health record containing such information as may be prescribed is created and maintained at that health establishment for every user of health services⁶. There is thus an opportunity for the National Department of Health to provide regulations and guidelines as to what records should be kept and the format of communicable disease recording could be dealt with here.

Once regulations and guidelines have been provided, compliance can be verified by means of periodic audits.

6.1.6 Finding: The most frequent point of entry in the tertiary academic hospitals in Gauteng hospitals is the Casualty or Emergency unit.

Recommendation: Since these are points of most frequent entry, it is recommended that structural changes in these areas should be prioritized in an effort to become outbreak ready. It is imperative that these areas be equipped with the infection control compatible ventilation, scrub units and Protective Environment Wards or Airborne Infection Isolation Rooms. The National Department of Health should also provide a list of minimum norms and standards for the structural design of these points of entry. Facility audits should then be conducted as part of the accreditation process to ensure compliance.

6.1.7 Finding: In the Gauteng Province, the only tertiary academic hospital that has a protective environment ward (PEW) is Johannesburg General Hospital that can accommodate 4 patients.

Recommendation: The National and Provincial Departments of Health need to conduct an audit of exactly where all the AEIIR's and PEW's are. Thereafter, referral guidelines together with a co-ordination and admission procedure should be drawn up to facilitate ease of patient referrals and transfer should there be a large scale outbreak. The logistics e.g. transportation etc. should also be

included in this plan. Feasibility studies should also be conducted at the Gauteng academic hospitals with a view to establishing more AEIIR and PEW capacity.

6.1.8 Finding: None of the Gauteng academic hospitals have infection control compatible ventilation in their emergency units.

Recommendation: It is therefore recommended that adequate funding be allocated for the upgrade and installation of air-conditioning and ventilation systems at all entrance units at hospitals.

6.1.9 Finding: None of the Gauteng academic hospitals claim that they will be able to manage a patient that requires quarantine in the emergency unit area.

Recommendation: Hospitals entry units need to be redesigned and upgraded to facilitate ease of workflow and quarantine. It is important that a multi-disciplinary team be consulted during planning and the design to ensure a functional design. Despite sophisticated care being given at hospitals, many hospitals lack the basic infrastructure to minimize the risk of spread of infection⁸.

6.1.10 Finding: All academic hospitals in Gauteng have policies on the disposal of hazardous waste and were able to provide the policy. Hospitals in Gauteng Province use the Provincial Policy on Waste Management. Customization of provincial policies as well as implementation still remains a challenge especially in the segregation and disposal of waste.

Recommendation: Awareness campaigns should be conducted to improve compliance with waste management policy. It is also recommended that all infection control policies be kept in a centralized policy bank for ease of access and retrieval. Policies should also be updated in regular intervals. All hospitals should consider forming a policy committee that is responsible for the reviewing and safekeeping of all hospital policies.

6.1.11 Finding: All Gauteng academic hospitals have a policy on the management of laboratory specimens from suspected infectious disease cases.

These hospitals also provided evidence of the policy. However, some hospitals had difficulty in locating the policy at short notice.

Recommendation: Again placing the documentation in a centralised “policy bank” would provide for easy access in times of crisis. This should be done in conjunction with the NHLS and NICD

6.1.12 Finding: The number of formal and informal training sessions on personal protective equipment varies significantly between the Gauteng academic hospitals. This may be a reflection of the management style of the various institutions or be indicative of available capacity for conducting training.

Recommendation: It is therefore recommended that a norm or standard should be set for the minimum number of training sessions that should be conducted formally and informally on Personal Protective Equipment per year. The norm or standard should, however, be flexible enough to cater for the unique circumstances of each institution. Documentation on the training also needs to be improved so that health care workers that have not been exposed to the training can be identified timeously and be trained accordingly. Training manuals also need to be developed and reviewed regularly to accommodate the changes in the use of PPE in different settings. Practical drills also should be included in the training.

6.1.13 Finding: Again the number of formal and informal training sessions on infection control varies significantly between the Gauteng academic hospitals.

Recommendation: It is therefore recommended that a norm should be set for the minimum number of formal and informal training sessions to be conducted per year on infection control. Further, records of both formal and informal training sessions should be kept. The content of the infection control training manuals also needs to be customized to the specific hospital setting bearing in mind the available resources.

6.2 GENERAL CONCLUSION

It can be concluded from the findings of this study that academic hospitals in Gauteng, as well as in other areas of South Africa in general are not adequately prepared for the management of an infectious disease outbreak.

A great deal of work still needs to be done to reach a state of preparedness. This finding concurs with that of other authors who claims that infection control programs in South Africa range from non-existent to excellent and that in the majority of our health care facilities in South Africa, these programs are generally poor^{8, 25}. Where infection control policies are lacking, the containment of the spread of infectious organisms becomes extremely difficult. It is a well established fact that the quality of the health care facility's infection control programme is an overall reflection of the standard of care provided by that institution. Further, despite sophisticated care being given at hospitals, many hospitals lack the basic infrastructure to minimize the risk of spread of infection⁸.

The study has also illustrated that there is not an easily available model, for South African context, that can be used by hospital management in facility specific planning for infectious disease outbreaks.

The development of a generic approach that could be utilized by institutions to develop an institution specific outbreak response policy and standard operating procedures would assist hospital management in meeting their obligation as regards outbreak response.

A generic model has been formulated and is presented in Appendix 6.

6.3 LIMITATIONS OF THE STUDY

6.3.1 RESEARCH DESIGN

Due to the descriptive, cross-sectional survey design used, the study only provides a snap shot in time. As the study progressed, hospitals could have been in progress with renovations or even drawing up protocols and standard operating procedures, which would not have been captured by this study.

6.3.2 TARGET POPULATION

In the study the most probable persons that hold the information pertaining to the questionnaire were targeted as the responders. However, other persons within the hospital that hold the information could have been excluded giving a false impression that certain items are non-existent or deficient within the hospital. Only tertiary academic hospitals were selected. All other levels of hospitals were excluded from this study. It could be that these hospitals contain information or models relevant for the development of outbreak policies and standard operating procedures, especially since level one and two hospitals are the first points of entry for patients into the health care system.

6.3.3 SAMPLING

Since the definitions of hospitals and the levels of care nationally still remain in draft form, only hospitals that fitted the researcher's definition of tertiary academic hospitals were included in this study.

6.3.4 THE RESEARCH INSTRUMENT

There was no specific instrument in the literature that could be used to measure the infectious disease outbreak preparedness. This could limit the degree of comparability with other past and future studies of this nature.

The questionnaire only focused on 5 specific aspects. Items that were excluded from the study included, amongst others, the structural differences, human

resources, budget allocations for infection control and equipment for outbreak management.

Due to the small sample size (12 tertiary academic hospitals) only one hospital was selected as the pilot site. In retrospect, probably more than one hospital should have been selected to make comparisons and contrasts.

6.3.5 RESEARCH PROCESS

The research process was time consuming. This again illustrated the difficulty of surveying by questionnaire. In some instances the questionnaire had to be sent to the respondent on numerous occasions, as the respondent would misplace the questionnaire. Numerous follow-ups with the respondents were necessary to obtain all the relevant documentation on time.

6.3.6 VALIDITY

Face validity was established by telephonically asking individuals that were prospective participants in the study to comment on the relevance and adequacy of the research instrument.

Content validity was established by seeking the expert opinion from the supervisors of this study.

6.3.7 RELIABILITY

Parallel reliability was tested by giving the respondent the same questionnaire to answer twice in the pilot study. The responses were then compared.

Test-retest reliability was tested by getting the same respondent to answer the questionnaire on two different days.

As mentioned above, reliability could have been further increased if more respondents were used for the pilot study.

6.3.8 ELIMINATION OF BIAS

Interviewer and inter-observer bias was limited by the researcher and respondent being the ones to complete the questionnaire.

Selection bias was eliminated by using an all inclusive sample of all academic tertiary hospitals in South Africa. One concern here is non-response bias since only seven of the twelve hospitals responded to the questionnaire.

Information bias was eliminated by the researcher being the sole person to brief all respondents about the study.

Instrument bias was eliminated by avoiding the use of leading questions on the research instrument.

The researcher also ensured that quality control in the completion of the questionnaires was maintained at all times. Each questionnaire was checked by the researcher to ensure completeness as well as correctness of completion. Follow-ups were made with the respondents if clarity was required on any issue pertaining to the questionnaire.

6.3.9 ETHICAL CONSIDERATIONS

The study was approved by the Medunsa Campus research Ethics Committee. [Annexure 6]

Permission to conduct the study was obtained from the hospital CEO's as well as the Chief Director of Hospital Services in Gauteng Province. Informed consent was obtained from all respondents participating in the study.

Upon completion of the final write up the findings of the study will be made available to all participating hospitals.

6.4 RECOMMENDATIONS FOR FURTHER RESEARCH

Follow up studies can be embarked upon using the same research instrument that was used to conduct this study. The findings of this study would then serve as a baseline study for the evaluation of the capability on Gauteng's Provincial academic / tertiary hospitals to manage and infectious disease outbreak.

The readiness of Level 1 and Level 2 hospitals readiness to manage infectious disease outbreaks could also be assessed, as an infected patient may walk into any hospital at any time.

Research also needs to be conducted to evaluate the adequacy and levels of customization of the policies relating to infectious disease outbreaks that exist within hospitals.

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