A Review of the Communicable Diseases and Infection Control Policy for Emergency Medical Services in the Pre-hospital environment in the Public health sector in South Africa-2005

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i. Declaration

I, **Dr Ozayr Haroon Mahomed,** confirm that I understand the policy on plagiarism of the University of Kwa-Zulu-Natal and that I will be penalized if this dissertation infringes that policy.

I, declare that this research report is my own, unaided work, except as indicated in the acknowledgments, the text and the references. This report is being submitted in partial fulfillment of the requirements of the Masters of Medicine in Public Health Medicine (MMed (PHM)) as awarded by the University of Kwa Zulu Natal

It has not been submitted before, in whole, or in part for any degree or any examination at any other university.

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v. Acronyms and Abbreviations

AIDS:	Acquired Immune Deficiency Syndrome
AusAid:	Australian Government Overseas Aid programme
CCHF:	Crimean Congo Haemorrhagic Fever
CDC:	Centre for Disease Control
ECP:	Emergency Care Practitioners
EMS:	Emergency Medical Services
HBV:	Hepatitis B Virus
HCW:	Health care worker
Hep B:	Hepatitis B
HIV:	Human Immune Deficiency Virus
HSV:	Herpes Simplex Virus
ILO:	International Labour Organization
KZN:	Kwa-Zulu Natal
MDR-TB:	Multi drug resistant tuberculosis
NDOH:	National Department of Health
OHSA:	Occupational Health and Safety Act, No.85 of 1993
PPE:	Personal protective equipment
SOP:	Standard Operating Procedure
SSA:	Sub Saharan Africa
TB	Tuberculosis
USA:	United States of America
WHO:	World Health Organization

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vii. Abstract

Introduction

Emergency Medical Service (EMS) personnel evaluate patients, resuscitate them, and transport them to a medical care facility. This care is performed in an uncontrolled environment and involves invasive procedures and life support measures. The performance of these duties places EMS personnel at risk of occupationally acquired injuries and communicable diseases. Although the legislative guidelines exist for the protection of healthcare workers (HCW) from occupationally acquired injuries and diseases little is known about the degree to which protective measures are available for and utilized by EMS personnel in the pre-hospital environment in South Africa.

Study Aim

The aim of the study was to inform the development and design of policies and programmes addressing communicable diseases and infection control for EMS in the pre-hospital environment in the public health sector at a National and Provincial level in South Africa.

Study Methods

Semi-structured key informant interviews were utilized to collect data in respect of the availability and implementation of the policy on communicable diseases and infection control in EMS, as well as the nature and content of educational programs to impart and reinforce the knowledge and skills of communicable diseases and infection control for EMS employees.

Results

There is no National Policy on Communicable diseases and Infection control in Emergency Medical Services. Only Kwa-Zulu Natal (KZN), Eastern Cape and Gauteng have EMS specific Standard Operating Procedures for Communicable Diseases and Infection Control. Formal education and in service training is limited with respect to control measures for infection control and the prevention of communicable diseases.

Conclusion and Recommendation

An EMS specific National Communicable Disease and Infection Control Policy together with an accredited training module on Communicable Diseases and Infection Control for Emergency Medical Services in the pre-hospital environment needs to be developed.

Chapter 1: Background and Introduction

The fundamental ethic of health care delivery is that sick persons must receive adequate care. All health-care workers (HCW) have always accepted that there is a certain degree of risk of acquiring a communicable disease from their patients as part and parcel of their profession. This Chapter provides an introduction to the burden of communicable diseases globally and nationally. The National Health Act and the Occupational Health and Safety Act (OHSA) provide the legislative framework for the protection of health care workers against occupational hazards. The relevant sections of these acts that pertain to the protection of health care workers are summarized in this chapter.

The aims and objectives of the study and a detailed background to the study are provided. The outline of the dissertation is presented at the end of the chapter.

1.1. Introduction

Despite the extraordinary medical advances of the 20th century, a significant component of the global burden of disease continues to be attributable to infectious diseases, under-nutrition and complications of childbirth.[1] Human Immune Deficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) has become the leading cause of mortality among adults aged 15–59 years, and is responsible for over 2 million deaths representing 13% of global deaths in this age group.[2]

Communicable diseases are responsible for more than 50% of deaths in Sub-Saharan Africa (SSA). HIV and AIDS, tuberculosis (TB) and malaria together account for more than one in three deaths, and lower respiratory infections, measles and diarrhoea for another 20%. About 8.8 million people develop active TB every year, and 1.7 million die of the disease. The majority of TB sufferers live in developing countries with the number of TB cases having doubled or even trebled in the past decade in several African countries, including South Africa mainly as a result of the HIV epidemic. [3]

HIV and other infectious and parasitic diseases accounts for 40% of the mortality in South Africa and are a significant contributor to the burden of disease.[4] According to the annual antenatal clinic-based surveillance survey, there were an estimated 6.29 million South Africans who were HIV positive at the end of 2004, including 3.3 million women and 104,863 babies. [5]

The health status of the South African population has declined in the last decade as evidenced by a decreasing life expectancy. This has been the result of the rapid spread of the HIV epidemic. The AIDS epidemic has fuelled the TB epidemic and also resulted in increased deaths due to communicable diseases.

The fundamental ethic governing health service delivery is that sick persons must receive adequate care.[6] As AIDS and its related communicable diseases progress, the weakened state of immune-compromised patients, may increase the demand for EMS services, since patients and families may not be able to transport them to hospitals and clinics.

Currently, EMS personnel sequentially evaluate patients' clinical status, resuscitate them, and transport them to a medical care facility. Patients' resuscitation and initial care is often performed in an uncontrolled environment and involves time-sensitive, invasive procedures and life support measures that expose EMS personnel to blood and body fluid-borne pathogens like HIV and hepatitis, as well as airborne communicable diseases like TB. This interface between the sick patient and the EMS personnel places them at risk of occupationally contracting these life threatening diseases and subsequently, transmitting them to other patients. This transmissibility of communicable diseases can transform care-givers into victims. Ill care-givers doubly weaken a nation's health status and present an immediate threat to the nation's EMS workforce.

Healthcare workers have accepted that there is a certain degree of risk of acquiring an infectious disease from their patients as part of their professional practice. Since the personnel of the health service are its most valuable asset, everything possible should be done to provide the highest quality of care. If healthcare workers are troubled by their own ill-health, or other stressful circumstances, then their performance will be adversely affected. In addition, apart from being good employment practice, no healthcare service can function effectively if there is a high incidence of ill health among its workers.

There are two over-arching legislative measures that form the foundation for the protection of the healthcare service providers in South Africa. The first is the National Health Act, 61 of 2003. [7] Section 20 (3) of the National Health Act, states that:

"Subject to any applicable law, every health establishment must implement measures to minimize-

(a) Injury or damage to the person and property of health care personnel working at that establishment and;

(b) Disease transmission"

The second piece of legislation is the Occupational Health and Safety Act, 85 of 1993 (OHSA)[8] which requires employers to provide for the health and safety of persons at work against hazards arising out of or in connection with the activities of persons.

In terms of this Act, the employer is obliged to:

- "establish, as far as is reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed, and he shall, as far as is reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article, substance, plant or machinery in order to protect the health and safety of persons, and he shall provide the necessary means to apply such precautionary measures;
- Providing such information, instructions, training and supervision as may be necessary to ensure, as far as is reasonably practicable, the health and safety at work of his employees."[8]

The employee's responsibilities in terms of the Act are:

- "to take reasonable care for the health and safety of themselves and of other persons who may be affected by their acts or omissions;
- carry out any lawful order given to them, and obey the health and safety rules and procedures laid down by their employer or by anyone authorized thereto by their employer, in the interest of health or safety;
- if they are involved in any incident which may affect their health or which has caused an injury to themselves, report such incident to their employer or to anyone authorized thereto by the employer, or to their health and safety representative, as soon as practicable but not later than the end of the particular shift during which the incident occurred, unless the circumstances were such that the reporting of the incident was not possible, in which case they shall report the incident as soon as practicable thereafter".[8]

1.2. Problem Statement

Whilst the National Health Act and OHSA provide the general legislative and policy framework to safeguard the health and safety of all workers (including EMS), it is unclear to what extent these generic policies have been translated into specific policies, programmes and standard operating procedures (SOPs) to specifically address the high risks facing EMS personnel.

Further cognizance needs to be taken of the relationship between the National and Provincial departments of health in formulating and implementing policies. Whilst the National Department of Health (NDOH) has the mandate to draft and promulgate national legislation and policies, implementation of these policies through appropriate programmes and services is the prerogative of the provincial department of health. The uneven distribution of health care resources and capacity amongst the nine provinces in South Africa may result in the uneven development of provincial programmes to protect EMS personnel.

1.3. Background

EMS in South Africa is an exclusive provincial legislative competency in terms of Schedule 5, Part A, of the constitution.[9] Prior to 1994; EMS was under the responsibility of local government and merged with fire services. The delivery of EMS in the public health sector has progressively been converted to a provincial function since 1997. However, only in the Ekhuruleni Metropolitan Council, in the Gauteng Province, EMS services are under the administration of 5 municipalities, which have service level agreements with the province. This unconstitutional situation is as a result of the legacy of the previous administration and failure of negotiations pertaining to service contracts.

The EMS Directorate nationally as well as provincially are situated within the health service delivery cluster. All provinces have a Provincial EMS Director except for the Free State, Mpumulunga and Northern Cape where the Provincial EMS department is headed by a Deputy Director, with only a policy development role.

All Provinces have devolved operational responsibility to District level EMS managers who report directly to the Provincial Senior EMS managers except in the Free State where the Chief Directors at District levels have overall responsibility for the operational functions and do not report to the Provincial EMS Department but to the General Manager of the Health Service Delivery cluster.

KZN has the most highly developed EMS functions at a district level with a full support structure that includes operational managers and soon to be appointed senior medical officers and district training coordinators. Western Cape, Free State, North West and Eastern Cape are at an intermediate level with appointed district managers. Limpopo Province and Northern Cape are still at an early stage and in the process of devolving responsibility to the district level.

EMS provides a range of emergency medical services and care, including: [10]

- Basic, Intermediate and Advanced Life Support;
- Ambulance based emergency care;
- Patient transfers from rural hospitals into tertiary care centres in the metropolitan areas;
- Patient Transfers for follow-up care from outlying areas to Metropolitan areas;
- Medical Rescue services including Mountain Rescue, High Angle Rescue, Trench Rescue, Swift Water Rescue, Heavy Motor Vehicle Rescue, Light Motor Vehicle Rescue, Air Sea Rescue, Building Rescue;
- Mass Casualty, Disaster Management and Cave Rescue;
- Transfer of Infectious Disease Patients.

1.3.1. EMS Workforce in the Public Health Sector in S.A. in 2004

There were 8142 EMS personnel in the public health sector in South Africa on the 30th of April 2005, of which 61% are trained at a Basic Life Support Level. The urban provinces of Gauteng, Kwa-Zulu Natal, Western Cape and Eastern Cape Province have 68% of the EMS employees with the rural provinces of Limpopo, North West, Free State, Mpumulunga and Northern Cape having only 32% of the national EMS personnel. The majority of the EMS practitioners in the rural provinces of Mpumulunga, Free State, North West, Limpopo and Northern Cape are trained at a basic emergency level only (Table 1).

Table 1: Distribution EMS Workforce in South Africa in 2004 disaggregated by province: Numbers and Percentage (%)

Province	*Number and Percentage of EMS practitioners per province*	*Number and Percentage of EMS practitioners per province trained at Basic Level*
Gauteng	1659 (21)	1012 (61)
Kwa-Zulu Natal	1649 (20)	805 (49)
Western Cape	1200 (15)	565 (47)
Eastern Cape	1000 (13)	500 (50)
Free State	670 (8)	603 (90)
North West	664 (8)	465 (70)
Mpumulanga	500 (6)	400 (80)
Limpopo	437 (5)	306 (70)
Northern Cape	363 (4)	300 (83)
Total	**8142 (100)**	**4976 (61)**

Figure 1 depicts the distribution of EMS practitioners per 100000 population based on the mid-year population estimates for 2005.

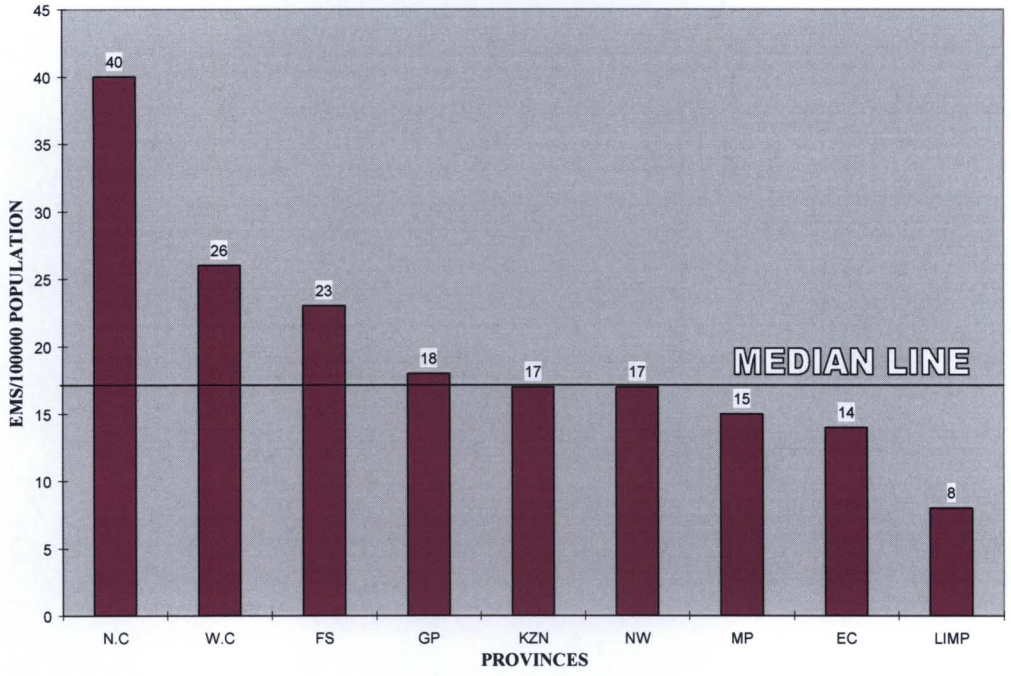

Figure 1: Number of EMS personnel/100000 population across provinces in 2005 in the public health sector

The median number of EMS personnel/100000 population in the public health sector in South Africa in 2005 was 17 with a mean of 20 and a range of 32 EMS personnel/100000 populations. The mean is skewed upwards by Northern Cape and Free State province because these provinces have the lowest number of people living within them. Limpopo province has the lowest number of EMS personnel/100000 population.

1.4. Relevance of the Study

The emergency care practitioner (ECP) or paramedic provides the first link in the "chain of survival" of the critically ill or injured patient. The primary task of the ECP is to give pre-hospital care to sick or injured persons. ECP may be called upon to deal with;

- Medical Emergencies such as anaphylaxis, asthma, carbon monoxide poisoning, cardiac arrest, arrhythmia (Adult and Child), chest pains including myocardial infarctions, choking, a collapsed or unconscious patient, diabetic hypoglycaemia, drowning, croup, convulsions, heat exhaustion, gastroenteritis, meningitis, respiratory tract infections, neonatal emergencies, poisoning, pregnancy and psychiatric emergencies;
- Trauma such as limb injuries, paediatric trauma, burns, amputation, penetrating trauma, motor vehicle accidents, suicides and gun shot wounds.

Pre-hospital care involves the resuscitation and stabilization of patients, prevention of further injuries and the transport of patients to the nearest healthcare centre. When a call for assistance is received, the nearest available ambulance is sent out to the scene as well as a rapid response vehicle in special circumstances. The ECP's at the basic or intermediate level assesses the patient and provide basic life-support, stops any bleeding, administers treatment for shock that includes intravenous therapy and defibrillation (shock) chest decompression, stabilizes of fractures, dresses wounds, administers bronchodilators for asthma, provides assistance with delivery of patients in advanced labour and basic treatment of cases of burns and poisoning. The advanced life support paramedics are usually involved in situations of a disaster or serious motor vehicle accidents. They provide advanced airway management, intravenous therapy, drug therapy and advanced resuscitation.

The ECP may be exposed to accident, physical, chemical, ergonomic, psychosocial and biological hazards during the course of their normal work. In addition to the above conventional risks associated with the pre-hospital care and transport of patients, the global pandemic of HIV, TB, multi-drug resistant tuberculosis (MDR-TB) as well as emerging and re-emerging infectious diseases exposes the ECP to additional risks of infectious and communicable diseases.

The global HIV epidemic, its related and unrelated communicable diseases, coupled with the unique aspects of EMS medical care have attracted the attention and concern of the EMS director and public health officials in South Africa. The NDOH, commissioned the Department of Public Health Medicine at the School of Family and Public Health Medicine of the University of Kwa-Zulu Natal to undertake a review of the current national and provincial communicable diseases and infection control policies for EMS in the pre-hospital environment in the public health sector, to identify the strengths, gaps, weaknesses, and the extent of implementation of standard operating procedures at the provincial level; thereby informing the further development of policies, standard operating procedures, and training modules, for the prevention of blood, body fluid, and airborne transmission of communicable diseases to and from EMS workers.

1.5. Aim of the study

The aim of the study was to inform the development and design of policies and programmes addressing communicable diseases and infection control for EMS in the pre-hospital environment in the public health sector at a National and Provincial level in South Africa in 2005.

1.6. Study objectives

The objectives of the study were:

- To review the existing national and provincial policies and legislative measures that aim to protect EMS personnel in the public health sector from communicable diseases.
- To identify the availability and the gaps in the implementation of standard operating procedures addressing communicable diseases and infection control for EMS in each province.
- To review the follow-up surveillance conducted by Provincial EMS service managers to ensure that their personnel are protected from communicable diseases.
- To determine from National and Provincial senior management of EMS the availability of and the provision of training programmes targeted at EMS personnel that would train them to protect themselves from contracting communicable diseases.
- To make recommendations to the National EMS coordinating committee based on the findings of the study.

1.7. Conceptual framework for the study

Globally, increased attention is being focused on the development of effective health systems and the contribution that policies can make to this. Policy-making involves those in positions of authority making choices that have a special status within the group to which they will apply. The results take many forms ranging from national health policies made by the government to clinical guidelines determined by professional bodies. Rational models of policy-making assume policy-makers identify problems, then gather and review all the data about alternative possible solutions, and their consequences, and select the solution that best matches their goals.[11]

The systems approach offered the theoretical and conceptual framework that guided the design of the study. Figure 2 depicts the adapted approach of the model that forms the basis for this review.

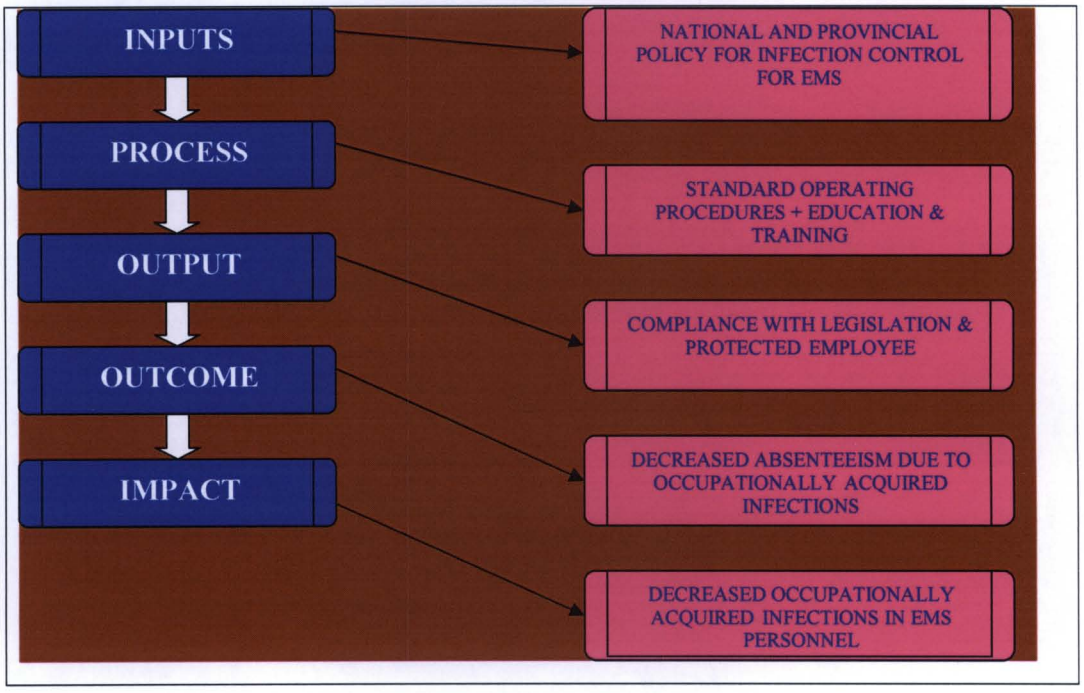

Figure 2: Application of the systems approach to the study design.

The rising incidence of HIV/AIDS, MDR-TB and other emerging and re-emerging communicable diseases, together with the increased demand for health services provide the context for the development of a policy. The objective of the policy is to decrease the incidence of occupationally acquired infections of EMS employees and the onward transmission to patients.

The main input in the model is a National communicable diseases and infection control policy for EMS in the pre-hospital environment in the public health sector. This is followed by the adoption and/or development of a Provincial communicable diseases and infection control policy for EMS in the pre-hospital environment in the public health sector. The process for implementing the policy to achieve the objective is the development of SOP's and education and training of EMS employees. The output is the compliance with legislation and an employee that is protected against occupationally acquired communicable diseases. The main outcome is a decrease in the incidence of occupationally acquired infections of EMS employees and the onward transmission to patients.

This study focused on the inputs and process components as outlined in Figure 2 and not on the outputs and outcomes.

1.8. Operational Definitions

Ambulance: An **ambulance** is a vehicle designated for the transport of sick or injured people. An ambulance can be any vehicle, including a bus, helicopter, or even a hospital ship.

Biological Hazards: any agent that causes infection including, bacteria, viruses, fungi and parasites.

Circular: A specific directive from the NDOH indicating policies and procedures to be followed by all provincial EMS departments

Communicable Disease: An illness due to a specific infectious agent or its toxic products that arises through transmission of that agent or its products from an infected person, animal or inanimate reservoir to a susceptible host; either directly or indirectly through an intermediate plant or animal host, vector or the inanimate environment.

Infectious Disease: Change from a state of health to a state in which part or all of a host's body cannot function normally because of the presence of an infectious agent or its products.

Medical Surveillance: planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner, and in prescribed cases by an occupational medicine practitioner.

Refresher Courses: special training courses that are held at regular intervals to enhance the knowledge and skills of employees

Policy: A definite course or method of action selected (by government, institution, group or individual) from among alternatives and in the light of given conditions to guide and, usually, to determine present and future decisions.

Standard Precautionary Measures: simple standards of infection control practices to be used in the care of all patients, at all times, to reduce the risk of transmission of blood borne infections.

Standard Operating Procedures: (SOP) are written guidelines that explain what is expected and required of emergency service personnel in performing their jobs.

Updates: Weekly or monthly meetings or newsletters providing current information regarding communicable diseases statistics and outbreaks.

1.9. Structure of the Report

Chapter 2 contains a review of literature to establish the epidemiology of communicable diseases in health care workers and especially EMS as well as the framework of a communicable diseases and infection control policy in the pre hospital environment.

Chapter 3 describes the methodology employed in performing the study as well as the reliability and validity of the measuring instruments

Chapter 4 presents the key findings of the study

Chapter 5 discusses the key findings of the study.

Chapter 6 provides conclusion and recommendations to the National EMS Coordinating Committee in order to address the gaps identified.

Chapter 2: Literature Review

A literature review of the epidemiology of communicable diseases amongst EMS personnel as well the availability of published standards for the protection of EMS personnel from communicable diseases in the pre-hospital environment was performed. A search using the Pubmed database with the following key words Emergency Medical Services, Communicable Diseases, Pre-hospital environment revealed no published articles in the South African setting, while several references on Infection Control Policy for Emergency Medical Services from various Emergency services globally were listed and reviewed. The International Labour Organization (ILO) has listed the hazards that ambulance drivers may be exposed in the course of their normal work in the International Datasheets on Occupations.[12] The listed hazards include accidents, physical hazards, chemical hazards, biological hazards and ergonomic, psychosocial and organizational factors. Since the primary aim of this study was communicable diseases and infection control policies and programmes, the main focus of the literature review was on biological hazards. To determine which infections pose risk and how risky specific exposures may be, a review of all literature on occupationally acquired infections in health care workers published in English between January 1990 and December 2004 was reviewed. The first part of the review examines the various routes of exposure to human sources of micro-organisms in the healthcare settings and characterizes the type and risk of disease for the healthcare workers and specifically ECP due to the exposure. This is followed by a review of policies on Communicable Diseases and Infection Control for EMS in the pre-hospital environment.

2.1. Routes of exposure to human sources of microorganisms in the healthcare setting

Exposure to human sources of microorganisms in healthcare settings occurs via three primary routes: contact (direct and indirect), respiratory droplets, and airborne droplet nuclei (i.e., respirable particles of <5 μm).[13]

Contact transmission: the most common mode of transmission is divided into two subgroups: direct contact and indirect contact.

- Direct contact transmission occurs when microorganisms are transferred directly from one person to another person. In healthcare settings these include:
    - Blood from a patient directly enters a caregiver's body through a cut in the skin;
    - Scabies mites from a patient are transferred to the skin of a caregiver while he/she is lifting the patient;
    - A healthcare provider develops herpetic whitlow on a finger after contact with Herpes simplex virus when providing oral care to a patient without using gloves or HSV is transmitted to a patient from a herpetic whitlow on an ungloved hand of a HCW.[14]

Direct contact transmission is more efficient than indirect contact transmission but occurs less frequently in healthcare settings than indirect contact transmission. Disease is more likely to develop following direct contact transmission when the pathogen is highly virulent or has a low infectious dose or the patient or HCW is immune compromised.

Indirect contact transmission, the most frequent mode of transmission, involves the transfer of an infectious agent through a contaminated intermediate object or person. Hands of personnel are usually cited as the most important contributors to indirect contact transmission. [15] Examples of indirect contact transmission are as follows:

- Hands of healthcare personnel touch an infected or colonized body site on one patient or a contaminated inanimate object, and then subsequently touch another patient without healthcare personnel performing adequate hand hygiene between patient contacts.

- Patient-care devices (e.g., electronic thermometers, glucose monitoring devices contaminated with blood or body fluids are shared between patients without cleaning and disinfecting between patients.

- Instruments that are inadequately cleaned between patients before disinfection or sterilization or that have manufacturing defects that interfere with the effectiveness of reprocessing may transmit bacterial and viral pathogens.

Droplet transmission occur when respiratory droplets are generated when an infected person coughs, sneezes, or talks or during procedures such as suctioning, bronchoscopes, and cough induction by chest physiotherapy. Transmission occurs when droplets propelled short distances (<3 feet through the air) are deposited on the conjunctivae, nasal mucosa, or mouth. Examples of infectious agents that can be transmitted via the droplet route include *Bordetella pertussis*, Influenza virus, Adenovirus, Rhinovirus, *Mycoplasma pneumoniae*, SARS-associated corona virus (SARS-CoV), Group A streptococcus, and *Neisseria meningitidis*.[16]

Airborne transmission occurs by dissemination of airborne droplet nuclei small particle residue [5 μm or smaller in size] of evaporated droplets, which contain infectious micro organisms that remain suspended in the air for long periods of time or dust particles containing the infectious agent. Micro organisms carried in this manner can be dispersed widely by air currents and may be inhaled by susceptible hosts within the same room or over a longer distance from the source patient when the air supply is shared. There are only a few micro organisms known to be transmitted by the airborne

route: Mycobacterium tuberculosis, Rubeola virus (measles), and Varicella-zoster virus (chickenpox).[16]

Other sources of infection that do not involve person-to-person transmission include those associated with common source vehicles, e.g. contaminated food, water, or medications (e.g. intravenous fluids). Vector borne transmission of infectious agents from mosquitoes, flies, rats, and other vermin also can also occur in healthcare settings.

2.1.1. Occupational exposure to human sources of microorganisms in the EMS Setting

Health care workers are at an occupational risk for a vast array of infections that cause substantial illness and occasional deaths. Despite this, there are no reported studies in the South African or African literature that have examined the incidence and route of occupational exposure to human sources of micro organisms in the EMS setting. In the United States of America (USA), the following incidence and type of occupational exposures to human sources of micro organisms were reported in the EMS setting by the Portland Bureau of Fire Rescue and Emergency Services. Two hundred and fifty-six (256) exposures were categorized during the 2-year period commencing on the 1st of January 1988, and ending on the 31st of December 1989. The overall incidence of reported exposure was 4.4 per 1,000 EMS calls. Of these exposures, 120 (46.9%) were exposures to intact skin, 61 (23.8%) involved respiratory exposure only, 38 (14.8%) were exposure to non intact skin, 15 (5.9%) were eye splashes, 14 (5.5%) were needle sticks, and 8 (3.1%) were mucous membrane exposures.[17]

2.2. Epidemiology and Risks of Occupationally acquired infections in health care workers

2.2.1. Blood borne Transmission

Although many non medical occupational groups are at risk for diseases caused by organisms transmitted through the airborne or oral-faecal route, health care workers are one of the few groups at high risk for the transmission of blood borne pathogens. Blood borne transmission have received increased attention with the advent of the acquired immunodeficiency syndrome epidemic and, more recently, the viral haemorrhagic fever outbreaks. [18]

2.2.1.1. HIV Infection

In 2004 there were an estimated 4.9 million newly infected cases and 39.4 million people living with HIV globally. Of all the regions of the world, Sub-Saharan Africa is the region most affected by the HIV/AIDS epidemic with an estimated 25.4 million people [range 23.4–28.4 million] living with HIV, in the region at the end of 2004.

South Africa has the largest number of people living with HIV/AIDS in the world. There were between 5.7 million and 6.2 million people living with HIV/AIDS in South Africa in 2004 based on antenatal ante-natal clinic-based surveillance estimates. Of the estimated 5.7 million people living with HIV and AIDS, about 25% (1.4 million people) were likely to be symptomatic including 7% (400 000 people) with full blown AIDS.

HCW's are at risk for exposure to blood borne pathogens from accidental needle sticks and other sharps injuries. ECP's come in direct contact with patients in emergency situations. Typically, the response is made with little preparation time and in uncontrolled environments. In most situations, the ECP does not know if the patient has an infectious blood borne or other communicable disease. The CDC Cooperative Needle stick Surveillance Group in the USA reporting on pooled data from 25 prospective studies of health care workers exposed to HIV through needle sticks or other parenteral exposures, quantified the risk for acquiring HIV as 0.32% (95% CI,

0.18% to 0.46%).[19] The risk for transmission of the virus depends on the extent and the circumstances of exposure. With HIV, deep, penetrating injuries, especially with hollow needles and the higher the concentration of HIV in the source patient's blood greatly increase risk; and likelihood of transmission. [20]

2.2.1.2 Hepatitis B

Hepatitis B virus (HBV) infection is a major global public health problem and one of the first blood borne pathogens to be recognized as an occupational risk among health care workers. There are approximately 2 billion people infected worldwide, with more than 350 million chronic carriers of HBV. [21] HBV infection accounts for 500 000 to 1.2 million deaths each year and is the 10th leading cause of death worldwide. [22] HBV is widespread in sub-Saharan Africa and South Africa. In South Africa, HBV has been particularly common in two young children and young sexually active adults with about 8% of children under the age of one year and almost 16% of children less than 6 years of age infected with HBV. Between 10-18% of South African adults are HBV carriers. Infection has been more common in some areas of the country, for example the Eastern Cape Province and Kwa-Zulu-Natal. South Africa has had one of the highest rates of liver cancer in the world, and this is linked to the high rate of HBV. [23] The risk for transmission of HBV from a single needle stick varies according to E antigen status: 1% to 6% for E antigen-negative blood compared with 22% to 40% with E antigen-positive blood. [24]

2.2.1.3. Viral Haemorrhagic Fever (VHF)

Viral hemorrhagic fevers (VHF's) are a group of febrile illnesses caused by RNA viruses from several viral families. These highly infectious viruses lead to a potentially lethal disease syndrome characterized by fever, malaise, vomiting, mucosal and gastrointestinal bleeding, edema, and hypotension. Class 4 viruses known or considered likely to occur in Africa include Marburg, Ebola, Rift Valley fever (RVF), and Crimean-Congo haemorrhagic fever (CCHF), Lassa fever, and Hanta viruses. In South Africa, local transmission is only reported with CCHF and RVF. Ebola virus and Marburg virus are imported into South Africa. [25]

Outbreaks of VHF's have represented very formidable hazards of occupationally acquired nosocomial infections to healthcare workers. On March 23, 2005, the World Health Organization (WHO) confirmed Marburg virus (family Filoviridae, which includes Ebola virus) as the causative agent of an outbreak of viral hemorrhagic fever (VHF) in Uige Province in northern Angola. A total of 132 cases were identified between 01 October 2004 and 23 March 2005; of these, 127 were fatal. Approximately 75% of the reported cases occurred in children aged less than 5 years; cases also have occurred in adults, including health-care workers. Twelve health care workers died during this outbreak. [26] In the 1995 outbreak of Ebola in Kikwit, in the former Zaire, 90 of the 296 cases were healthcare workers with 79% mortality. [27] Similarly, in a CCHF outbreak in Pakistan in 1976, 10 of 17 exposed healthcare workers were infected and 2 died. [28] In South Africa, fatal transmission of Ebola and CCHF infections to a surgeon and some nursing personnel has been documented. [29]

The risk of nosocomial transmission is high in conditions of poor medical services where facilities for isolation and containment are inadequate with poor standards of infection control. They are also high if personnel are unsure that a patient is infected with one of these viruses. However, when adequate high security precautions are put into place and containment facilities are good, nosocomial transmission has been limited.

2.2.2. Airborne Transmission

2.2.2.1 Mycobacterium tuberculosis (MTB)

South Africa is burdened by one of the worst TB epidemics in the world, with disease rates more than double those observed in other developing countries and up to 60 times higher than those currently seen in the USA or Western Europe. South Africa had an estimated 98,000 new smear positive cases (218 per 100,000), with a TB specific mortality rate of 73 per 100,000 population. The number of TB cases in South Africa is likely to further increase over the next few years due to HIV/AIDS. [30]

Failure to complete the required course of treatment, which normally renders TB completely curable, leads to the continued spread of TB and an increased risk of patients developing MDR-TB. This type of TB has a high mortality rate with fewer

than 30% of patients with MDR-TB surviving. A national study of MDR-TB conducted by the Medical Research Council of South Africa in 2002 found that 1.8 percent of new TB cases, and 6.7 percent of cases in re-treatment, had MDR-TB, with approximately 6,000 new cases of MDR-TB expected in 2005. [31]

Transmission of MDR-TB is a recognized risk in health-care settings. [32] The magnitude of the risk varies by setting, occupational group, patient population, prevalence of TB in the community, and effectiveness of TB infection-control measures. The risk may be higher in settings in which patients with TB disease might be encountered before diagnosis and before the initiation of anti-TB treatment or where procedures that induce coughing are performed.

EMP's are at an increased risk due to cumulative exposure as well as exposure to patients prior to their condition being diagnosed.

2.2.3 Droplet Transmission

2.2.3.1 Influenza

Outbreaks of influenza occur each winter and cause substantial illness. Numerous nosocomial outbreaks of Influenza have been reported in the USA. There are no published data with respect to nosocomial outbreaks of Influenza in South Africa. In an Influenza outbreak at a hospital with poor vaccination compliance rates in the USA, the virus spread to 118 workers, including 8% of the nurses and 3% to 6% of the physicians. [33] Influenza results in a high rate of employee absenteeism. Absenteeism during a community outbreak of Influenza at a hospital in the USA was 1.7 times higher than it had been the year before costing an additional $24 500 for sick leave. [34] An effective vaccine has been available and is indicated even for adults without underlying medical conditions. Nonetheless, rates of vaccination for patients and health care workers remain low. ECP's are at increased risk of acquiring this infection as well as transmitting it to patients with depleted immune systems.

2.2.4 Direct Contact

2.2.4.1. Neiserria meningitidis

Meningococcal infection in health care workers has been linked to rescue breathing. The risk for salivary transmission may be high during mouth-to-mouth ventilation or other intensive respiratory exposure (such as endotracheal intubations) if a patient has systemic *N. meningitidis* infection.[35]

2.2.4.2. Herpes Simplex virus Infection

Herpes simplex virus (HSV) has been shown to be readily transmitted both from patient to rescuer and from rescuer to patient, reflecting the ubiquity of HSV infection in the general population. Viable HSV has been obtained from the saliva of 2.5% of asymptomatic adults, and copious shedding of HSV occurs in persons with active lesions. Two cases of primary herpes labialis in medical residents who performed mouth-to-mouth ventilation have been reported. [36]

2.2.4.3. Scabies

Infection may spread to health care workers as a result of direct contact. In one hospital 300 health care workers were affected, including 45 of 200 laundry workers (22.5%), 126 of 1448 nurses (8.7%), and 32 of 87 health care workers (36.8%) who had direct contact with patients.[37] Despite the highly contagious nature of the disease, mortality from the disease is low.

2.3. Infection Control and Communicable Diseases Policy for EMS in the Pre hospital Environment

General infection control policies are designed to prevent the transmission of a variety of microbiological agents and to provide a wide margin of safety for health care workers. Although these policies were initially developed for hospital employees and other workers in health care facilities, similar modes of blood-borne exposure and disease transmission have been described for patient care activities in both the hospital and out-of-hospital environments. According to the Communicable Disease Notification Protocol for Emergency Service Workers from the Occupational Health and Safety Division, Saskatchewan, Canada, it is essential that an employer of emergency response workers prepares and implement a written infection control policy specific to the pre hospital environment. The policy must be kept current and reviewed at least every two years and changed if there is any change at the workplace that may affect a worker's risk of acquiring an infectious disease. EMS personnel who are at risk of exposure to infectious material or organism must have access to the policy and the services described in the policy. [38]

The purpose of the infection control policy is to provide a comprehensive infection control system which maximizes protection against communicable diseases for all members, and for the public that they serve.

The U.S. National Association of EMS Physicians (NAEMSP) recommends that the infection control policy should identify "at-risk" job classifications and tasks, establish a schedule for initial and ongoing infection control training for employees, communicate the hazards of blood-borne, airborne, droplet spread diseases, mechanisms of transmission, and methods to prevent or minimize exposures, establish procedures for post exposure incident reporting, documentation, medical management, and follow-up. [39]

Our literature review focused primarily on two important concepts namely, medical surveillance and education and training on infection control for EMS employees.

2.3.1. Health Maintenance and Medical Surveillance

The OHSA defines "medical surveillance" as a planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner in prescribed cases, by an occupational medicine practitioner.[40]

All employees should be subject to health surveillance, which should include medical examinations on placement, transfer, on leaving the organization as well as at periodic intervals. The main purpose of a pre-employment medical evaluation is to

- Establish a baseline of the candidate's health against which any future changes can be measured and monitored
- Identify possible risk of deterioration in the employee's health status which might be caused by the job process and/or work environment.
- To determine the need of the employee to be immunized.[41]

To meet the responsibility of protecting employees against infectious diseases, employers should have an immunization programme which is part of a wider safe system of work. A typical immunisation programme may consist of the following:

- Mantoux test to identify TB immunity levels. BCG vaccination may be indicated
- Screening for Hepatitis B (Hep B) immunity and Hep B immunization
- Immunity identification against Rubella, Varicella and Influenza

2.3.2. Education and Training of EMS employees on infection control

Education and training of staff is the cornerstone of an effective, facility wide program for the prevention and control of infections. In a study undertaken by Klein, Collins and Attas (2004)[42] at twelve urban/suburban emergency departments in the USA, testing EMS employee response to patients with suspected infectious disease, none of the EMS employees correctly identified their patients as being at risk for harbouring communicable diseases. EMS employee did not don any personal protective equipment (PPE) available to them on the ambulance (i.e., gloves, or N-95 mask) nor did they place a mask on their mock patients.

Based on these results and observations, the study concluded that further frontline education in infectious disease recognition and communication training for pre-hospital and emergency department personnel is needed so as to ensure the quick detection and an effective response for patients infected with suspected highly communicable, infectious agents.

A study testing paramedic knowledge of infectious disease aetiology and transmission in an Australian emergency medical system was performed by means of a mail survey. The study demonstrated that paramedic knowledge of infectious disease aetiology and modes of transmission was poor. Of the 25 infectious diseases included in the survey, only three aetiological agents were correctly identified by at least 80% of respondents. The most accurate responses for aetiology of individual infectious diseases were for HIV/AIDS (91.4%), Influenza (87.4%), and Hep B (85.7%). Modes of transmission of significant infectious diseases were also assessed. Most accurate responses were found for HIV/AIDS (85.8%), Salmonella (81.9%) and Influenza (80.1%).[43]

The results revealed that knowledge of aetiology and transmission of infectious disease is generally poor amongst paramedics. Comprehensive in-service educational programs on infection control for paramedics with emphasis on infectious disease aetiology and transmission were recommended.

An electronic search of the literature for guidelines available from professional agencies, uncovered very little in the way of specific national guidelines for infection control education and training of workers.

Since 1994 health professionals licensed, registered or certified in New York State have been required to receive training on infection control and barrier precautions every four years unless otherwise exempted. In terms of guidelines issued by the New York Health Department the training or coursework needs to cover the following core elements;

- Scientifically accepted principles and practices of infection control and to monitor the performance of those for whom the professional is responsible.
- Modes and mechanisms of transmission of pathogenic organisms in the healthcare setting and strategies for prevention and control.
- Use of engineering and work practice controls to reduce the opportunity for patient and healthcare worker contact with potentially infectious material for blood borne pathogens.
- Selection and use of barriers and/or personal protective equipment for preventing patient and healthcare worker contact with potentially infectious material.
- Creation and maintenance of a safe environment for patient care through application of infection control principles and practices for cleaning, disinfection, and sterilization.
- Prevention and management of infectious or communicable diseases in healthcare workers.[44]

Chapter 3: Methods

This chapter describes the type of research conducted, the study design, the study population and the instruments utilized for data collection. Measures to ensure the validity and reliability of the study, the management of the data and type of analysis performed are also detailed in this chapter.

3. Methods

3.1. Study Location

The study was conducted nationally in the public health sector in South Africa.

3.2. Study Population

The participants in the study were the National Director of EMS and the 9 Provincial EMS Senior Managers in South Africa as listed in Appendix 1.

3.3. Sampling strategy

There was no sampling of study participants.

3.4. Sample Size

There were a total of 10 participants in the study.

3.5. Study design

The study was a qualitative study that utilized key informant interviews to describe the policies and programmes addressing communicable diseases and infection control for E.M.S in the pre-hospital environment in the public health sector at a National and Provincial level in South Africa in 2005.

3.6. Study Period

The study was conducted between January and June 2005.

3.7. Data Collection

The primary mode of data collection was through key informant interviews. The interviews were semi-structured and conducted by the principal investigator. The participants in the interviews were the National EMS Director and the 9 Provincial EMS senior managers. The interviews lasted a maximum of 60 minutes. The outline of the questions was forwarded to the EMS managers 7-10 days prior to the interview.

Interview I: Directed to the National EMS Director, this interview was designed to ascertain the existence of policies on a national level addressing the protection of EMS personnel, how these policies are activated, and how activation was monitored.

Interview II: Directed to the nine Provincial EMS Directors, this interview was meant to delineate the extent to which EMS management are aware of national policies, how this was translated into provincial policies, the protective resources provided to EMP and the monitoring and implementation of SOP.

3.8. Data Management

All interviews were recorded using a tape recorder and a 90 minute tape. An informed consent document was signed prior to the interview. Permission from interviewees was sought prior to recording.

3.9. Data Analysis

The information gathered was then transcribed by an administrative assistant. A summary of the data was then compiled. The transcripts were read several times to identify themes and categories.

Coding

Coding involved looking for common themes. Text passages were identified and labels were applied to them to indicate that they are examples of some thematic idea. The data was explored for common themes and were coded for analysis in the following categories:

- Policy existence and development
    - Existence and content of a national policy
    - Process for the development of policy
- State of implementation of policies
    - Existence of provincial policies
    - Availability of updated provincial EMS SOP's
    - Content of EMS SOP's -Gaps between current SOP and desired SOP based on international best practice
    - Implementation of SOP's

- State of education and training on communicable diseases and infection control
    - Existence of education and training standards
    - From managers perspective, to explore the adequacy and time allocated to infection control training
    - The status of in-service training for EMS employees

3.10. Assuring the credibility and quality of the study

3.10.1. Quality of data sources

Several procedures were utilized in order to collect appropriate, high quality data.

a) For the documentary evidence, the primary source of information was from official records.

b) Purposive sampling of participants for key informant interviews- The key informants were knowledgeable of the key issues facing ECP.

3.10.2. Systematic collection and management of data

After identifying the potential sources of data, the researcher implemented systematic data collection activities. Several specific activities assisted in maintaining quality control during data collection:

a) Recording and transcription of interviews- this ensured access to dependable data

b) Collection of detailed descriptive data of the context

c) Data management controls- a database of the interviews was created – allowing systematic access.

3.10.3. Analysis of data and development of findings

The following techniques were utilized to ensure the credibility and quality of the study:

a) Triangulation: the results from two different methods of data collection (interviews and observation) were compared to look for patterns of convergence to develop or corroborate an overall interpretation.

b) Documenting methods and methodological choices: At the outset of the study, the researcher prepared a systematic design to guide the study. Throughout the study the investigator documented data collection and analysis activities, clearly indicating the source of data, collection methods, data management and analysis. This documentation is the basis for an audit trail for an external review.

3.10.4. Assessing the credibility of the findings and conclusions

Respondent validation: The investigator's account of the interviews was compared with those of the research subjects to establish the level of correspondence between the two sets. The study participants' reactions to the analysis were then incorporated into the study findings. The preliminary results were presented to the National EMS Coordinating committee and their responses were incorporated into the study.

3.11. Ethical Approval

An official letter of permission for undertaking the study was received from the NDOH, and circulated to all nine provincial DOH's. (Appendix 4) This was followed by a request to each Provincial senior EMS manager for consent to be interviewed and to provide data pertaining to the study. The study was approved by the Research and Bio-ethics Committee of the University of Kwa-Zulu Natal. (Appendix 5)

3.12. Summary

Table 2 summarizes the methodology of the study in terms of the objectives, respondents, data collection methods, issues explored and the data analysis techniques.

Table 2: Summary of the methodology of the study

Objectives	Respondent	Data collection methods	Issues explored	Analysis Techniques
Review of the existing national and provincial policies and legislative measures	National EMS manager and Provincial EMS managers	Document retrieval Key informant interviews	Existence of a national policy Content of existing policy Process for the development of policy and obstacles in policy development	Document analysis against international best practices Thematic analysis
State of implementation of policies and SOP's	9 Provincial EMS managers	Document retrieval Key informant interviews	Existence of provincial policies Availability of updated provincial EMS SOP's Content of EMS SOP's	Document analysis against international best practices Thematic analysis
State of Education and training	National and 9 Provincial EMS managers	Document retrieval Key informant interviews	Existence of education and training standards To explore the adequacy and time allocated to infection control training The status of in-service training	Document analysis Thematic analysis

Chapter 4: Results

The findings are presented in terms of the key objectives namely; Review of National and Provincial EMS Policy documents, Standard Operating Procedures and State of implementation of standard operating procedures, and the education and training of of ECP on communicable diseases and infection control.

The National Director of EMS and the 9 provincial senior EMS managers participated actively during the interviews. Although, the proposed structure and questions that were asked during the interviews were forwarded timeously to the managers, together with a request for the relevant policy documents, only the national EMS manager and three provincial managers were able to provide complete answers to the questions posed and provide the relevant documentation.

4.1. Review of National and Provincial EMS Policy documents

Although there is a general communicable diseases and infection control policy for the prevention of transmission of infections in the healthcare setting, there is no specific national policy on communicable diseases and infection control for the Emergency Medical Services sector in the pre hospital environment in the public health sector in South Africa. A draft national policy document was circulated for comment in 2003, but no further actions to implement this as a national policy was taken. Kwa-Zulu Natal, Gauteng and Eastern Cape were the only provinces to have circulated a document on Infection Control for Emergency Medical Services. The Eastern Cape document had been adopted from the previous Western Cape Metro Services and has not been updated for the past 13 years. However a review of these documents revealed that they were SOP's rather than formal policy statements.

The current generic national policy has been developed by a task team under the auspices of the Communicable Diseases directorate of the NDOH, comprising academics and is based on the international guidelines of the Centre for Disease Control in the USA. However, lack of adequate resources- financial, human resources and equipment are the major obstacle to the implementation of the policy across all provinces.

Policy development involves a process of agenda setting, decision making and implementation. Over the past 5 years, the restructuring and revitalizing of the EMS infrastructure were key items on the agenda and therefore the development of EMS specific policies was neglected.

4.2. Standard Operating Procedures

An analysis of the availability, content and implementation of SOP's at the nine provincial EMS departments revealed the following features:

Only 3 Provinces, namely Kwa-Zulu Natal, Gauteng and Eastern Cape have documented EMS specific standard operating procedures for communicable diseases and infection control. However, only the SOP in Gauteng has revised and updated in 2003. The SOP in Kwa-Zulu Natal had been updated in 1999.

The SOP's in KwaZulu Natal, Gauteng and Eastern Cape detail the exposure risks that EMS face with respect to communicable diseases, and describe disease specific precautionary measures to be adopted. These are based on international guidelines. All other provinces utilize the generic infection control SOP's for healthcare settings issued as circulars by the Provincial health departments.

4.3. Implementation of SOP's across the nine provinces

4.3.1. Standard Precautionary Measures

The provision of Standard precautionary measures was uneven across all provinces. (Table 3) Standard personal protective equipment such as disposable latex gloves, face masks and eye protectors are provided by six provinces. Northern Cape Province is still to acquire eye protectors for its personnel. Free State and Mpumulunga only provide disposable latex gloves, although the managers in Mpumulunga indicated that the eye protectors were on order.

Pocket masks with one-way valves are important to prevent the spread of communicable diseases when ECP's perform Cardio-Pulmonary Resuscitation. None of the provinces provide this protective equipment to their employees. Lack of these pocket masks with one-way valves could result in hesitancy or refusal on the part of ECP's to perform resuscitation in emergencies requiring life saving respiratory assistance.

Fluid-resistant gowns are designed to protect clothing and skin from contact with splashes of pathogen-laden blood or body fluids. The majority of provinces provide a standard uniform to employees, with Kwa-Zulu Natal, Gauteng and Western Cape Province providing personnel with an additional jacket which serves to prevent contamination from splashes blood or body fluids.

Table 3: Distribution of the availability of PPE across the nine provinces

PPE	EC[1]	FS[2]	GP[3]	KZN[4]	LIMP[5]	MP[6]	NW[7]	NC[8]	*WC*[9]	*No.*	*%*
Disposable Gloves	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	100%
Face mask	✓	×	✓	✓	✓	×	✓	✓	✓	7	78%
Eye-protectors	✓	×	✓	✓	✓	×	✓	×	✓	6	67%
Pocket mask with one way valve	×	×	×	×	×	×	×	×	×	0	0

✓= Present ×= Absent 1. EC= Eastern Cape 2. FS= Free State 3. GP= Gauteng 4. KZN= Kwa-Zulu Natal 5. Limp= Limpopo 6. MP= Mpumulunga 7. NW= North West 8. NC= Northern Cape 9. WC= Western Cape

4.3.2. Pre Response Preparedness

EMS personnel are allocated to a specific vehicle per shift according to a roster. Emergency calls are received at a control centre and vehicles are dispatched accordingly. Emergency vehicles are often re-dispatched from receiving hospitals or re-routed from an initial response to provide emergency service to another patient who may harbour a communicable disease. Therefore it is essential that prior to commencing a particular shift, EMS personnel should prepare their vehicles for all types of emergencies that they might be dispatched to during their shift. This preparedness involves ensuring that all equipment is clean and functional, as well as ensuring

adequate supplies of laundry, personal protective equipment, disinfectant, sharps containers and disposable bags for discarding of bio-hazardous waste and soiled linen. Although, all senior managers indicated that this should be the standard practice of EMS employees, none of the provinces had SOPs to this effect. There were no specifically designed check lists and data sheets to verify that EMS employees are engaged in pre response preparedness.

4.3.3. Post Response Decontamination Procedures

Clearly marked bio-hazard sharps containers were available in all ambulances except in the Northern Cape and in Mpumulanga. Northern Cape provides a very basic level EMS service with no intravenous fluids or medications being administered by EMS personnel and therefore has not yet provided sharps containers. Mpumulanaga is in the process of equipping all ambulances with sharps containers. All the provincial EMS's have interdepartmental arrangements with the hospitals for the disposal and replacement of the sharp containers. Disposable linen bags are provided in all ambulances across all the provinces for the storage of soiled linen. These bags are disposed of at designated hospitals where the linen is laundered. Most EMS services work on the principle of one clean sheet for every soiled sheet.

Although the number of ambulances available was a constraint to decontamination after each case, simple measures were available for cleaning and decontamination of vehicles in the Eastern Cape, Kwa-Zulu Natal, Gauteng, North West and Western Cape provinces. Detailed circulars describing the various modes, frequency and indications for cleaning and decontamination of ambulances were available in these provinces. (Table 4)

Table 4: Distribution of the Availability of sharps containers, leak proof linen bags and policy for decontamination of ambulances

	EC[1]	FS[2]	GP[3]	KZN[4]	LIMP[5]	MP[6]	NW[7]	NC[8]	*WC[9]*	*No.*	*%*
Sharps Containers	✓	✓	✓	✓	✓	√/×	✓	×	✓	*7*	*78%*
Linen Bags	✓	✓	✓	✓	✓	✓	✓	✓	✓	*9*	*100%*
Decontamination of ambulances	✓	×	✓	✓	×	×	✓	×	✓	*5*	*56%*

✓= Present ×= Absent 1. EC= Eastern Cape 2. FS= Free State 3. GP= Gauteng 4. KZN= Kwa-Zulu Natal 5. Limp= Limpopo 6. MP= Mpumulunga 7. NW= North West 8. NC= Northern Cape 9. WC= Western Cape

4.3.4. Post exposure protocols

4.3.4.1. Exposure to blood and body fluids

Emergency Medical Services have adopted and contextualized the National Guidelines for the Management of Occupational Exposures to Blood and Body Fluids that have been issued by the NDOH. Detailed circulars have been issued to each district and stations regarding the steps to be followed on accidental exposure to blood and body fluids. Interdepartmental agreements have been concluded with various hospitals to provide post exposure counselling and prophylaxis. Part of the Eastern Cape (Port Elizabeth and Uitenhage District) has engaged the services of a private institution to provide post exposure counselling and prophylaxis to their EMS employees.

4.3.4.2. Hospital-diagnosed Communicable Diseases

Communicable diseases as varied as meningitis, tuberculosis, and hepatitis are diagnosed at hospitals amongst patients transported by EMS. However, there were no guidelines in all provinces to provide for the notification of EMS practitioners of a communicable disease being diagnosed on a patient transported by them. According to the EMS managers the responsibility for this notification rests with the infection control practitioners at the various hospitals to inform EMS station managers of such cases, and in coordination with the station manager, arrange prophylaxis for the involved personnel. However, many institutions do not have designated infection control practitioners.

4.3.5. Surveillance and Protection of ECP

Table 5 provides a summary of employment medical examinations and health maintenance in the public health EMS sector across all nine provinces in 2005.

Table 5: Employment Medical Examinations and Health Maintenance in EMS

	E.C[1]	F.S[2]	GP[3]	KZN[4]	Limp[5]	M.P[6]	N.W[7]	N.C[8]	W.C[9]
Entrance employment medical examination	×	×	✓	×	×	×	×	×	×
Immunization (Hepatitis B)	×	✓	✓	✓	✓	✓	✓	×	✓
Chest X Ray	×	×	×	×	×	×	×	×	×
Wellness clinics	×	×	×	×	×	×	×	×	×
Annual medicals	×	×	×	×	×	×	×	×	×

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Gauteng is the only province that performs entrance employment medical examination of EMS employees. This conforms to contractual conditions of employment for local authorities. The other provinces rely on the integrity of the EMS practitioner when completing the health questionnaire in the initial application forms, to provide accurate medical information.

Although most provinces indicated that Hep B immunization is performed on emergency care practitioners according to the generic infection control policy for healthcare workers, the implementation of the policy in the EMS setting is inconsistent. This is due to the fact that the onus is on the new emergency care practitioners to request the vaccination rather than being informed of the requirement. However, there has been a shift in many provinces towards routine counselling and immunization with disincentives for those who fail to be immunized.

According to EMS managers, anecdotal evidence shows that Influenza accounts for a significant morbidity and absenteeism rate of EMS personnel during the winter months. Although most senior managers indicated the availability of an influenza vaccine within hospitals, there were no directives issued to EMS employees that required them to undergo the immunization or informing them of the availability and benefits of the influenza vaccine.

There were no SOPs regarding Booster doses of Tetanus and no employment Chest Radiographs are performed despite the burden of tuberculosis in South Africa.

There were no employee wellness clinics for EMS employees and EMS employees have to attend public or private health institutions for primary health care or regular occupational health services. No annual medical examinations are performed for EMS employees.

4.3.6. Incident monitoring

There are no routine indicators of illness in the workforce monitored by senior EMS managers and reported to National EMS and/or Provincial Public Health, or systems that have been developed within the EMS sector for monitoring employee health, compliance to SOPs, adverse events, and reporting to EMS managers. Although the reporting of needle stick injuries is mandatory in terms of the Compensation of Occupational Injuries and Diseases Act, senior managers do not have accurate statistics on the exposure of personnel within their province to blood or body fluids as well as the number of employees that have received antiretroviral prophylaxis for the year 2003/2004.

Despite the huge burden of communicable diseases in South Africa and the transport of these patients to hospitals by ambulances, no annual physical examinations, chest x rays or sputum examinations performed on EMS employees. Employee absenteeism rates are not monitored. Therefore, despite the high prevalence of communicable diseases in South Africa and the close contact of infectious patients with EMS personnel during their care and transport to hospitals, no early warning mechanisms for the early detection of outbreaks and epidemics within the EMS services.

Exit interviews for employees leaving the service are not mandatory. Therefore, no data is available to discover and track the rate of attrition from illness, including communicable diseases, unless they are medically boarded. This prevents the establishment of baselines and trends in EMS workforce morbidity and mortality.

4.4. Education and Training of ECP's on Infection Control

Despite the standardization of national training and protocols for EMS personnel by the Professional Board for Emergency Care Personnel, very little content and time in the curriculum is devoted to communicable diseases education and infection control training. According to the senior EMS managers and EMS College principal's only 1 week of the 12 month curriculum of basic course is dedicated to training on the epidemiology of communicable diseases. Therefore, it is essential that continuous in service training is provided to EMS personnel. However, there are no national guidelines pertaining to in service training for EMS personnel, and specifically to communicable diseases and infection control. The content of the in service training specifically to communicable diseases and infection control varies across the different provinces. (Table 6)

Table 6: Distribution of and Content of In Service Training Programmes at Provincial level

	EC[1]	FS[2]	GP[3]	KZN[4]	LIMP[5]	MP[6]	NW[7]	NC[8]	*WC*[9]	*No.*	*%*
Orientation	×	×	×	✓	×	×	×	×	×	*1*	*11%*
Updates	✓	✓	✓	✓	×	×	✓	×	✓	*6*	*67%*
Refresher	×	×	✓	✓	×	×	×	×	×	*2*	*22%*
Circulars	✓	✓	✓	✓	×	✓	✓	✓	✓	*8*	*89%*

✓= Present ×= Absent 1. EC= Eastern Cape 2. FS= Free State 3. GP= Gauteng 4. KZN= Kwa-Zulu Natal 5. Limp= Limpopo 6. MP= Mpumulunga 7. NW= North West 8. NC= Northern Cape 9. WC= Western Cape

Kwa-Zulu-Natal is the only province that has an intensive programme that focuses on initial orientation training, followed by regular updates and annual refresher courses. Circulars are issued if any special circumstances arise that require immediate province-wide notification and intervention. District Training Coordinators were in the process of being employed in Kwa Zulu Natal during 2004 to conduct in-service training. However other provinces are yet to establish a formal in service training programme or appoint district trainers.

4.5. Summary

Currently, there is no communicable diseases and infection control policy specific to EMS in the pre-hospital environment in the public health sector in South Africa. This policy needs to be translated into practice at a provincial, district and local station level through formalized SOP's.

There are inconsistencies in the development, operationalization and monitoring of SOPs for communicable diseases and infection control for EMS personnel. Only three provinces namely, Gauteng, Kwa-Zulu Natal and Eastern Cape address all the above requirements in a formalized protocol document. Despite the formalized protocol documents in these provinces none of the provinces adhere completely to all the requirements of an infection control SOP.

All provinces faired reasonably well in two areas of the SOP:

a) Provision of personal protective equipment like face mask, eye protectors and disposable gloves were available in all provinces except for Free State and Mpumulunga that only provided disposable gloves and the Northern Cape where no eye protectors were available.

b) Post-Exposure Protocols- all provinces utilized the national protocol for management of occupational exposure to HIV.

Chapter 5: Discussion

The key findings are discussed from a systems perspective, focusing on the input which is the policy, the process that focuses on standard operating procedures, education and training of ECP's on communicable diseases and infection control. The limitations of the study are discussed at the concluding sections of this chapter.

This study is the first national review of communicable diseases and infection control policy for EMS in the pre hospital environment. This study has shown that although there are various legislations and regulations within the generic form, that address the issues of communicable diseases and infection control in the healthcare setting there are none that directly address the high risk EMS and the pre-hospital environment. This review has shown that there are marked variations in the development, operationalization and monitoring of SOPs for communicable diseases and infection control for EMS personnel across the 9 provinces, with little time dedicated to communicable diseases and infection control training during the basic EMP course. The organization and management of EMS is not uniform across all 9 provinces, and therefore presents a challenge to proper management and planning.

5.1. Policy Development

In 1994, health care in SA was "highly fragmented, biased towards curative care and the private sector, inefficient and inequitable."[46] The newly elected democratic government faced the tremendous challenge of transforming a highly inequitable and fragmented health care system. Several key legislations were enacted and policies formulated for transforming the health sector to achieve a universal right of access to equitable health care for all sectors of the population in South Africa. During the first decade of democracy much emphasis was placed on the development of generic policies at a national and provincial level. However, very few if any of these policies have been translated into sector specific policies.

Communicable diseases remain a major cause of illness and death in South Africa. HIV/AIDS, tuberculosis, malaria, hepatitis B, measles and diarrhoeal illnesses are endemic in South Africa. With the increase in travel and tourism and globalization of world markets, there is an increased risk of importing new and virulent strains of other organisms. The recent outbreaks of Severe Acute Respiratory Syndrome (SARS) in China, Marburg Virus in Angola, and the Avian Influenza are a few examples of new emerging diseases that can be imported into South Africa.

The changing epidemiology of disease, widening scope of practice of health care providers and increased occupational risks associated with provision of health care as well as the requirements of the National Health Act and OHSA, compel the National

EMS Directorate to establish and provide policies and guidelines, designed to prevent or minimize occupational exposure of EMP's to blood borne and body fluid pathogens, airborne pathogens, or other potentially infectious materials.

The key role players in the formulation of health policy are the National Department of Health. EMS is a core provincial competency and therefore requires the active participation of provincial EMS departments. However, until 1997 and currently in many districts in Gauteng EMS are still under the control of local authorities and EMS personnel are employed under different employment contracts. Some of these local authorities exert powerful leverage and have been resisting the efforts to be brought under the control of the Province. As a result of the restructuring and tension between provinces and local authorities, EMS specific policies have not being developed. The current decentralization of services to the district as well as service level agreements with local authorities provides EMS the opportunity to gain the buy-in of all role players.

The current models for infectious disease control are disease specific and vertical. The decisions relate to the development of control methods using the biomedical model. Infectious diseases are understood to be acquired by *individuals* (thus a focus on treatment and cure) but are also viewed as diseases which are communicable to others in a *population* (thus a parallel emphasis on prevention).

The current perspective focuses on short-term outcomes, and is viewed as 'health sector interventions' only, other social and policy sectors are not necessarily deemed relevant to the control of infectious disease.

A broad concept of 'infectious disease policy' will assist in developing ways of addressing the 'creation of healthy employees' and not simply the treatment and prevention of infectious disease. With the emergence or recrudescence of diseases like AIDS and MDR-TB public health policy can no longer afford to ignore the importance of wider socioeconomic and structural change in providing the basis for a betterment of health. [47]

5.2. Standard Operating Procedures

SOPs help to integrate departmental operations, linking the work of managers and planners with the activities of other workers. SOPs provide a direct link between the tasks assigned to individual department members and the laws, regulations, standards, and policies that control EMS operations.

The important components of an infection control SOP are[48]

a. basic measures for infection control, i.e. standard and additional precautions;
b. education and training of health care workers;
c. protection of health care workers, e.g. immunization;
d. identification of hazards and minimizing risks;
e. routine practices essential to infection control such as aseptic techniques, use of single use devices, reprocessing of instruments and equipment, antibiotic usage, management of blood/body fluid exposure, handling and use of blood and blood products;
f. effective work practices and procedures, such as environmental management practices including management of clinical waste, support services (e.g., food, linen),
g. use of therapeutic devices;
h. surveillance;
i. incident monitoring;
j. infection control in specific situations; and research

Although, the EMS specific SOP's of KwaZulu Natal, Gauteng and Eastern Cape as well as the generic SOP's of the other six provinces, address the major components of an infection control SOP as listed above, there are significant shortcomings in the SOP's with respect to the identification of hazards, minimizing risks and effective work practices and procedures, such as environmental management practices.

Well-written standard operating procedures (SOPs) provide direction, improve communication, reduce training time, and improve work consistency. Standard operating procedures used in combination with planned training and regular performance feedback lead to an effective and motivated workforce.

5.2. Education and training

Infection control training and education of staff is the cornerstone of an effective, facility wide program for the prevention and control of occupationally acquired infections. Knowledge and understanding of microbiology underpins infection control patient care practices of paramedics, as with all health care workers. Recognition of the early signs of infection informs timely provisional identification of the type of infectious disease, its aetiological cause and the type of precautions needed to prevent transmission to others. Studies conducted in the U.S.A. and Australia demonstrated that paramedic knowledge of infectious disease aetiology and modes of transmission was poor. Therefore, it is essential that a considerable period of time during formal education is dedicated to communicable diseases and infection control. There are no individual standards that apply specifically to infection control education and training for EMS employees in South Africa.

The goals of infection control training are to:

- Assure that health professionals understand how blood borne and other pathogens can be transmitted in the work environment: patient to healthcare worker, healthcare worker to patient, and patient to patient.
- Apply current scientifically accepted infection control principles as appropriate for the specific work environment.
- Minimize opportunity for transmission of pathogens to patients and healthcare workers.
- Familiarize professionals with the law requiring this training and the professional misconduct charges that may result from failure to comply with the law.[49]

On going in service training and education are critical in enhancing EMS personnel compliance knowledge of communicable diseases and infection control policies and adherence to SOP's. Only KZN and Gauteng have a program for on going training and education of EMS personnel.

When infection control programs were less complex and there were fewer requirements for education and training, department managers and individual staff members per se

could provide all the infection control training for all staff as well as keeping records of attendance. As training and education needs have become more complex there is a requirement for dedicated infection control practitioners to perform this duty. However, none of the provinces have infection control practitioners for EMS. Kwa-Zulu Natal is in the process of employing district trainers who as part of their functions will perform infection control training.

5.3. Limitations of the study

While the present study is the first of its kind in South Africa and provides important baseline data, there are a number of limitations.

- Selection Bias-The key informants for the study were senior managers in EMS. However, the operations within EMS are controlled by District managers.
- Recall Bias- A numbers of senior managers were newly appointed, limiting the quality of information that was obtained.
- Information Bias- Information was not easily available with respect to exposures and absenteeism and despite the promises of senior managers to forward them to the investigator, none were forthcoming.

5.4. Summary

The discussion in this chapter highlight the changing context, the position of the various actors, the content of the policy and the process involved in developing a policy. Education and training is the cornerstone of a successful implementation of the policy and the standards for infection control training is presented in this chapter. The chapter concludes with the limitation of the study.

Chapter 6: Conclusion and Recommendations

This chapter concludes the report with an overall summary of the key findings of the study. Recommendations for the way forward are discussed in terms of policy development, education and training, organizational development and further research to be performed.

6.1. Conclusions

The risk of exposure to communicable diseases for EMP's is high, particularly given the unique environments in which they are required to work. Despite the high risk environment in which EMP work, and the legislative imperatives of the National Health Act 61of 2003 and the OHSA, this study found that although there are various legislations and regulations within the generic form, which address the issues of communicable diseases and infection control in the healthcare setting there are none that directly address EMS and the pre hospital environment. Furthermore, there are marked variations in the development, implementation and monitoring of SOPs for communicable diseases and infection control for EMS personnel across the 9 provinces, with little time dedicated to communicable diseases and infection control education during the basic EMP course as well as during in service training. This warrants a review of infection control practices and education programs in the pre-hospital environment. EMS need to address specific and ever-increasing challenges in infection control, by establishing evidence-based practices that add value to patient care.

The first decade of democracy in South Africa has seen the rapid development of policies that were of a generic nature. Simultaneously, the health services have been restructured from a hospital centred approach to a district based primary health care approach. In this period of rapid transition, EMS was neglected.

The rapidly changing epidemiological disease profile and the need to reinforce the generic policies with sector specific policies have provided the context for EMS to introduce the communicable diseases and infection control policy for protection of ECP's in the pre-hospital environment.

6.2. Recommendations

In order to address the gaps identified, and to lay a sound policy and programmatic foundation the following recommendations are proposed. The recommendations address the following key areas:

- Policy Development,
- Surveillance and incident monitoring
- Education and In service training,
- Further research to improve infection control practices in the EMS sector.

6.2.1. Policy Development

In order to comply with the requirements of the National Health Act and OHSA, the National EMS Directorate needs to establish and provide policies and guidelines, designed to prevent or minimize occupational exposure of EMP's to blood borne and body fluid pathogens, airborne pathogens, or other potentially infectious materials.

The infection control policy must:

- set relevant national objectives consistent with other national health care objectives;
- develop and continually update guidelines for recommended health care surveillance, prevention, and practice;
- develop a national system to monitor selected infections and assess the effectiveness of interventions;
- harmonize initial and continuing training programme for EMS personnel;
- facilitate access to materials and products essential for hygiene and safety; and
- Encourage health care establishments to monitor health-care associated infections and to provide feedback to the professional's concerned. [50]

A specific recommendation modified from Manitoba Health in Canada and the State of Alaska Health Services Department [51] that is suggested for a Communicable Disease and Infection Control Policy for EMS in South Africa is attached as Appendix 6.

6.2.2. Surveillance and Incident Monitoring

Surveillance and Incident monitoring

The District and station EMS manager should conduct;

- Inspections of station facilities
- Observation of on-scene activities
- Analysis of reported exposures to communicable diseases
- A semi-annual quality and compliance report.

The following are but critical examples of performance and health status indicators that need to be analyzed over pre-determined periods of time. Each would have a target set in advance and measurement of performance would be against that benchmark. The baseline data could be used to judge the extent of the improvement.

- Hep B Immunization uptake rate (% of all personnel)
- Absenteeism rate per shift (% of all personnel on a specified shift)
- Needle stick injury incidence (per predetermined time period)

Policy Evaluation

The Infection Control Policy will be required to be evaluated at least annually by the EMS Manager to ensure that the policy is both appropriate and effective.

In addition, the Infection Control Policy will be evaluated as needed to reflect any significant changes in assigned tasks or procedures; in medical knowledge related to infection control; or in regulatory matters.

The Chief Medical Officer for EMS will actively participate in program evaluations to ensure that the program remains state of the art.

6.2.3. Formal Education and training

The widespread and expanding extent of the current HIV and AIDS epidemic and its related infections in South Africa, coupled with the findings from the present study compel recommendation of the following requirements:

An infection control module standardized across all provinces should be designed and then designated for inclusion in the curriculum of all EMS training institutions.

An initial infection control training prior to assignment of tasks where occupational exposure to blood, body fluid, and aerosolized products of coughing may occur. A refresher course should take place at least annually and continuous training and reinforcement regarding Infection Control procedures within the districts and stations.

Periodic circulars providing notification of and updates on outbreaks and the corresponding protective measures to be implemented should be widely circulated to all emergency medical service employees when the need arises.

The first possible opportunity to initiate and influence protective work practices in prospective EMS personnel occurs during the initial formal education process. An infection control module standardized across all provinces should be designed and then designated for inclusion in the curriculum of all EMS training institutions.

The design of such a module should be based upon imparting knowledge of endemic contagious disease symptoms and signs. Sequentially, the endemic syndromes encompassing different combinations of these symptoms and signs should be taught, to include HIV/AIDS, TB, Hep B, Anthrax, Marburg, Ebola, Polio, and Malaria. Then, matching the syndromes with the type of precautions that are indicated (respiratory vs. contact vs. body fluid vs. combinations thereof) can complete the link of diagnosis with appropriate protection.

Training should address practical situations that workers face, including both common and unusual circumstances. Training should involve students in addressing mock, practical scenarios of infectious disease patient care and exposure, motivating them to continually monitor and evaluate their practices.

Training must comply with the South African Qualification Authority standards and OSHA Regulation and should include the following:

• A general explanation of the epidemiology of blood-, body fluid-, and air-borne diseases. The symptoms and physical examination signs of these diseases

• An explanation of the modes of transmission and portals of entry of blood-, body fluid-, and air-borne pathogens

• An explanation of the department exposure control plan and how the employee can obtain a copy.

• An explanation of the normal duty tasks that place employees at risk of exposure to blood, body fluids, and respiratory secretions

• Information on the types, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment and medical equipment

• An explanation of the basis for selection of personal protective equipment;

• Information on the hepatitis B vaccine, including information on its efficacy, safety, and the benefits of being vaccinated, notification that the vaccine and vaccination will be provided at no charge.

• Information on the taking appropriate actions and contacting appropriate service personnel following a hazardous exposure to blood or other potentially infectious materials

• An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available.

• Information on the post-exposure evaluation and follow-up that the department is required to provide following an exposure incident.

• An explanation of the signs and labels and/or colour-coding required for biohazard materials; information on the proper storage and disposal of biohazard materials.

• An opportunity for interactive questions and answers.

Infection control trainers must be knowledgeable in all the program elements listed above, particularly as they relate to emergency services provided by the department.

A companion programme needs to be developed for call centre operators to train them to ask augmented, standardized questions during infectious disease outbreaks, in an effort to identify potential patients with communicable diseases. This serves to forewarn EMS practitioners en route to emergency scenes where contamination is a possibility.

6.2.3.1. <u>In service education and training</u>

A province-specific in-service training programme should ensure that new workers receive initial training on modes of infectious disease transmission and their prevention prior to beginning patient care. This should include education about the risk of exposure to infectious materials and diseases in their province-specific work environment; and the signs and symptoms of the infectious diseases with which they are likely to come into contact. They should receive training on how to take appropriate preventive measures and execute emergency procedures safely, including the appropriate maintenance of engineering controls and use of personal protective equipment. All of this training should be consistent with respective province-specific prevention and protection protocols, guidelines for which are discussed previously.

Written records of all training sessions should be maintained for three years after the date on which the training occurs.

Training records should include:

- The dates of the training sessions,
- The contents of the training sessions
- The names and qualifications of persons conducting the training
- The names of session attendees
- The proportion of staff trained in each area of training provided.

6.2.2.2. Monitoring of the outputs of the training programme

The Infection Control trainers should conduct on site spot checks on a quarterly basis to monitor compliance with infection control policies.

Key performance indicators should be developed to determine the performance of EMS personnel post training. These indicators should be collected monthly and compared with each other.

6.3. Research

Prior to designing and implementing any new programme it is recommended that the following additional research be performed to guide the future strategic route to be adopted;

a) A survey of all directors of training institutions to generate information on the present status of communicable disease education and prevention training (models of best practices) as well as content that they recommend for inclusion.

b) A survey of the knowledge and practices of EMS personnel with respect to communicable diseases and infection control.

c) In depth research on the design and accreditation of a Communicable Diseases and Infection Control Policy module for EMS personnel.

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8. Appendices

8.1. Appendix 1: Schedule of Appointments

Table 7: Schedule of Appointments

Date	**Province**	***Person Met***
08/03/2005	Free State	*Mr N W Sithole*
09/03/2005	Northern cape	*Mr F Mohamed*
16/03/2005	Limpopo Province	*Mr B Kerupershad*
22/03/2005	Gauteng	*Dr V Wessels*
31/03/2005	Kwazulu Natal	*Mr T.Dludla*
05/04/2005	Eastern Cape	*Mr H Bruiners*
06/04/2005	Western Cape	*Dr C Robertson*
07/04/2005	National	*Mr P.Fuhri*
12/04/2005	Mpumulanga	*Dr K Hugo*
13/04/2005	*North West*	*Mr B Redlinghys*

8.2. Appendix 2: Interview of the National EMS Director

A-1 Does the National Department of Health have a formal policy document and regulations regarding prevention of contagious disease transmission in EMS work?

A-2 If so, how are these regulations transmitted to the provincial EMS services?

A-3 Has the National Department of Health initiated any formalized follow-up program with provincial EMS service directors concerning the establishment, updating, and compliance monitoring of these regulations?

A-4 Does the National Department of Health have regulations addressing the management of EMS occupational exposure to blood and body fluids that may carry HIV?

A-5 If so, how is awareness of these regulations disseminated throughout EMS systems in the country?

A-6 If so, has the National Department of Health organized post-exposure prophylaxis and follow-up of EMS workers occupationally exposed to blood and body fluids?

A-7 Would the National Department of Health is willing to endorse an educational program of transmissible disease prevention if the results of **Surveys II and III** demonstrated a need for such?

A-8 what is the process by which new material is introduced into the EMS training curriculum in South Africa?

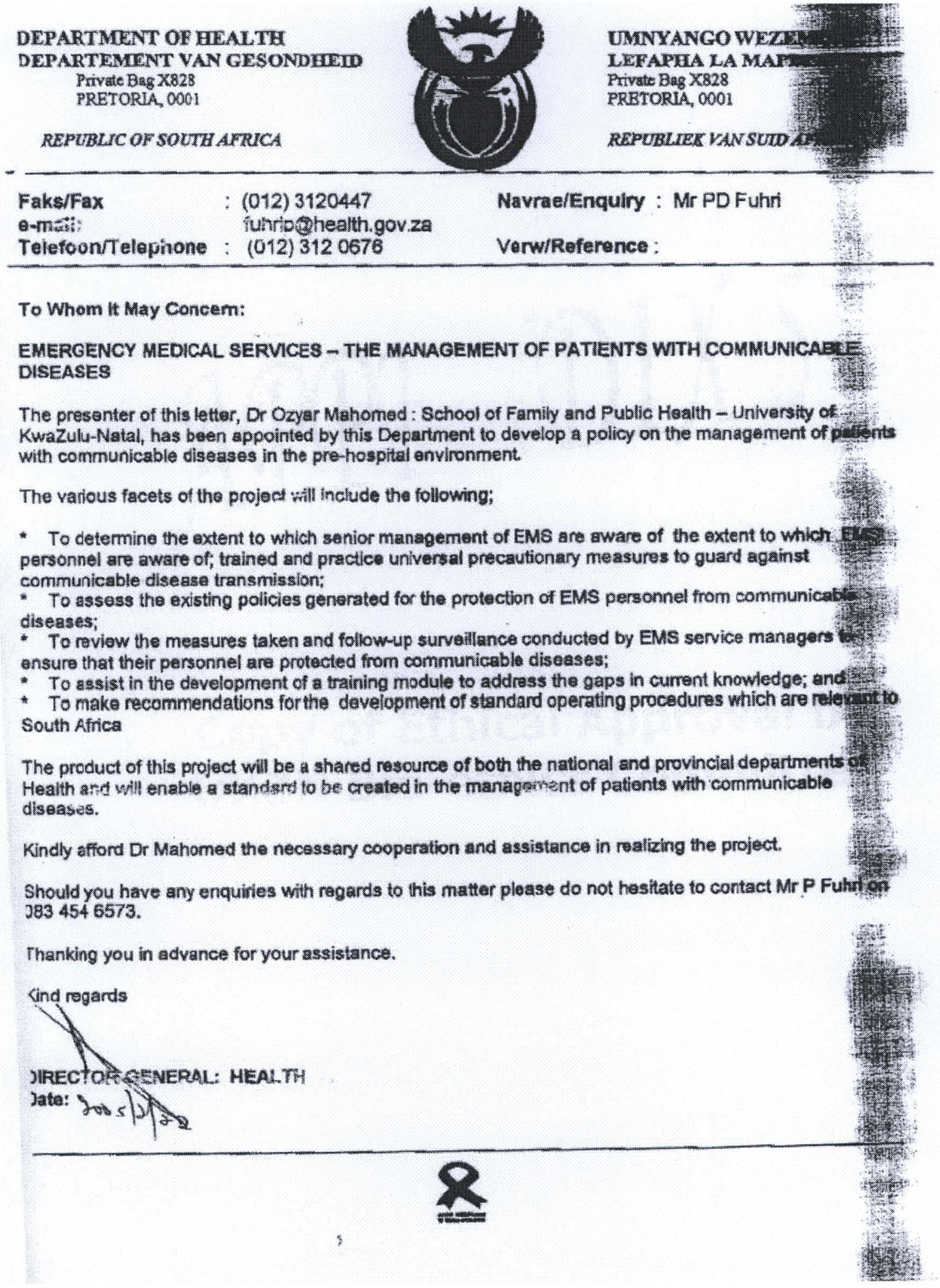
A-9 Does the National Department of Health have any current recommendations as to the content of such a training course?

8.3. Appendix 3: Interview of the Provincial Directors

1) Are you aware of any National Department of Health policy or regulations regarding prevention of contagious disease transmission in EMS work?
2) If so when did you become aware of such a document or policy?
3) What percentage of these regulations have you implemented?
4) Which are the regulations you have implemented?
5) How long ago have you implemented them?
6) What external (outside the EMS service) constraints have you experienced in attempting to institute the NDOH regulations and guidelines?
7) What internal challenges have you experienced in attempting to institute the NDOH regulations and guidelines?
8) Does your provincial EMS service provide in-service lectures, teaching active-duty personnel protection from contagious disease transmission?
9) How often are these lectures given?

10) Does your provincial EMS service provide personal protective equipment to protect active-duty personnel from contagious disease transmission?
11) Does your provincial EMS service provide training in the use of protective equipment to protect active-duty personnel from contagious disease transmission?
12) How often is this training provided?
13) Does your EMRS have a formal policy on occupational exposure to bloods or body fluids?
14) What measures does your provincial EMS service take when an EMS caregiver reports an occupational exposure to blood or body fluids?
15) How many EMS practitioners were employed in your provincial EMS service in the 2004? ___
16) What is the percentage of absenteeism per shift?
17) How many cases of occupational exposure to blood or body fluids were reported in 2004?
18) How many employees received post exposure prophylaxis?
19) How many employees developed TB in the past year?
20) How many days were lost due to contagious diseases like Influenza? (Obtained from sick notes record)?
21) How much does it cost to replace an employee at EMRS?
22) How many employees have left the service or died to ill health in the past year?
23) How many practitioners in your provincial EMS service during the last 6 months 2004 have received formal lectures or training in precautions against contagious disease transmission?
24) Are you willing to implement such a training module as part of in service training of employees?
25) What are your requirements for such a programme?

8.4. Appendix 4: Authorization from Department of Health



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Navrae/Enquiry : Mr PD Fuhri
Verw/Reference :

To Whom It May Concern:

EMERGENCY MEDICAL SERVICES – THE MANAGEMENT OF PATIENTS WITH COMMUNICABLE DISEASES

The presenter of this letter, Dr Ozyar Mahomed : School of Family and Public Health – University of KwaZulu-Natal, has been appointed by this Department to develop a policy on the management of patients with communicable diseases in the pre-hospital environment.

The various facets of the project will include the following;

* To determine the extent to which senior management of EMS are aware of the extent to which EMS personnel are aware of; trained and practice universal precautionary measures to guard against communicable disease transmission;
* To assess the existing policies generated for the protection of EMS personnel from communicable diseases;
* To review the measures taken and follow-up surveillance conducted by EMS service managers to ensure that their personnel are protected from communicable diseases;
* To assist in the development of a training module to address the gaps in current knowledge; and
* To make recommendations for the development of standard operating procedures which are relevant to South Africa

The product of this project will be a shared resource of both the national and provincial departments of Health and will enable a standard to be created in the management of patients with communicable diseases.

Kindly afford Dr Mahomed the necessary cooperation and assistance in realizing the project.

Should you have any enquiries with regards to this matter please do not hesitate to contact Mr P Fuhri on 083 454 6573.

Thanking you in advance for your assistance.

Kind regards

DIRECTOR-GENERAL: HEALTH
Date:

8.5. Appendix 5.1: Ethics Approval from UKZN

UNIVERSITY OF
KWAZULU-NATAL

11 May 2005

Dr O H Mahomed
Community Health
Nelson R Mandela School of Medicine

Dear Dr Mahomed

PROTOCOL : Epidemiological study of the interaction between Emergency Medical Rescue Services and Communicable Diseases. O H Mahomed, Community Health. Ref.: H021/05

A sub-Committee of the Biomedical Research Ethics Committee considered the abovementioned application and the protocol was approved on 31 January 2005 pending appropriate responses to queries raised and approval by the Postgraduate Education Committee. These conditions have now been met, the study is given full ethics approval and may begin as at today's date : 11 May 2005.

This approval is valid for one year from 31 January 2005. To ensure continuous approval, an application for recertification should be submitted a couple of months before the expiry date.

May I take this opportunity to wish you everything of the best with your study. Please send the Biomedical Research Ethics Committee a copy of your report once completed.

Yours sincerely

PROFESSOR A DHAI
Chair : Biomedical Research Ethics Committee

c.c. Professor C C Jinabhai, Community Health
Mr S Siboto, Postgraduate Education Committee

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8.5.1. Appendix 5.2: Letter of Approval from Post Graduate Education Committee

UNIVERSITY OF
KWAZULU-NATAL

9 May 2005

Dr O H Mahomed
Community Health
Nelson R Mandela School of Medicine

Dear Dr Mahomed

PROTOCOL : Epidemiological study of the interaction between Emergency Medical Rescue Services and Communicable Diseases. O H Mahomed, Community Health. Ref.: H021/05

The Postgraduate Education Committee considered the abovementioned application and made various recommendations. These recommendations have been addressed and the protocol is approved for your MMed degree.

May I take this opportunity to wish you every success with your study.

Yours sincerely

PROFESSOR M ADHIKARI
Chair : Postgraduate Education Committee

c.c. Professor C C Jinabhai, Community Health
Mr S Siboto, Postgraduate Education

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8.6. Appendix 6: National Training Standards for Infectious Diseases for EMS.

CONTENTS -

- Definitions, recognition, signs and symptoms, spread management and special precautions :
  - Methods of disinfecting and discarding of material.
  - Primary health care.
    - Immunity.
    - Incubation periods.
    - Carriers.
    - Inoculation.
    - Routes of spread.
    - Wound care.
    - Obstetric and neonatology.
    - Diets and nutrition.
  - Common infectious disease.

Recognition growth and development management and special precautions :

- Measles, German measles, chicken-pox, smallpox, mumps, whooping cough, TB, typhoid, malaria, tetanus, poliomyelitis and diphtheria.
- Life-threatening and potentially life-threatening disease :
  - Hepatitis A.
  - Hepatitis B.
  - Non-A, Non-B Hepatitis.
  - AIDS
  - Poliomyelitis.
  - Vaccinations immunisation.

OBJECTIVES -

- Discuss the common communicable diseases to which emergency personnel are exposed :
  - Names of disease.
  - Methods of infection of each disease.
  - Immunisation, where possible.
- Preventative/protective measures against disease against which there is no immunisation.
- Life-threatening and potentially life-threatening disease :
  - Hepatitis A.
  - Hepatitis B.
  - AIDS.
  - Tuberculosis.
  - Smallpox.
  - Poliomyelitis.
  - Meningococcal meningitis.
- Discuss the handling of :
  - Sharps.
  - Infective material.
- Discuss the various types of formidable infectious diseases :
  - Names of diseases.
  - Methods of infection of each disease.
  - Clinical picture of each disease.
  - Laboratory diagnosis.
  - Immunisation where possible.
  - Preventative/protective measures against disease against which there is no immunisation.

Discuss the differential diagnosis of each formidable infectious disease.

Discuss the transportation of these patients.

Discuss personal hygiene.

Obstetric primary health care.

Discuss anaemia, types in pregnancy and treatment.

Discuss and describe antenatal care with reference to routine visit dates/why/examination.

Discuss early referral, indications for cesarean section.

Family planning -

- Sterilisation - male and female - techniques/timing.
- IUCD- types /timing /side-effects /complications/indications /contra-indications /techniques.
- Barrier contraception -
  - Diaphragm.
  - Condoms/cap - advantages and disadvantages.
  - Spermicides - advantages and disadvantages.
  - Safe period methods - techniques/advantages/disadvantages.
  - Coitus interruptus - disadvantage.
- Sexually transmitted diseases - types/diagnosis/treatment.
- Urinary tract infections - causes/diagnosis/treatment.

Discuss and describe immunisation schedules :

- Child Health - (GOBI FFF)
  - Growth monitoring.
  - Oral monitoring.
  - Breast-feeding.
  - Immunisation.
  - Female education.
  - Food supplementation.
  - Family spacing/planning.

8.7. Appendix 7: Suggested Communicable Diseases and Infection Control Policy for EMS in the pre-hospital environment in South Africa.

Preamble

The Infection Control Program is applicable to all members, career, and volunteer, providing rescue or emergency medical services. It is effective immediately.

Policy Statement

Communicable disease exposure is an occupational health hazard. Communicable disease transmission is possible during any aspect of emergency response, including in-station operations. The health and welfare of each member is a joint concern of the member, the officers, and this EMS service. While each member is ultimately responsible for his or her own health, the department recognizes a responsibility to provide as safe a workplace as possible. The goal of this policy is to provide all members with protection from occupationally acquired communicable disease.

It is the policy of this department:

• To provide emergency medical services to the public without regard to known or suspected diagnoses of communicable disease in any patient.

• To regard all patient contacts as potentially infectious. Standard precautions will be observed at all times and will be expanded to include all body fluids and other potentially

• To provide all members with the necessary training, immunizations, and personal protective equipment (PPE) needed for protection from communicable diseases.

• To recognize the need for work restrictions based on infection control concerns.

• To prohibit discrimination of any member for health reasons, including infection and/or seroconversion with HIV/HBV virus.

• To regard all medical information as strictly confidential. No member's health information will be released without the written consent of the member.

Purpose: To provide a comprehensive infection control system that maximizes protection against communicable diseases for all EMP's, and for the public that they serve.

Responsibilities of role players in the EMS pre hospital environment

Responsibilities of the Employing Agency

Occupational Health and Safety Regulations requires all employers to take all "practical" steps to prevent harmful worker exposure to all infectious organisms. This includes:

- employee notification and exposure follow-up
- employee education
- employee vaccination
- safer work practices
- ensuring that medical waste, chemicals, soiled laundry and laboratory samples are handled according to accepted standards and government regulations
- a system for infectious waste collection that minimizes the risk of exposure to their workers as well as to the waste transportation and disposal workers

Responsibilities of the Infection Control Officer (or other designated individual)

Each district should designate an Infection Control Officer to support and enforce compliance with the Infection Control Guidelines. This individual (or designate) will be responsible for:

- ensuring the Infection Control Guidelines are instituted
- ensuring adequate personal protective equipment (PPE) that meets all current requirements for each base and responding vehicle

- coordinating communication between the EMS personnel, and appropriate medical support regarding exposure to an infectious disease that represents a risk to the provider
- conducting spot checks of on scene and base operations to ensure compliance with the Infection Control Program
- coordinating the immunization program

Responsibilities of Individual EMS Personnel

Each EMS personnel will assume responsibility for his/her health by:

- maintaining up to date immunizations
- using personal protective equipment (PPE) as mandated by the employing agency
- reporting any suspected exposure to a blood borne pathogen or other infectious disease to the Infection Control Officer
- reporting any communicable diseases which pose a risk for transmission (occupational or non occupational) to the Infection Control Officer (or designate)
- following all other aspects of the Infection Control Program

Responsibilities of Referring Health Care Facilities

When carrying out an inter facility transfer, it is the responsibility of the referring health care facility to inform the EMS personnel, as well as the receiving facility, of the presence or possible presence of a communicable disease, in so far as it relates to the medical care being provided or is deemed to be a serious and immediate threat, and the measures that are required to prevent the spread of the disease.

Exposure control plan

PURPOSE: To identify those tasks and corresponding job classifications for which it can be reasonably anticipated that an exposure to blood, other body fluids, aerosolized products of coughing, or other potentially infectious materials may occur, to establish a

schedule for implementation of the department's infection control plan, and to identify the procedure for evaluating exposure incidents.

Exposure determination

The following job classifications are reasonably anticipated to involve exposure to blood, body fluids, or other potentially infectious substances in the performance of their duties:

- Provisions of emergency medical care to injured or ill patients
- Rescue of victims from hostile environments, including burning structures or vehicles, contaminated bodies of water , or oxygen deficient atmospheres
- Extrication of persons from vehicles, machinery, or collapsed excavations or structures
- Training, as in CPR, First aid, etc.
- Recovery and/or removal of bodies from any situation cited above
- Job classifications with high probability of contact with infectious substances:
- All EMS Responders Vehicle Operators
- Rescue Personnel

Job classifications with low to moderate probability of contact with infectious substances:

- Student Interns/Observers Administrator
- Clerical Staff

Standard Operating Procedures

SOPs identify specific procedural guidelines for all aspects of response and station environments where disease transmission can be reasonably anticipated, as well as training, administrative aspects of the program, and post-exposure evaluation.

Health Maintenance Policy

a) Employment Medical Examinations and Vaccinations

EMS personnel shall not be assigned to emergency response duties until an entrance physical assessment has been performed by a physician and the person has been certified as fit for duty.

All EMS personnel should be evaluated for their susceptibility to Rubella (German Measles) and Varicella Zoster (Chickenpox), and Hepatitis B and EMS personnel will be offered Hepatitis B vaccination (unless known to be immune) after an explanation of the risks and benefits of this vaccine. EMS personnel who decline Hepatitis B vaccination will be required to sign a "Declination of Hepatitis B Vaccination Form". Providers who initially refuse vaccination may receive this vaccination on request at a later date.

EMS personnel will be advised to maintain an up-to-date immunization status and offered Tetanus, Hepatitis B and Influenza vaccinations if required.

Work restrictions may be required by a physician when the provider is at risk of contacting or exposing others to an infectious disease (ie. infection of exposed skin such as impetigo). Any provider returning to work after a communicable disease (occupational or non-occupational) must be cleared for fitness to work by a physician,

Public Health Nurse or Infection Control Officer prior to resuming emergency response duties.

The following information will be documented on the employee provider's record by the Infection Control Officer:

- immunization screening records
- circumstances of exposure to communicable diseases
- management of exposures

Communication between physicians and management of employing agencies will focus on the fitness to work (with recommended restrictions if indicated) rather than upon specific medical information, including diagnosis.

Tuberculosis Screening

The most effective method for screening for tuberculosis is by skin testing with a purified, non-infectious extract from the tuberculosis bacterium known as the "Mantoux Test."

Tuberculin skin testing should be carried out prior to employment, on an annual basis (recommended), and after any high risk exposure (eg. close unprotected contact - mandatory). Tuberculin skin testing (1-step) will be done immediately after exposure and repeated at 2-3 months. If the area of induration is 10 mm or greater the individual is classified as "Tuberculin Reactor".

This indicates that the individual has been previously infected with tuberculosis although it is impossible to know when this occurred (may have been years previous). Therefore, a positive reaction does not distinguish between active, inactive or previously treated disease. A recent BCG immunization may also cause this type of reaction

Active infection is suggested in those who have had an initial skin test · less than 5 mm and within two years changes to 10 mm or greater of induration or less than 5 mm which increases to greater than 14 mm within two months of contact with a case of infectious tuberculosis. If the area of induration is between 5 mm and 10 mm the test is considered "indefinite". The skin test will be repeated in one week at a different site on the forearm with the result that the area of induration is now greater than 10 mm. This is known as the booster effect and occurs because the body's immune system does not recognize the initial skin test but is "reawakened" by the repeat test one week later. If the area of induration is less than 5 mm the individual is considered a "non-reactor" This usually indicates that there has been no previous infection with tuberculosis.

Skin testing is recommended for providers with a previous skin test less than 10 mm who have breathed the same air for four hours as a patient with infectious tuberculosis (i.e. inside an ambulance). In these cases skin testing is not useful until at least three months after the exposure has occurred. Nevertheless, a test shortly after the exposure is useful to determine the provider's baseline status.

Chest x-rays will be done

- if the skin test is positive after 48 hours
- if the skin test is positive after 2-3 months
- as recommended by the physician
- chest x-ray, sputum examination and sputum cultures may be indicated in providers who have experienced a cough or sputum production lasting longer than one month regardless of the results of skin testing

Recommended frequency of skin testing for EMS personnel is as follows:

- annually for non reactors
- within 30 days of employment if there is no previous record of skin testing or if the skin test
- measured less than 10 mm on a previous occasion
- reactors do not require any further skin testing but require follow up with a physician
- three months after exposure to a patient with active tuberculosis

Base Environment and Infection Control

Each EMS station shall have designated separate areas for

- Equipment decontamination and disinfection.
- Storage of clean patient care equipment and personal protective equipment (PPE) used for infection control purposes
- Storage of biomedical waste (e.g. sharps)

Decontamination areas will be marked with biohazard signs and should be properly equipped. Biological waste storage areas will be marked with biohazard signs that conform and are maintained according to government regulations.

Contaminated sharps will be stored in closed puncture resistant containers (sharps boxes) with appropriate bio-hazardous markings. Other contaminated materials will be stored in leak proof bags and disposed of with regular garbage. If outside contamination of a storage or disposal bag is visible, a second bag with identical markings will be placed over the first. (Note: This is the only circumstance where double bagging is required)

Reusable bins and containers used to store biological waste will be inspected, cleaned and disinfected weekly (if in use) with recommended disinfecting solutions. If the bin or container is contaminated on its outside, it should be disinfected immediately

All biohazard waste will be disposed of in accordance with provincial and local regulations and will be performed by an approved licensed contractor designated by the service or by agreement with a local health care facility.

Infection Control Supplies for Emergency Vehicles

The following must be kept in each ambulance vehicle

- disposable gloves of various sizes (patient care)
- utility gloves (for cleaning)
- alcohol-based hand scrub (minimum 60% alcohol)
- disposable face masks of the following types:
- tight-fitting facial seal masks for protection against airborne pathogens (N95)
- surgical or procedure masks for droplet protection
- goggles and face shields
- pocket masks with one way valves
- fluid resistant gowns (i.e. OR gowns)
- sharps containers
- waterproof bags for waste (i.e. linen and other contaminated material)
- bags for normal waste
- disinfectant solutions
- fluid spill clean up kits

Routine Practices and Additional Precautions

Emergency response often is unpredictable and uncontrollable. Routine practices should be used for all patients regardless of their condition. Therefore all body fluids are considered infectious.

PPE is chosen to provide barrier protection against all body fluids. Each district is responsible for the supply, repair, replacement and safe disposal of PPE. The Infection Control Officer or designate, will determine proper stock supply levels of PPE both for bases and for response vehicles and will ensure the base stock of PPE is adequate.

The available PPE will include disposable gloves, utility gloves for disinfection purposes, face masks, eye protectors, fluid impervious gowns, sharps containers, leak proof disposal bags. Full face shields are optional

Routine Practices

Hand Hygiene (Hand Washing)

Hands must be washed immediately before contact with a patient, after any direct contact with a patient.

Plain soap and water may be used for routine hand washing. Alcohol-based hand scrub (waterless hand washes) may be used as a substitute for soap and water. Where there is visible soiling, hands should be washed with soap and water prior to using waterless hand wash. Where soap and water are unavailable, cleanse hands first with water and wipe clean with a towel prior to using waterless hand wash, then wash with soap and water when they are available (e.g. at the receiving hospital)

Fingernails should be kept short to facilitate hygiene. Artificial nails, gel nails and nail extenders can harbour micro organisms, and should not be worn while on duty

Fluid resistant gowns are designed to protect clothing from splashes such as during emergency childbirth or vigorous bleeding (disposable gowns are useful for this purpose)

A Gown, apron or coveralls should be used when cleaning contaminated equipment or the interior of an emergency response vehicle

Scene Operations

The blood, body fluids, and tissues of all patients should be considered potentially infectious and Routine Practices must be used for all patient contact. On arrival at the scene, the situation should be quickly assessed to see what PPE is required based on the situation (i.e. presence of blood, other body fluids or a possible infectious disease)

An infectious disease should always be suspected if one of the following is present

- fever
- rash
- weeping skin lesions
- cough
- diarrhoea
- jaundice

The number of personnel coming into contact with patients where the possibility of contact with an infectious disease, blood or other body fluids is present should be kept to a minimum.

While complete control of the emergency scene is not possible, scene operations should attempt to limit splashing, spraying or aerosolisation of body fluids as much as possible.

Sharps Containers

Needles should not be recapped as the most common occupational blood exposure occurs when needles are recapped. Used needles and other sharps should be disposed of in puncture proof sharps containers. Needles should not be recapped, resheathed, bent, broken, or separated from disposable syringes.

Sharps containers must be easily accessible on scene (carry in jump box, etc., as well as in the vehicle).

All used sharps should be accounted for and needles or other sharps should not be forced into a sharps container - if force is required the sharps should be placed into a different container

CPR Equipment

Disposable resuscitation equipment should be used whenever possible for CPR, the order of preference is:

- disposable bag valve mask
- disposable pocket mask with one way valve

All personnel must have access to pocket masks with one way valves to eliminate the need for mouth to mouth resuscitation and must be kept readily available during on scene operations. If mouth to mouth resuscitation is performed for any reason, it should be reported to your supervisor as an Incident Report (or similar)

Personnel should use the same precautions to protect themselves when handling a dead body as they would use if the patient were still alive.

At conclusion of on scene operations, all potentially contaminated patient care equipment should be removed and placed in leak -proof bags for appropriate disposal or decontamination and reuse.

Post-Response Infection Control

Upon return to base, contaminated equipment must be removed and placed in an appropriate container.

Disposable equipment and other waste generated during on scene operation must be stored in the disposal area in appropriate leak proof containers

Sharps containers, when three quarters full, must be closed and placed in the bio-hazardous disposal area

Bio-hazardous waste should be bagged appropriately and disposed of according to local regulations. Gloves and gown (or apron) should be worn for all contact with contaminated equipment or materials. Other PPE will be used depending on splash or spill potential. Heavy-duty utility gloves may be used for cleaning, disinfection or decontamination of equipment.

Disinfection must be performed with a commercially available chemical germicide. Any damaged equipment must be cleaned and disinfected before being sent out for repair

The manufacturer's guidelines must be used for the cleaning and decontamination of all equipment unless otherwise specified.

- durable equipment (backboards, splints,) must be washed with hot soapy water, rinsed with clean water and disinfected with an approved disinfectant and must be allowed to air dry
- delicate equipment (radios, cardiac monitors, etc.) must be wiped with disinfectant and allowed to air dry

Contaminated boots and shoes must be scrubbed with a hot solution of soapy water, rinsed with clean water, and allowed to air dry.

Contaminated work clothes (jump suits, t-shirts, uniform pants) must be removed and exchanged for clean clothes. Personnel must shower if body fluids were in contact with skin under work clothes.

Contaminated work clothes should be laundered at the base using hot water and if this is not possible, an agreement should be made with another facility to do this laundry.

Liquid waste containers containing urine, oral secretions, etc. should be emptied by carefully pouring into a utility toilet preferably done at the receiving health care facility and if containers are reusable, place them with other equipment to be disinfected; otherwise dispose of them as contaminated waste

All soiled wet linen and clothing must be contained in leak proof bags. And laundry staff sorting soiled linen must wear protective gloves and waterproof gowns.

There is a vast array of commercially available disinfectants available, and it is recommended that EMS utilize the same disinfectants as a local health care facility

There should be a designated person trained to do cleaning and decontamination and this person should be trained to use appropriate protective barriers, including water repellent aprons or gowns, gloves, masks and goggles, glasses or a face shield, and in the safe cleaning and handling of supplies and equipment. If there is no designated person to do cleaning and decontamination, all workers must be trained in these duties

Employees should understand that protective barriers do not guard against all accidents or protect from careless handling of equipment.

Cleaning up Spills of Blood, Body Fluids, or other Infectious Materials

EMS personnel are often required to clean up potentially infectious materials and therefore should ensure they are adequately protected to perform this task.

They should wear gloves and a gown if clothing contamination is likely. If the spill contains broken glass or other objects, these should be removed and discarded without contact with the hands using rigid sheets of cardboard as a "pusher" and "receiver" to handle such objects and should be discarded with the objects into an appropriate bio-hazard container

Since most disinfectants are less active, or even ineffective, in the presence of blood, spilled liquid should be absorbed with disposable absorbent material (i.e. paper towels, gauze pads, or tissue paper wipes). If the spill is large, granular absorbent beads or gels can be used. After absorption of the liquid, all contaminated materials should be discarded in the waste container. The disinfected spill site should be disinfected using a commercial disinfectant or liquid household bleach. All disposable materials used to decontaminate the spill should be placed into a suitable disposal container.

Cleaning an Ambulance or Emergency Response Vehicle

EMS personnel must ensure that their response vehicle is suitably cleaned in preparation for an emergency response. The vehicle must be cleaned after each call if possible or the vehicle must be cleaned on a regular basis, regardless of whether or not a response was undertaken. The schedule for routine vehicle cleaning must be at a minimum of once every two weeks if a call was not done during that period.

Appropriate PPE should be used when cleaning a response vehicle. All equipment should be removed from the vehicle storage locations prior to cleaning. As part of the routine cleaning, all visible contaminants on surfaces should be removed by scrubbing with soap and hot water. After pre cleaning with soap and water, the vehicle should be wiped or sprayed with a disinfectant solution followed by air drying.

All the equipment used in cleaning the vehicle (i.e. cloths, brushes, mops, etc.) should be placed into a fresh decontamination solution and allowed to soak for 30 minutes or laundered. They should then be removed and rinsed with water and allowed to air dry.

All soapy water as liquid waste should be disposed off after use by carefully pouring into a utility toilet or appropriate drain.

Each district must have a written policy on the following:

- location of designated areas and a cleaning schedule for each base
- who will be doing the cleaning
- what method will be used (i.e. types of tools and disinfectants) – Table 7
- disposal of sharps containers
- infectious waste (for disposal)
- infectious instruments (for disinfection)
- infectious linens (for disinfection)
- location of MSDS

Post-Exposure Protocol

The routine post-exposure protocol relates to the transmission of blood-borne infection agents (e.g. HIV, Hepatitis B, and C).

Immediate post-exposure management includes administration of the appropriate first aid, removing blood contaminated clothes if blood has soaked through the fabric and cleaning the affected area with soap and water or with an antiseptic solution. If the exposure was percutaneous (e.g. needle stick injury, cut, and scratch) rinse and wash with water and soap or with an antiseptic solution. There is no evidence supporting the practice of forcing the wound to bleed. Following a mucosal exposure, the exposed area should be thoroughly rinsed with water and the exposed area should be washed with soap or with an antiseptic solution.

Personnel having an occupational exposure should immediately report the exposure to his or her supervisor. Needle stick injuries should be reported to the infection control officer as soon as possible. In all situations, the current version of the Post -Exposure Protocol for blood borne pathogens developed by the National Department of Health should be followed. Personnel should fill out an Exposure Report Form for any of the following significant exposures; needle stick injury, break in skin caused by a potentially contaminated object, splash of blood or other potentially infectious material onto or into eyes, mucous membranes, or non intact skin, mouth to mouth resuscitation without a one way valve pocket mask.

A significant exposure includes significant exposure to the following body fluids; blood, cerebrospinal fluid (CSF), synovial fluid, pleural fluid, pericardial fluid, amniotic fluid, peritoneal fluid, semen or vaginal secretions, or any body fluid that contains visible blood. If a significant exposure to a significant body fluid has occurred, the employee should verbally notify the supervisor immediately. The supervisor will assess the situation to verify if a significant exposure occurred. The supervisor will advise the worker involved what steps to take. If a significant exposure occurred, medical evaluation will be done by a physician at a Hospital's Emergency Department. The report will include details of the task being performed, the means of transmission, the

portal of entry, and the type of PPE in use at the time, and other information as requested in the Exposure Report Form. The supervisor will review the communicable disease exposure report and forward it to the Infection Control Officer or other individual designated to manage occupational health. The Infection Control Officer (or designate) will evaluate the report for exposure hazards and will complete the communicable disease exposure report and initiate the appropriate follow-up for the exposure, based on guidelines established by the Department of Health.

The Infection Control Officer (or designate) will refer personnel for infection control retraining or for stress management counselling if indicated. Spousal counselling should also be available.

The source patient should be traced to the receiving medical facility (if possible). A request can be made of the source patient (either by staff at the receiving medical facility or occupational/staff health, depending on regional policy) so that the presence of an infectious disease is known or testing carried out and returned as quickly as possible.

The source patient has the right to refuse testing (including HIV testing) under present regulations. The provider's occupational health agency or personal physician will provide appropriate diagnostic work up if a communicable disease exposure has occurred. Services should include long term follow up, and personnel and spousal counselling. Hospital facilities should notify the Chief Medical Officer of EMS (or designate) of any patient transported by EMS personnel with a diagnosis of a transmissible disease (e.g. tuberculosis, Neisseria meningitidis)

When so notified, the Chief Medical Officer of EMS (or designate) should contact the Infection Control Officer for the transporting service who will then contact the providers involved and if necessary, arrange for post exposure prophylaxis.

Surveillance and monitoring

The District and station EMS manager should conduct;

- Inspections of station facilities
- Observation of on-scene activities
- Analysis of reported exposures to communicable diseases
- A semi-annual quality and compliance report.

The following are but critical examples of performance and health status indicators that need to be analyzed over pre-determined periods of time. Each would have a target set in advance and measurement of performance would be against that benchmark. The baseline data could be used to judge the extent of the improvement.

- Hep B Immunization uptake rate (% of all personnel)
- Absenteeism rate per shift (% of all personnel on a specified shift)
- Needle stick injury incidence (per predetermined time period)

Policy Evaluation

The Infection Control Policy will be evaluated at least annually by the EMS Manager to ensure that the policy is both appropriate and effective.

In addition, the Infection Control Policy will be evaluated as needed to reflect any significant changes in assigned tasks or procedures; in medical knowledge related to infection control; or in regulatory matters.

The Chief Medical Officer for EMS will actively participate in program evaluations to ensure that the program remains state of the art.

A Review of the Communicable Diseases and Infection Control Policy for Emergency Medical Services in the Pre-hospital environment in the Public health sector in South Africa-2005

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Revised November 2006

i. Declaration

I, Dr Ozayr Haroon Mahomed, confirm that I understand the policy on plagiarism of the University of Kwa-Zulu-Natal and that I will be penalized if this dissertation infringes that policy.

I, declare that this research report is my own, unaided work, except as indicated in the acknowledgments, the text and the references. This report is being submitted in partial fulfillment of the requirements of the Masters of Medicine in Public Health Medicine (MMed (PHM)) as awarded by the University of Kwa Zulu Natal

It has not been submitted before, in whole, or in part for any degree or any examination at any other university.

Dr Ozayr Haroon Mahomed

Identity number: 7303245084083

Student number: 933480073

Signed at **Durban Kwa-Zulu-Natal, South Africa**

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v. Acronyms and Abbreviations

AIDS:	Acquired Immune Deficiency Syndrome
AusAid:	Australian Government Overseas Aid programme
CCHF:	Crimean Congo Haemorrhagic Fever
CDC;	Centre for Disease Control
ECP:	Emergency Care Practitioners
EMS:	Emergency Medical Services
HBV:	Hepatitis B Virus
HCW:	Health care worker
HepB:	Hepatitis B
HIV:	Human Immune Deficiency Virus
HSV:	Herpes Simplex Virus
ILO:	International Labour Organization
KZN:	Kwa-Zulu Natal
MDR-TB:	Multi drug resistant tuberculosis
NDOH:	National Department of Health
OHSA:	Occupational Health and Safety Act, No.85 of 1993
PPE:	Personal protective equipment
SOP:	Standard Operating Procedure
SSA:	Sub Saharan Africa
TB	Tuberculosis
USA:	United States of America
WHO:	World Health Organization

vi. Acknowledgements

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vii. Abstract

Introduction

Emergency Medical Service (EMS) personnel evaluate patients, resuscitate them, and transport them to a medical care facility. This care is performed in an uncontrolled environment and involves invasive procedures and life support measures. The performance of these duties places EMS personnel at risk of occupationally acquired injuries and communicable diseases. Although the legislative guidelines exist for the protection of healthcare workers (HCW) from occupationally acquired injuries and diseases little is known about the degree to which protective measures are available for and utilized by EMS personnel in the pre-hospital environment in South Africa.

Study Aim

The aim of the study was to inform the development and design of policies and programmes addressing communicable diseases and infection control for EMS in the pre-hospital environment in the public health sector at a National and Provincial level in South Africa.

Study Methods

Semi-structured key informant interviews were utilized to collect data in respect of the availability and implementation of the policy on communicable diseases and infection control in EMS, as well as the nature and content of educational programs to impart and reinforce the knowledge and skills of communicable diseases and infection control for EMS employees.

Results

There is no National Policy on Communicable diseases and Infection control in Emergency Medical Services. Only Kwa-Zulu Natal (KZN), Eastern Cape and Gauteng have EMS specific Standard Operating Procedures for Communicable Diseases and Infection Control. Formal education and in service training is limited with respect to control measures for infection control and the prevention of communicable diseases.

Conclusion and Recommendation

An EMS specific National Communicable Disease and Infection Control Policy together with an accredited training module on Communicable Diseases and Infection Control for Emergency Medical Services in the pre-hospital environment needs to be developed.

Chapter 1: Background and Introduction

The fundamental ethic of health care delivery is that sick persons must receive adequate care. All health-care workers (HCW) have always accepted that there is a certain degree of risk of acquiring a communicable disease from their patients as part and parcel of their profession. This Chapter provides an introduction to the burden of communicable diseases globally and nationally. The National Health Act and the Occupational Health and Safety Act (OHSA) provide the legislative framework for the protection of health care workers against occupational hazards. The relevant sections of these acts that pertain to the protection of health care workers are summarized in this chapter.

The aims and objectives of the study and a detailed background to the study are provided. The outline of the dissertation is presented at the end of the chapter.

1.1. Introduction

Despite the extraordinary medical advances of the 20th century, a significant component of the global burden of disease continues to be attributable to infectious diseases, under-nutrition and complications of childbirth.[1] Human Immune Deficiency Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS) has become the leading cause of mortality among adults aged 15-59 years, and is responsible for over 2 million deaths representing 13% of global deaths in this age group.[2]

Communicable diseases are responsible for more than 50% of deaths in Sub-Saharan Africa (SSA). HIV and AIDS, tuberculosis (TB) and malaria together account for more than one in three deaths, and lower respiratory infections, measles and diarrhoea for another 20%. About 8.8 million people develop active TB every year, and 1.7 million die of the disease. The majority of TB sufferers live in developing countries with the number of TB cases having doubled or even trebled in the past decade in several African countries, including South Africa mainly as a result of the HIV epidemic.

HIV and other infectious and parasitic diseases accounts for 40% of the mortality in South Africa and are a significant contributor to the burden of disease.[4] According to the annual antenatal clinic-based surveillance survey, there were an estimated 6.29 million South Africans who were HIV positive at the end of 2004, including 3.3 million women and 104,863 babies.[5]

The health status of the South African population has declined in the last decade as evidenced by a decreasing life expectancy. This has been the result of the rapid spread of the HIV epidemic. The AIDS epidemic has fuelled the TB epidemic and also resulted in increased deaths due to communicable diseases.

The fundamental ethic governing health service delivery is that sick persons must receive adequate care.[6] As AIDS and its related communicable diseases progress, the weakened state of immune-compromised patients, may increase the demand for EMS services, since patients and families may not be able to transport them to hospitals and clinics.

Currently, EMS personnel sequentially evaluate patients' clinical status, resuscitate them, and transport them to a medical care facility. Patients' resuscitation and initial care is often performed in an uncontrolled environment and involves time-sensitive, invasive procedures and life support measures that expose EMS personnel to blood and body fluid-borne pathogens like HIV and hepatitis, as well as airborne communicable diseases like TB. This interface between the sick patient and the EMS personnel places them at risk of occupationally contracting these life threatening diseases and subsequently, transmitting them to other patients. This transmissibility of communicable diseases can transform care-givers into victims. Ill care-givers doubly weaken a nation's health status and present an immediate threat to the nation's EMS workforce.

Healthcare workers have accepted that there is a certain degree of risk of acquiring an infectious disease from their patients as part of their professional practice. Since the personnel of the health service are its most valuable asset, everything possible should be done to provide the highest quality of care. If healthcare workers are troubled by their own ill-health, or other stressful circumstances, then their performance will be adversely affected. In addition, apart from being good employment practice, no healthcare service can function effectively if there is a high incidence of ill health among its workers.

There are two over-arching legislative measures that form the foundation for the protection of the healthcare service providers in South Africa. The first is the National Health Act, 61 of 2003.[7] Section 20 (3) of the National Health Act, states that:

"Subject to any applicable law, every health establishment must implement measures to minimize-

(a) Injury or damage to the person and property of health care personnel working at that establishment and;

(b) Disease transmission"

The second piece of legislation is the Occupational Health and Safety Act, 85 of 1993 (OHSA) which requires employers to provide for the health and safety of persons at work against hazards arising out of or in connection with the activities of persons.

In terms of this Act, the employer is obliged to:

- "establish, as far as is reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed, and he shall, as far as is reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article, substance, plant or machinery in order to protect the health and safety of persons, and he shall provide the necessary means to apply such precautionary measures;
- Providing such information, instructions, training and supervision as may be necessary to ensure, as far as is reasonably practicable, the health and safety at work of his employees."[8]

The employee's responsibilities in terms of the Act are:

- "to take reasonable care for the health and safety of themselves and of other persons who may be affected by their acts or omissions;
- carry out any lawful order given to them, and obey the health and safety rules and procedures laid down by their employer or by anyone authorized thereto by their employer, in the interest of health or safety;
- if they are involved in any incident which may affect their health or which has caused an injury to themselves, report such incident to their employer or to anyone authorized thereto by the employer, or to their health and safety representative, as soon as practicable but not later than the end of the particular shift during which the incident occurred, unless the circumstances were such that the reporting of the incident was not possible, in which case they shall report the incident as soon as practicable thereafter".[8]

1.2. Problem Statement

Whilst the National Health Act and OHSA provide the general legislative and policy framework to safeguard the health and safety of all workers (including EMS), it is unclear to what extent these generic policies have been translated into specific policies, programmes and standard operating procedures (SOPs) to specifically address the high risks facing EMS personnel.

Further cognizance needs to be taken of the relationship between the National and Provincial departments of health in formulating and implementing policies. Whilst the National Department of Health (NDOH) has the mandate to draft and promulgate national legislation and policies, implementation of these policies through appropriate programmes and services is the prerogative of the provincial department of health. The uneven distribution of health care resources and capacity amongst the nine provinces in South Africa may result in the uneven development of provincial programmes to protect EMS personnel.

1.3. Background

EMS in South Africa is an exclusive provincial legislative competency in terms of Schedule 5, Part A, of the constitution.[9] Prior to 1994; EMS was under the responsibility of local government and merged with fire services. The delivery of EMS in the public health sector has progressively been converted to a provincial function since 1997. However, only in the Ekhuruleni Metropolitan Council, in the Gauteng Province, EMS services are under the administration of 5 municipalities, which have service level agreements with the province. This unconstitutional situation is as a result of the legacy of the previous administration and failure of negotiations pertaining to service contracts.

The EMS Directorate nationally as well as provincially are situated within the health service delivery cluster. All provinces have a Provincial EMS Director except for the Free State, Mpumulunga and Northern Cape where the Provincial EMS department is headed by a Deputy Director, with only a policy development role.

All Provinces have devolved operational responsibility to District level EMS managers who report directly to the Provincial Senior EMS managers except in the Free State where the Chief Directors at District levels have overall responsibility for the operational functions and do not report to the Provincial EMS Department but to the General Manager of the Health Service Delivery cluster.

KZN has the most highly developed EMS functions at a district level with a full support structure that includes operational managers and soon to be appointed senior medical officers and district training coordinators. Western Cape, Free State, North West and Eastern Cape are at an intermediate level with appointed district managers. Limpopo Province and Northern Cape are still at an early stage and in the process of devolving responsibility to the district level.

EMS provides a range of emergency medical services and care, including:

- Basic, Intermediate and Advanced Life Support;
- Ambulance based emergency care;
- Patient transfers from rural hospitals into tertiary care centres in the metropolitan areas;
- Patient Transfers for follow-up care from outlying areas to Metropolitan areas;
- Medical Rescue services including Mountain Rescue, High Angle Rescue, Trench Rescue, Swift Water Rescue, Heavy Motor Vehicle Rescue, Light Motor Vehicle Rescue, Air Sea Rescue, Building Rescue;
- Mass Casualty, Disaster Management and Cave Rescue;
- Transfer of Infectious Disease Patients.

1.3.1. EMS Workforce in the Public Health Sector in S.A. in 2004

There were 8142 EMS personnel in the public health sector in South Africa on the 30th of April 2005, of which 61% are trained at a Basic Life Support Level. The urban provinces of Gauteng, Kwa-Zulu Natal, Western Cape and Eastern Cape Province have 68% of the EMS employees with the rural provinces of Limpopo, North West, Free State, Mpumulunga and Northern Cape having only 32% of the national EMS personnel. The majority of the EMS practitioners in the rural provinces of Mpumulunga, Free State, North West, Limpopo and Northern Cape are trained at a basic emergency level only (Table 1).

Table 1: Distribution EMS Workforce in South Africa in 2004 disaggregated by province: Numbers and Percentage (%)

Province	*Number and Percentage of EMS practitioners per province*	*Number and Percentage of EMS practitioners per province trained at Basic Level*
Gauteng	1659 (21)	1012(61)
Kwa-Zulu Natal	1649 (20)	805 (49)
Western Cape	1200 (15)	565 (47)
Eastern Cape	1000 (13)	500 (50)
Free State	670 (8)	603 (90)
North West	664 (8)	465 (70)
Mpumulanga	500 (6)	400 (80)
Limpopo	437 (5)	306 (70)
Northern Cape	363 (4)	300 (83)
Total	**8142 (100)**	**4976 (61)**

Figure 1 depicts the distribution of EMS practitioners per 100000 population based on the mid-year population estimates for 2005.

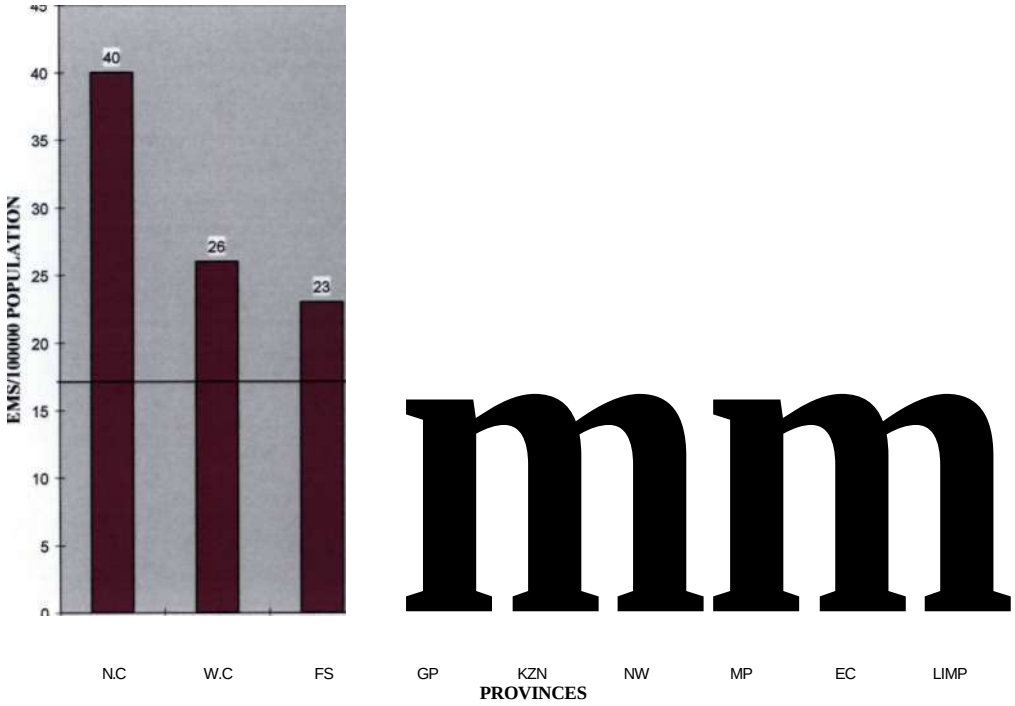

Figure 1: Number of EMS personnel/100000 population across provinces in 2005 in the public health sector

The median number of EMS personnel/100000 population in the public health sector in South Africa in 2005 was 17 with a mean of 20 and a range of 32 EMS personnel/100000 populations. The mean is skewed upwards by Northern Cape and Free State province because these provinces have the lowest number of people living within them. Limpopo province has the lowest number of EMS personnel/100000 population.

1.4. Relevance of the Study

The emergency care practitioner (ECP) or paramedic provides the first link in the "chain of survival" of the critically ill or injured patient. The primary task of the ECP is to give pre-hospital care to sick or injured persons. ECP may be called upon to deal with;

- Medical Emergencies such as anaphylaxis, asthma, carbon monoxide poisoning, cardiac arrest, arrhythmia (Adult and Child), chest pains including myocardial infarctions, choking, a collapsed or unconscious patient, diabetic hypoglycaemia, drowning, croup, convulsions, heat exhaustion, gastroenteritis, meningitis, respiratory tract infections, neonatal emergencies, poisoning, pregnancy and psychiatric emergencies;
- Trauma such as limb injuries, paediatric trauma, burns, amputation, penetrating trauma, motor vehicle accidents, suicides and gun shot wounds.

Pre-hospital care involves the resuscitation and stabilization of patients, prevention of further injuries and the transport of patients to the nearest healthcare centre. When a call for assistance is received, the nearest available ambulance is sent out to the scene as well as a rapid response vehicle in special circumstances. The ECP's at the basic or intermediate level assesses the patient and provide basic life-support, stops any bleeding, administers treatment for shock that includes intravenous therapy and defibrillation (shock) chest decompression, stabilizes of fractures, dresses wounds, administers bronchodilators for asthma, provides assistance with delivery of patients in advanced labour and basic treatment of cases of burns and poisoning. The advanced life support paramedics are usually involved in situations of a disaster or serious motor vehicle accidents. They provide advanced airway management, intravenous therapy, drug therapy and advanced resuscitation.

The ECP may be exposed to accident, physical, chemical, ergonomic, psychosocial and biological hazards during the course of their normal work. In addition to the above conventional risks associated with the pre-hospital care and transport of patients, the global pandemic of HIV, TB, multi-drug resistant tuberculosis (MDR-TB) as well as emerging and re-emerging infectious diseases exposes the ECP to additional risks of infectious and communicable diseases.

The global HIV epidemic, its related and unrelated communicable diseases, coupled with the unique aspects of EMS medical care have attracted the attention and concern of the EMS director and public health officials in South Africa. The NDOH, commissioned the Department of Public Health Medicine at the School of Family and Public Health Medicine of the University of Kwa-Zulu Natal to undertake a review of the current national and provincial communicable diseases and infection control policies for EMS in the pre-hospital environment in the public health sector, to identify the strengths, gaps, weaknesses, and the extent of implementation of standard operating procedures at the provincial level; thereby informing the further development of policies, standard operating procedures, and training modules, for the prevention of blood, body fluid, and airborne transmission of communicable diseases to and from EMS workers.

1.5. Aim of the study

The aim of the study was to inform the development and design of policies and programmes addressing communicable diseases and infection control for EMS in the pre-hospital environment in the public health sector at a National and Provincial level in South Africa in 2005.

1.6. Study objectives

The objectives of the study were:

- To review the existing national and provincial policies and legislative measures that aim to protect EMS personnel in the public health sector from communicable diseases.
- To identify the availability and the gaps in the implementation of standard operating procedures addressing communicable diseases and infection control for EMS in each province.
- To review the follow-up surveillance conducted by Provincial EMS service managers to ensure that their personnel are protected from communicable diseases.
- To determine from National and Provincial senior management of EMS the availability of and the provision of training programmes targeted at EMS personnel that would train them to protect themselves from contracting communicable diseases.
- To make recommendations to the National EMS coordinating committee based on the findings of the study.

1.7. Conceptual framework for the study

Globally, increased attention is being focused on the development of effective health systems and the contribution that policies can make to this. Policy-making involves those in positions of authority making choices that have a special status within the group to which they will apply. The results take many forms ranging from national health policies made by the government to clinical guidelines determined by professional bodies. Rational models of policy-making assume policy-makers identify problems, then gather and review all the data about alternative possible solutions, and their consequences, and select the solution that best matches their goals.[11]

The systems approach offered the theoretical and conceptual framework that guided the design of the study. Figure 2 depicts the adapted approach of the model that forms the basis for this review.

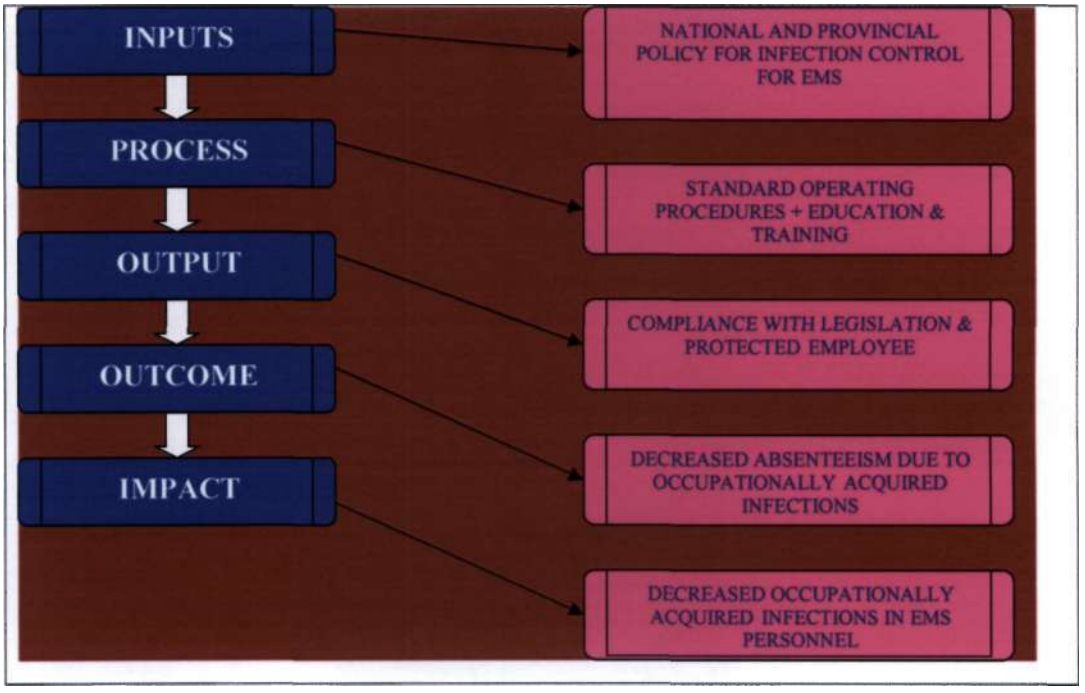

Figure 2: Application of the systems approach to the study design.

The rising incidence of HIV/AIDS, MDR-TB and other emerging and re-emerging communicable diseases, together with the increased demand for health services provide the context for the development of a policy. The objective of the policy is to decrease the incidence of occupationally acquired infections of EMS employees and the onward transmission to patients.

The main input in the model is a National communicable diseases and infection control policy for EMS in the pre-hospital environment in the public health sector. This is followed by the adoption and/or development of a Provincial communicable diseases and infection control policy for EMS in the pre-hospital environment in the public health sector. The process for implementing the policy to achieve the objective is the development of SOP's and education and training of EMS employees. The output is the compliance with legislation and an employee that is protected against occupationally acquired communicable diseases. The main outcome is a decrease in the incidence of occupationally acquired infections of EMS employees and the onward transmission to patients.

This study focused on the inputs and process components as outlined in Figure 2 and not on the outputs and outcomes.

1.8. Operational Definitions

Ambulance: An **ambulance** is a vehicle designated for the transport of sick or injured people. An ambulance can be any vehicle, including a bus, helicopter, or even a hospital ship.

Biological Hazards: any agent that causes infection including, bacteria, viruses, fungi and parasites.

Circular: A specific directive from the NDOH indicating policies and procedures to be followed by all provincial EMS departments

Communicable Disease: An illness due to a specific infectious agent or its toxic products that arises through transmission of that agent or its products from an infected person, animal or inanimate reservoir to a susceptible host; either directly or indirectly through an intermediate plant or animal host, vector or the inanimate environment.

Infectious Disease: Change from a state of health to a state in which part or all of a host's body cannot function normally because of the presence of an infectious agent or its products.

Medical Surveillance; planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner, and in prescribed cases by an occupational medicine practitioner.

Refresher Courses: special training courses that are held at regular intervals to enhance the knowledge and skills of employees

Policy: A definite course or method of action selected (by government, institution, group or individual) from among alternatives and in the light of given conditions to guide and, usually, to determine present and future decisions.

Standard Precautionary Measures: simple standards of infection control practices to be used in the care of all patients, at all times, to reduce the risk of transmission of blood borne infections.

Standard Operating Procedures: (SOP) are written guidelines that explain what is expected and required of emergency service personnel in performing their jobs.

Updates: Weekly or monthly meetings or newsletters providing current information regarding communicable diseases statistics and outbreaks.

1.9. Structure of the Report

Chapter 2 contains a review of literature to establish the epidemiology of communicable diseases in health care workers and especially EMS as well as the framework of a communicable diseases and infection control policy in the pre hospital environment.

Chapter 3 describes the methodology employed in performing the study as well as the reliability and validity of the measuring instruments

Chapter 4 presents the key findings of the study

Chapter 5 discusses the key findings of the study.

Chapter 6 provides conclusion and recommendations to the National EMS Coordinating Committee in order to address the gaps identified.

Chapter 2: Literature Review

A literature review of the epidemiology of communicable diseases amongst EMS personnel as well the availability of published standards for the protection of EMS personnel from communicable diseases in the pre-hospital environment was performed. A search using the Pubmed database with the following key words Emergency Medical Services, Communicable Diseases, Pre-hospital environment revealed no published articles in the South African setting, while several references on Infection Control Policy for Emergency Medical Services from various Emergency services globally were listed and reviewed. The International Labour Organization (ILO) has listed the hazards that ambulance drivers may be exposed in the course of their normal work in the International Datasheets on Occupations.[19] The listed hazards include accidents, physical hazards, chemical hazards, biological hazards and ergonomic, psychosocial and organizational factors. Since the primary aim of this study was communicable diseases and infection control policies and programmes, the main focus of the literature review was on biological hazards. To determine which infections pose risk and how risky specific exposures may be, a review of all literature on occupationally acquired infections in health care workers published in English between January 1990 and December 2004 was reviewed. The first part of the review examines the various routes of exposure to human sources of micro-organisms in the healthcare settings and characterizes the type and risk of disease for the healthcare workers and specifically ECP due to the exposure. This is followed by a review of policies on Communicable Diseases and Infection Control for EMS in the pre-hospital environment.

2.1. Routes of exposure to human sources of microorganisms in the healthcare setting

Exposure to human sources of microorganisms in healthcare settings occurs via three primary routes: contact (direct and indirect), respiratory droplets, and airborne droplet nuclei (i.e., respirable particles of <5 urn).[1^]

Contact transmission: the most common mode of transmission is divided into two subgroups: direct contact and indirect contact.

- Direct contact transmission occurs when microorganisms are transferred directly from one person to another person. In healthcare settings these include:
    - Blood from a patient directly enters a caregiver's body through a cut in the skin;
    - Scabies mites from a patient are transferred to the skin of a caregiver while he/she is lifting the patient;
    - A healthcare provider develops herpetic whitlow on a finger after contact with Herpes simplex virus when providing oral care to a patient without using gloves or HSV is transmitted to a patient from a herpetic whitlow on an ungloved hand of a HCW.[14]

Direct contact transmission is more efficient than indirect contact transmission but occurs less frequently in healthcare settings than indirect contact transmission. Disease is more likely to develop following direct contact transmission when the pathogen is highly virulent or has a low infectious dose or the patient or HCW is immune compromised.

Indirect contact transmission, the most frequent mode of transmission, involves the transfer of an infectious agent through a contaminated intermediate object or person. Hands of personnel are usually cited as the most important contributors to indirect contact transmission. [15] Examples of indirect contact transmission are as follows:

• Hands of healthcare personnel touch an infected or colonized body site on one patient or a contaminated inanimate object, and then subsequently touch another patient without healthcare personnel performing adequate hand hygiene between patient contacts.

• Patient-care devices (e.g., electronic thermometers, glucose monitoring devices contaminated with blood or body fluids are shared between patients without cleaning and disinfecting between patients.

• Instruments that are inadequately cleaned between patients before disinfection or sterilization or that have manufacturing defects that interfere with the effectiveness of reprocessing may transmit bacterial and viral pathogens.

Droplet transmission occur when respiratory droplets are generated when an infected person coughs, sneezes, or talks or during procedures such as suctioning, bronchoscopes, and cough induction by chest physiotherapy. Transmission occurs when droplets propelled short distances (<3 feet through the air) are deposited on the conjunctivae, nasal mucosa, or mouth. Examples of infectious agents that can be transmitted via the droplet route include *Bordetella pertussis,* Influenza virus, Adenovirus, Rhinovirus, *Mycoplasma pneumoniae,* SARS-associated corona virus (SARS-CoV), Group A streptococcus, and *Neisseria meningitidis.*[16]

Airborne transmission occurs by dissemination of airborne droplet nuclei small particle residue [5 urn or smaller in size] of evaporated droplets, which contain infectious micro organisms that remain suspended in the air for long periods of time or dust particles containing the infectious agent. Micro organisms carried in this manner can be dispersed widely by air currents and may be inhaled by susceptible hosts within the same room or over a longer distance from the source patient when the air supply is shared. There are only a few micro organisms known to be transmitted by the airborne

route: Mycobacterium tuberculosis, Rubeola virus (measles), and Varicella-zoster virus (chickenpox).[16]

Other sources of infection that do not involve person-to-person transmission include those associated with common source vehicles, e.g. contaminated food, water, or medications (e.g. intravenous fluids). Vector borne transmission of infectious agents from mosquitoes, flies, rats, and other vermin also can also occur in healthcare settings.

2.1.1. Occupational exposure to human sources of microorganisms in the EMS Setting

Health care workers are at an occupational risk for a vast array of infections that cause substantial illness and occasional deaths. Despite this, there are no reported studies in the South African or African literature that have examined the incidence and route of occupational exposure to human sources of micro organisms in the EMS setting. In the United States of America (USA), the following incidence and type of occupational exposures to human sources of micro organisms were reported in the EMS setting by the Portland Bureau of Fire Rescue and Emergency Services. Two hundred and fifty-six (256) exposures were categorized during the 2-year period commencing on the 1st of January 1988, and ending on the 31st of December 1989. The overall incidence of reported exposure was 4.4 per 1,000 EMS calls. Of these exposures, 120 (46.9%) were exposures to intact skin, 61 (23.8%) involved respiratory exposure only, 38 (14.8%) were exposure to non intact skin, 15 (5.9%) were eye splashes, 14 (5.5%) were needle sticks, and 8 (3.1%) were mucous membrane exposures.[17]

2.2. Epidemiology and Risks of Occupationally acquired infections in health care workers

2.2.1. Blood borne Transmission

Although many non medical occupational groups are at risk for diseases caused by organisms transmitted through the airborne or oral-faecal route, health care workers are one of the few groups at high risk for the transmission of blood borne pathogens. Blood borne transmission have received increased attention with the advent of the acquired immunodeficiency syndrome epidemic and, more recently, the viral haemorrhagic fever outbreaks.[10]

2.2.1.1. HIV Infection

In 2004 there were an estimated 4.9 million newly infected cases and 39.4 million people living with HIV globally. Of all the regions of the world, Sub-Saharan Africa is the region most affected by the HIV/AIDS epidemic with an estimated 25.4 million people [range 23.4-28.4 million] living with HIV, in the region at the end of 2004.

South Africa has the largest number of people living with HIV/AIDS in the world. There were between 5.7 million and 6.2 million people living with HIV/AIDS in South Africa in 2004 based on antenatal ante-natal clinic-based surveillance estimates. Of the estimated 5.7 million people living with HIV and AIDS, about 25% (1.4 million people) were likely to be symptomatic including 7% (400 000 people) with full blown AIDS.

HCW's are at risk for exposure to blood borne pathogens from accidental needle sticks and other sharps injuries. ECP's come in direct contact with patients in emergency situations. Typically, the response is made with little preparation time and in uncontrolled environments. In most situations, the ECP does not know if the patient has an infectious blood borne or other communicable disease. The CDC Cooperative Needle stick Surveillance Group in the USA reporting on pooled data from 25 prospective studies of health care workers exposed to HIV through needle sticks or other parenteral exposures, quantified the risk for acquiring HIV as 0.32% (95% CI,

0.18% to 0.46%).[19] The risk for transmission of the virus depends on the extent and the circumstances of exposure. With HIV, deep, penetrating injuries, especially with hollow needles and the higher the concentration of HIV in the source patient's blood greatly increase risk; and likelihood of transmission.

2.2.1.2 Hepatitis B

Hepatitis B virus (HBV) infection is a major global public health problem and one of the first blood borne pathogens to be recognized as an occupational risk among health care workers. There are approximately 2 billion people infected worldwide, with more than 350 million chronic carriers of HBV. [Z1] HBV infection accounts for 500 000 to 1.2 million deaths each year and is the 10th leading cause of death worldwide.[22] HBV is widespread in sub-Saharan Africa and South Africa. In South Africa, HBV has been particularly common in two young children and young sexually active adults with about 8% of children under the age of one year and almost 16% of children less than 6 years of age infected with HBV. Between 10-18% of South African adults are HBV carriers. Infection has been more common in some areas of the country, for example the Eastern Cape Province and Kwa-Zulu-Natal. South Africa has had one of the highest rates of liver cancer in the world, and this is linked to the high rate of HBV.[23] The risk for transmission of HBV from a single needle stick varies according to E antigen status: 1% to 6% for E antigen-negative blood compared with 22% to 40% with E antigen-positive blood. [24]

2.2.1.3. Viral Haemorrhagic Fever (VHF)

Viral hemorrhagic fevers (VHF's) are a group of febrile illnesses caused by RNA viruses from several viral families. These highly infectious viruses lead to a potentially lethal disease syndrome characterized by fever, malaise, vomiting, mucosal and gastrointestinal bleeding, edema, and hypotension. Class 4 viruses known or considered likely to occur in Africa include Marburg, Ebola, Rift Valley fever (RVF), and Crimean-Congo haemorrhagic fever (CCHF), Lassa fever, and Hanta viruses. In South Africa, local transmission is only reported with CCHF and RVF. Ebola virus and Marburg virus are imported into South Africa.

Outbreaks of VHF's have represented very formidable hazards of occupationally acquired nosocomial infections to healthcare workers. On March 23, 2005, the World Health Organization (WHO) confirmed Marburg virus (family Filoviridae, which includes Ebola virus) as the causative agent of an outbreak of viral hemorrhagic fever (VHF) in Uige Province in northern Angola. A total of 132 cases were identified between 01 October 2004 and 23 March 2005; of these, 127 were fatal. Approximately 75% of the reported cases occurred in children aged less than 5 years; cases also have occurred in adults, including health-care workers. Twelve health care workers died during this outbreak. *Oft* In the 1995 outbreak of Ebola in Kikwit, in the former Zaire, 90 of the 296 cases were healthcare workers with 79% mortality. [27] Similarly, in a CCHF outbreak in Pakistan in 1976, 10 of 17 exposed healthcare workers were infected and 2 died. [28] In South Africa, fatal transmission of Ebola and CCHF infections to a surgeon and some nursing personnel has been documented.

The risk of nosocomial transmission is high in conditions of poor medical services where facilities for isolation and containment are inadequate with poor standards of infection control. They are also high if personnel are unsure that a patient is infected with one of these viruses. However, when adequate high security precautions are put into place and containment facilities are good, nosocomial transmission has been limited.

2.2.2. Airborne Transmission

2.2.2.1 Mycobacterium tuberculosis (MTB)

South Africa is burdened by one of the worst TB epidemics in the world, with disease rates more than double those observed in other developing countries and up to 60 times higher than those currently seen in the USA or Western Europe. South Africa had an estimated 98,000 new smear positive cases (218 per 100,000), with a TB specific mortality rate of 73 per 100,000 population. The number of TB cases in South Africa is likely to further increase over the next few years due to HIV/AIDS.

Failure to complete the required course of treatment, which normally renders TB completely curable, leads to the continued spread of TB and an increased risk of patients developing MDR-TB. This type of TB has a high mortality rate with fewer

than 30% of patients with MDR-TB surviving. A national study of MDR-TB conducted by the Medical Research Council of South Africa in 2002 found that 1.8 percent of new TB cases, and 6.7 percent of cases in re-treatment, had MDR-TB, with approximately 6,000 new cases of MDR-TB expected in 2005.[31]

Transmission of MDR-TB is a recognized risk in health-care settings.[32] The magnitude of the risk varies by setting, occupational group, patient population, prevalence of TB in the community, and effectiveness of TB infection-control measures. The risk may be higher in settings in which patients with TB disease might be encountered before diagnosis and before the initiation of anti-TB treatment or where procedures that induce coughing are performed.

EMP's are at an increased risk due to cumulative exposure as well as exposure to patients prior to their condition being diagnosed.

2.2.3 Droplet Transmission

2.2.3.1 Influenza

Outbreaks of influenza occur each winter and cause substantial illness. Numerous nosocomial outbreaks of Influenza have been reported in the USA. There are no published data with respect to nosocomial outbreaks of Influenza in South Africa. In an Influenza outbreak at a hospital with poor vaccination compliance rates in the USA, the virus spread to 118 workers, including 8% of the nurses and 3% to 6% of the physicians. Influenza results in a high rate of employee absenteeism. Absenteeism during a community outbreak of Influenza at a hospital in the USA was 1.7 times higher than it had been the year before costing an additional $24 500 for sick leave.[34] An effective vaccine has been available and is indicated even for adults without underlying medical conditions. Nonetheless, rates of vaccination for patients and health care workers remain low. ECP's are at increased risk of acquiring this infection as well as transmitting it to patients with depleted immune systems.

2.2.4 Direct Contact

2.2.4.1. Neiserria meningitidis

Meningococcal infection in health care workers has been linked to rescue breathing. The risk for salivary transmission may be high during mouth-to-mouth ventilation or other intensive respiratory exposure (such as endotracheal intubations) if a patient has systemic *N. meningitidis* infection.

2.2.4.2. Herpes Simplex virus Infection

Herpes simplex virus (HSV) has been shown to be readily transmitted both from patient to rescuer and from rescuer to patient, reflecting the ubiquity of HSV infection in the general population. Viable HSV has been obtained from the saliva of 2.5% of asymptomatic adults, and copious shedding of HSV occurs in persons with active lesions. Two cases of primary herpes labialis in medical residents who performed mouth-to-mouth ventilation have been reported.

2.2.4.3. Scabies

Infection may spread to health care workers as a result of direct contact. In one hospital 300 health care workers were affected, including 45 of 200 laundry workers (22.5%), 126 of 1448 nurses (8.7%), and 32 of 87 health care workers (36.8%) who had direct contact with patients.[37] Despite the highly contagious nature of the disease, mortality from the disease is low.

2.3. Infection Control and Communicable Diseases Policy for EMS in the Pre hospital Environment

General infection control policies are designed to prevent the transmission of a variety of microbiological agents and to provide a wide margin of safety for health care workers. Although these policies were initially developed for hospital employees and other workers in health care facilities, similar modes of blood-borne exposure and disease transmission have been described for patient care activities in both the hospital and out-of-hospital environments. According to the Communicable Disease Notification Protocol for Emergency Service Workers from the Occupational Health and Safety Division, Saskatchewan, Canada, it is essential that an employer of emergency response workers prepares and implement a written infection control policy specific to the pre hospital environment. The policy must be kept current and reviewed at least every two years and changed if there is any change at the workplace that may affect a worker's risk of acquiring an infectious disease. EMS personnel who are at risk of exposure to infectious material or organism must have access to the policy and the services described in the policy.

The purpose of the infection control policy is to provide a comprehensive infection control system which maximizes protection against communicable diseases for all members, and for the public that they serve.

The U.S. National Association of EMS Physicians (NAEMSP) recommends that the infection control policy should identify "at-risk" job classifications and tasks, establish a schedule for initial and ongoing infection control training for employees, communicate the hazards of blood-borne, airborne, droplet spread diseases, mechanisms of transmission, and methods to prevent or minimize exposures, establish procedures for post exposure incident reporting, documentation, medical management, and follow-up.

Our literature review focused primarily on two important concepts namely, medical surveillance and education and training on infection control for EMS employees.

2.3.1. Health Maintenance and Medical Surveillance

The OHSA defines "medical surveillance" as a planned programme or periodic examination (which may include clinical examinations, biological monitoring or medical tests) of employees by an occupational health practitioner in prescribed cases, by an occupational medicine practitioner.

All employees should be subject to health surveillance, which should include medical examinations on placement, transfer, on leaving the organization as well as at periodic intervals. The main purpose of a pre-employment medical evaluation is to

- Establish a baseline of the candidate's health against which any future changes can be measured and monitored
- Identify possible risk of deterioration in the employee's health status which might be caused by the job process and/or work environment.
  To determine the need of the employee to be immunized.[41]

To meet the responsibility of protecting employees against infectious diseases, employers should have an immunization programme which is part of a wider safe system of work. A typical immunisation programme may consist of the following:

• Mantoux test to identify TB immunity levels. BCG vaccination may be indicated

• Screening for Hepatitis B (Hep B) immunity and Hep B immunization

• Immunity identification against Rubella, Varicella and Influenza

2.3.2. Education and Training of EMS employees on infection control

Education and training of staff is the cornerstone of an effective, facility wide program for the prevention and control of infections. In a study undertaken by Klein, Collins and Attas (2004)[42] at twelve urban/suburban emergency departments in the USA, testing EMS employee response to patients with suspected infectious disease, none of the EMS employees correctly identified their patients as being at risk for harbouring communicable diseases. EMS employee did not don any personal protective equipment (PPE) available to them on the ambulance (i.e., gloves, or N-95 mask) nor did they place a mask on their mock patients.

Based on these results and observations, the study concluded that further frontline education in infectious disease recognition and communication training for pre-hospital and emergency department personnel is needed so as to ensure the quick detection and an effective response for patients infected with suspected highly communicable, infectious agents.

A study testing paramedic knowledge of infectious disease aetiology and transmission in an Australian emergency medical system was performed by means of a mail survey. The study demonstrated that paramedic knowledge of infectious disease aetiology and modes of transmission was poor. Of the 25 infectious diseases included in the survey, only three aetiological agents were correctly identified by at least 80% of respondents. The most accurate responses for aetiology of individual infectious diseases were for HIV/AIDS (91.4%), Influenza (87.4%), and Hep B (85.7%). Modes of transmission of significant infectious diseases were also assessed. Most accurate responses were found for HIV/AIDS (85.8%), Salmonella (81.9%) and Influenza (80.1%).[43]

The results revealed that knowledge of aetiology and transmission of infectious disease is generally poor amongst paramedics. Comprehensive in-service educational programs on infection control for paramedics with emphasis on infectious disease aetiology and transmission were recommended.

An electronic search of the literature for guidelines available from professional agencies, uncovered very little in the way of specific national guidelines for infection control education and training of workers.

Since 1994 health professionals licensed, registered or certified in New York State have been required to receive training on infection control and barrier precautions every four years unless otherwise exempted. In terms of guidelines issued by the New York Health Department the training or course work needs to cover the following core elements;

- Scientifically accepted principles and practices of infection control and to monitor the performance of those for whom the professional is responsible.
- Modes and mechanisms of transmission of pathogenic organisms in the healthcare setting and strategies for prevention and control.
- Use of engineering and work practice controls to reduce the opportunity for patient and healthcare worker contact with potentially infectious material for blood borne pathogens.
- Selection and use of barriers and/or personal protective equipment for preventing patient and healthcare worker contact with potentially infectious material.
- Creation and maintenance of a safe environment for patient care through application of infection control principles and practices for cleaning, disinfection, and sterilization.
- Prevention and management of infectious or communicable diseases in healthcare workers.[4]

Chapter 3: Methods

This chapter describes the type of research conducted, the study design, the study population and the instruments utilized for data collection. Measures to ensure the validity and reliability of the study, the management of the data and type of analysis performed are also detailed in this chapter.

3. Methods

3.1. Study Location

The study was conducted nationally in the public health sector in South Africa.

3.2. Study Population

The participants in the study were the National Director of EMS and the 9 Provincial EMS Senior Managers in South Africa as listed in Appendix **1**.

3.3. Sampling strategy

There was no sampling of study participants.

3.4. Sample Size

There were a total of 10 participants in the study.

3.5. Study design

The study was a qualitative study that utilized key informant interviews to describe the policies and programmes addressing communicable diseases and infection control for E.M.S in the pre-hospital environment in the public health sector at a National and Provincial level in South Africa in 2005.

3.6. Study Period

The study was conducted between January and June 2005.

3.7. Data Collection

The primary mode of data collection was through key informant interviews. The interviews were semi-structured and conducted by the principal investigator. The participants in the interviews were the National EMS Director and the 9 Provincial EMS senior managers. The interviews lasted a maximum of 60 minutes. The outline of the questions was forwarded to the EMS managers 7-10 days prior to the interview.

Interview I: Directed to the National EMS Director, this interview was designed to ascertain the existence of policies on a national level addressing the protection of EMS personnel, how these policies are activated, and how activation was monitored.

Interview II: Directed to the nine Provincial EMS Directors, this interview was meant to delineate the extent to which EMS management are aware of national policies, how this was translated into provincial policies, the protective resources provided to EMP and the monitoring and implementation of SOP.

3.8. Data Management

All interviews were recorded using a tape recorder and a 90 minute tape. An informed consent document was signed prior to the interview. Permission from interviewees was sought prior to recording.

3.9. Data Analysis

The information gathered was then transcribed by an administrative assistant. A summary of the data was then compiled. The transcripts were read several times to identify themes and categories.

Coding

Coding involved looking for common themes. Text passages were identified and labels were applied to them to indicate that they are examples of some thematic idea. The data was explored for common themes and were coded for analysis in the following categories:

- Policy existence and development
  - Existence and content of a national policy
  - Process for the development of policy
- State of implementation of policies
  - Existence of provincial policies
  - Availability of updated provincial EMS SOP's
  - Content of EMS SOP's -Gaps between current SOP and desired SOP based on international best practice
  - Implementation of S OP' s

- State of education and training on communicable diseases and infection control

  - Existence of education and training standards
  - From managers perspective, to explore the adequacy and time allocated to infection control training
  - The status of in-service training for EMS employees

3.10. Assuring the credibility and quality of the study

3.10.1. Quality of data sources

Several procedures were utilized in order to collect appropriate, high quality data.

a) For the documentary evidence, the primary source of information was from official records.

b) Purposive sampling of participants for key informant interviews- The key informants were knowledgeable of the key issues facing ECP.

3.10.2. Systematic collection and management of data

After identifying the potential sources of data, the researcher implemented systematic data collection activities. Several specific activities assisted in maintaining quality control during data collection:

a) Recording and transcription of interviews- this ensured access to dependable data

b) Collection of detailed descriptive data of the context

c) Data management controls- a database of the interviews was created - allowing systematic access.

3.10.3. Analysis of data and development of findings

The following techniques were utilized to ensure the credibility and quality of the study:

a) Triangulation: the results from two different methods of data collection (interviews and observation) were compared to look for patterns of convergence to develop or corroborate an overall interpretation.

b) Documenting methods and methodological choices: At the outset of the study, the researcher prepared a systematic design to guide the study. Throughout the study the investigator documented data collection and analysis activities, clearly indicating the source of data, collection methods, data management and analysis. This documentation is the basis for an audit trail for an external review.

3.10.4. Assessing the credibility of the findings and conclusions

Respondent validation: The investigator's account of the interviews was compared with those of the research subjects to establish the level of correspondence between the two sets. The study participants' reactions to the analysis were then incorporated into the study findings. The preliminary results were presented to the National EMS Coordinating committee and their responses were incorporated into the study.

3.11. Ethical Approval

An official letter of permission for undertaking the study was received from the NDOH, and circulated to all nine provincial DOH's. (Appendix 4) This was followed by a request to each Provincial senior EMS manager for consent to be interviewed and to provide data pertaining to the study. The study was approved by the Research and Bio-ethics Committee of the University of Kwa-Zulu Natal. (Appendix 5)

3.12. Summary

Table 2 summarizes the methodology of the study in terms of the objectives, respondents, data collection methods, issues explored and the data analysis techniques.

Table 2: Summary of the methodology of the study

Objectives	**Respondent**	**Data collection methods**	**Issues explored**	**Analysis Techniques**
Review of the existing national and provincial policies and legislative measures	National EMS manager and Provincial EMS managers	Document retrieval Key informant interviews	Existence of a national policy Content of existing policy Process for the development of policy and obstacles in policy development	Document analysis against international best practices Thematic analysis
State of implementation of policies and SOP's	9 Provincial EMS managers	Document retrieval Key informant interviews	Existence of provincial policies Availability of updated provincial EMS SOP's Content of EMS SOP's	Document analysis against international best practices Thematic analysis
State of Education and training	National and 9 Provincial EMS managers	Document retrieval Key informant interviews	Existence of education and training standards To explore the adequacy and time allocated to infection control training The status of in-service training	Document analysis Thematic analysis

Chapter 4: Results

The findings are presented in terms of the key objectives namely; Review of National and Provincial EMS Policy documents, Standard Operating Procedures and State of implementation of standard operating procedures, and the education and training of of ECP on communicable diseases and infection control.

The National Director of EMS and the 9 provincial senior EMS managers participated actively during the interviews. Although, the proposed structure and questions that were asked during the interviews were forwarded timeously to the managers, together with a request for the relevant policy documents, only the national EMS manager and three provincial managers were able to provide complete answers to the questions posed and provide the relevant documentation.

4.1. Review of National and Provincial EMS Policy documents

Although there is a general communicable diseases and infection control policy for the prevention of transmission of infections in the healthcare setting, there is no specific national policy on communicable diseases and infection control for the Emergency Medical Services sector in the pre hospital environment in the public health sector in South Africa. A draft national policy document was circulated for comment in 2003, but no further actions to implement this as a national policy was taken. Kwa-Zulu Natal, Gauteng and Eastern Cape were the only provinces to have circulated a document on Infection Control for Emergency Medical Services. The Eastern Cape document had been adopted from the previous Western Cape Metro Services and has not been updated for the past 13 years. However a review of these documents revealed that they were SOP's rather than formal policy statements.

The current generic national policy has been developed by a task team under the auspices of the Communicable Diseases directorate of the NDOH, comprising academics and is based on the international guidelines of the Centre for Disease Control in the USA. However, lack of adequate resources- financial, human resources and equipment are the major obstacle to the implementation of the policy across all provinces.

Policy development involves a process of agenda setting, decision making and implementation. Over the past 5 years, the restructuring and revitalizing of the EMS infrastructure were key items on the agenda and therefore the development of EMS specific policies was neglected.

4.2. Standard Operating Procedures

An analysis of the availability, content and implementation of SOP's at the nine provincial EMS departments revealed the following features:

Only 3 Provinces, namely Kwa-Zulu Natal, Gauteng and Eastern Cape have documented EMS specific standard operating procedures for communicable diseases and infection control. However, only the SOP in Gauteng has revised and updated in 2003. The SOP in Kwa-Zulu Natal had been updated in 1999.

The SOP's in KwaZulu Natal, Gauteng and Eastern Cape detail the exposure risks that EMS face with respect to communicable diseases, and describe disease specific precautionary measures to be adopted. These are based on international guidelines. All other provinces utilize the generic infection control SOP's for healthcare settings issued as circulars by the Provincial health departments.

4.3. Implementation of SOP's across the nine provinces

4.3.1. Standard Precautionary Measures

The provision of Standard precautionary measures was uneven across all provinces. (Table 3) Standard personal protective equipment such as disposable latex gloves, face masks and eye protectors are provided by six provinces. Northern Cape Province is still to acquire eye protectors for its personnel. Free State and Mpumulunga only provide disposable latex gloves, although the managers in Mpumulunga indicated that the eye protectors were on order.

Pocket masks with one-way valves are important to prevent the spread of communicable diseases when ECP's perform Cardio-Pulmonary Resuscitation. None of the provinces provide this protective equipment to their employees. Lack of these pocket masks with one-way valves could result in hesitancy or refusal on the part of ECP's to perform resuscitation in emergencies requiring life saving respiratory assistance.

Fluid-resistant gowns are designed to protect clothing and skin from contact with splashes of pathogen-laden blood or body fluids. The majority of provinces provide a standard uniform to employees, with Kwa-Zulu Natal, Gauteng and Western Cape Province providing personnel with an additional jacket which serves to prevent contamination from splashes blood or body fluids.

Table 3: Distribution of the availability of PPE across the nine provinces

PPE	EC[1]	FS[2]	GP[3]	KZN[4]	LIMP[5]	MP[6]	NW[7]	NC[8]	*WC*[9]	*No.*	*%*
Disposable Gloves		^	•	^	^	•	•/	*V*	*V*	•/	9	100%
Face mask	*/	x	^	</	*S*	x	•	•	•	7	78%
Eye-protectors	•	x	V	•	•	x	•	x	•	6	67%
Pocket mask with one way valve	x	x	x	x	x		x	x	x	x	O	O

/= Present x= Absent 1. EC= Eastern Cape 2. FS= Free State 3. GP= Gauteng 4. KZN= Kwa-Zulu Natal 5. Limp= Limpopo 6. MP= Mpumulunga 7. NW= North West 8. NC= Northern Cape 9. WC= Western Cape

4.3.2. Pre Response Preparedness

EMS personnel are allocated to a specific vehicle per shift according to a roster. Emergency calls are received at a control centre and vehicles are dispatched accordingly. Emergency vehicles are often re-dispatched from receiving hospitals or re-routed from an initial response to provide emergency service to another patient who may harbour a communicable disease. Therefore it is essential that prior to commencing a particular shift, EMS personnel should prepare their vehicles for all types of emergencies that they might be dispatched to during their shift. This preparedness involves ensuring that all equipment is clean and functional, as well as ensuring

adequate supplies of laundry, personal protective equipment, disinfectant, sharps containers and disposable bags for discarding of bio-hazardous waste and soiled linen. Although, all senior managers indicated that this should be the standard practice of EMS employees, none of the provinces had SOPs to this effect. There were no specifically designed check lists and data sheets to verify that EMS employees are engaged in pre response preparedness.

4.3.3. Post Response Decontamination Procedures

Clearly marked bio-hazard sharps containers were available in all ambulances except in the Northern Cape and in Mpumulanga. Northern Cape provides a very basic level EMS service with no intravenous fluids or medications being administered by EMS personnel and therefore has not yet provided sharps containers. Mpumulanaga is in the process of equipping all ambulances with sharps containers. All the provincial EMS's have interdepartmental arrangements with the hospitals for the disposal and replacement of the sharp containers. Disposable linen bags are provided in all ambulances across all the provinces for the storage of soiled linen. These bags are disposed of at designated hospitals where the linen is laundered. Most EMS services work on the principle of one clean sheet for every soiled sheet.

Although the number of ambulances available was a constraint to decontamination after each case, simple measures were available for cleaning and decontamination of vehicles in the Eastern Cape, Kwa-Zulu Natal, Gauteng, North West and Western Cape provinces. Detailed circulars describing the various modes, frequency and indications for cleaning and decontamination of ambulances were available in these provinces. (Table 4)

Table 4: Distribution of the_Availability of sharps containers, leak proof linen bags and policy for decontamination of ambulances

	EC[1]	FS[2]	GP[3]	KZN[4]	LIMP[5]	MP[6]	NW[7]	NC[8]	*WC*[9]	*No.*	*%*
Sharps Containers	•	•	•	•	•	V/x	•	x	V	7	*78%*
Linen Bags	/	•	•	•	•	•	•	•	•	p	*100%*
Decontamination of ambulances	/	x	*S*	*S*	x	x	*S*	x	•/	5	55%

/= Present x- Absent 1. EC= Eastern Cape 2. FS= Free State 3. GP= Gauteng 4. KZN= Kwa-Zulu Natal 5. Limp= Limpopo 6. MP= Mpumulunga 7. NW= North West 8. NC= Northern Cape 9. WC= Western Cape

4.3.4. Post exposure protocols

4.3.4.1. Exposure to blood and body fluids

Emergency Medical Services have adopted and contextualized the National Guidelines for the Management of Occupational Exposures to Blood and Body Fluids that have been issued by the NDOH. Detailed circulars have been issued to each district and stations regarding the steps to be followed on accidental exposure to blood and body fluids. Interdepartmental agreements have been concluded with various hospitals to provide post exposure counselling and prophylaxis. Part of the Eastern Cape (Port Elizabeth and Uitenhage District) has engaged the services of a private institution to provide post exposure counselling and prophylaxis to their EMS employees.

4.3.4.2. Hospital-diagnosed Communicable Diseases

Communicable diseases as varied as meningitis, tuberculosis, and hepatitis are diagnosed at hospitals amongst patients transported by EMS. However, there were no guidelines in all provinces to provide for the notification of EMS practitioners of a communicable disease being diagnosed on a patient transported by them. According to the EMS managers the responsibility for this notification rests with the infection control practitioners at the various hospitals to inform EMS station managers of such cases, and in coordination with the station manager, arrange prophylaxis for the involved personnel. However, many institutions do not have designated infection control practitioners.

4.3.5. Surveillance and Protection of ECP

Table 5 provides a summary of employment medical examinations and health maintenance in the public health EMS sector across all nine provinces in 2005.

Table 5: Employment Medical Examinations and Health Maintenance in EMS

	E.C[1]	F.S[2]	GP[3]	KZN[4]	Limp[5]	M.P[6]	N.W[7]	N.C[8]	W.C[9]
Entrance employment medical examination	x	x	^	x	x		x	x	x	x
Immunization (Hepatitis B)	x	*S*	*S*	*S*	*S*	*S*	•/	•*	•/
Chest X Ray		x	x	x	x	x	x	x	x	x
Wellness clinics		x	x	x	x		x	x	x	x
Annual medicals		x	x	x	x					

/= Present x= Absent 1. EC= Eastern Cape 2. FS= Free State 3. GP= Gauteng 4. KZN= Kwa-Zulu Natal 5. Limp= Limpopo 6. MP= Mpumulunga 7. NW= North West 8. NC= Northern Cape 9. WC= Western Cape

Gauteng is the only province that performs entrance employment medical examination of EMS employees. This conforms to contractual conditions of employment for local authorities. The other provinces rely on the integrity of the EMS practitioner when completing the health questionnaire in the initial application forms, to provide accurate medical information.

Although most provinces indicated that Hep B immunization is performed on emergency care practitioners according to the generic infection control policy for healthcare workers, the implementation of the policy in the EMS setting is inconsistent. This is due to the fact that the onus is on the new emergency care practitioners to request the vaccination rather than being informed of the requirement. However, there has been a shift in many provinces towards routine counselling and immunization with disincentives for those who fail to be immunized.

According to EMS managers, anecdotal evidence shows that Influenza accounts for a significant morbidity and absenteeism rate of EMS personnel during the winter months. Although most senior managers indicated the availability of an influenza vaccine within hospitals, there were no directives issued to EMS employees that required them to undergo the immunization or informing them of the availability and benefits of the influenza vaccine.

There were no SOPs regarding Booster doses of Tetanus and no employment Chest Radiographs are performed despite the burden of tuberculosis in South Africa.

There were no employee wellness clinics for EMS employees and EMS employees have to attend public or private health institutions for primary health care or regular occupational health services. No annual medical examinations are performed for EMS employees.

4.3.6. Incident monitoring

There are no routine indicators of illness in the workforce monitored by senior EMS managers and reported to National EMS and/or Provincial Public Health, or systems that have been developed within the EMS sector for monitoring employee health, compliance to SOPs, adverse events, and reporting to EMS managers. Although the reporting of needle stick injuries is mandatory in terms of the Compensation of Occupational Injuries and Diseases Act, senior managers do not have accurate statistics on the exposure of personnel within their province to blood or body fluids as well as the number of employees that have received antiretroviral prophylaxis for the year 2003/2004.

Despite the huge burden of communicable diseases in South Africa and the transport of these patients to hospitals by ambulances, no annual physical examinations, chest x rays or sputum examinations performed on EMS employees. Employee absenteeism rates are not monitored. Therefore, despite the high prevalence of communicable diseases in South Africa and the close contact of infectious patients with EMS personnel during their care and transport to hospitals, no early warning mechanisms for the early detection of outbreaks and epidemics within the EMS services.

Exit interviews for employees leaving the service are not mandatory. Therefore, no data is available to discover and track the rate of attrition from illness, including communicable diseases, unless they are medically boarded. This prevents the establishment of baselines and trends in EMS workforce morbidity and mortality.

4.4. Education and Training of ECP's on Infection Control

Despite the standardization of national training and protocols for EMS personnel by the Professional Board for Emergency Care Personnel, very little content and time in the curriculum is devoted to communicable diseases education and infection control training. According to the senior EMS managers and EMS College principal's only 1 week of the 12 month curriculum of basic course is dedicated to training on the epidemiology of communicable diseases. Therefore, it is essential that continuous in service training is provided to EMS personnel. However, there are no national guidelines pertaining to in service training for EMS personnel, and specifically to communicable diseases and infection control. The content of the in service training specifically to communicable diseases and infection control varies across the different provinces. (Table 6)

Table 6: Distribution of and Content of In Service Training Programmes at Provincial level

	EC[1]	FS[2]	GP[3]	KZN[4]	LIMP[5]	MP[6]	NW[7]	NC[8]	*WC*[9]	*No.*	*%*
Orientation	x	x	x	^	x	x	x	x	x	7	*11%*
Updates	•	•	•	•	x	x	•	x	/	*6*	*67%*
Refresher	x	x	^	*^	x	x	x	x	x	2	*22%*
Circulars	V	•/	*S*	•/	x	•	•	•	•	8	*89%*

•=Present x=Absent 1 EC= Eastern Cape 2. FS= Free State 3.GP=Gauteng 4. KZN= Kwa-Zulu Natal 5. Limp= Limpopo 6. MP= Mpumulunga 7. NW= North West 8. NC= Northern Cape 9. WC= Western Cape

Kwa-Zulu-Natal is the only province that has an intensive programme that focuses on initial orientation training, followed by regular updates and annual refresher courses. Circulars are issued if any special circumstances arise that require immediate province-wide notification and intervention. District Training Coordinators were in the process of being employed in Kwa Zulu Natal during 2004 to conduct in-service training. However other provinces are yet to establish a formal in service training programme or appoint district trainers.

4.5. Summary

Currently, there is no communicable diseases and infection control policy specific to EMS in the pre-hospital environment in the public health sector in South Africa. This policy needs to be translated into practice at a provincial, district and local station level through formalized SOP's.

There are inconsistencies in the development, operationaUzation and monitoring of SOPs for communicable diseases and infection control for EMS personnel. Only three provinces namely, Gauteng, Kwa-Zulu Natal and Eastern Cape address all the above requirements in a formalized protocol document. Despite the formalized protocol documents in these provinces none of the provinces adhere completely to all the requirements of an infection control SOP.

All provinces faired reasonably well in two areas of the SOP:

a) Provision of personal protective equipment like face mask, eye protectors and disposable gloves were available in all provinces except for Free State and Mpumulunga that only provided disposable gloves and the Northern Cape where no eye protectors were available.

b) Post-Exposure Protocols- all provinces utilized the national protocol for management of occupational exposure to HIV.

Chapter 5: Discussion

The key findings are discussed from a systems perspective, focusing on the input which is the policy, the process that focuses on standard operating procedures, education and training of ECP's on communicable diseases and infection control. The limitations of the study are discussed at the concluding sections of this chapter.

This study is the first national review of communicable diseases and infection control policy for EMS in the pre hospital environment. This study has shown that although there are various legislations and regulations within the generic form, that address the issues of communicable diseases and infection control in the healthcare setting there are none that directly address the high risk EMS and the pre-hospital environment. This review has shown that there are marked variations in the development, operationalization and monitoring of SOPs for communicable diseases and infection control for EMS personnel across the 9 provinces, with little time dedicated to communicable diseases and infection control training during the basic EMP course. The organization and management of EMS is not uniform across all 9 provinces, and therefore presents a challenge to proper management and planning.

5.1. Policy Development

In 1994, health care in SA was "highly fragmented, biased towards curative care and the private sector, inefficient and inequitable."[46] The newly elected democratic government faced the tremendous challenge of transforming a highly inequitable and fragmented health care system. Several key legislations were enacted and policies formulated for transforming the health sector to achieve a universal right of access to equitable health care for all sectors of the population in South Africa. During the first decade of democracy much emphasis was placed on the development of generic policies at a national and provincial level. However, very few if any of these policies have been translated into sector specific policies.

Communicable diseases remain a major cause of illness and death in South Africa. HIV/AIDS, tuberculosis, malaria, hepatitis B, measles and diarrhoeal illnesses are endemic in South Africa. With the increase in travel and tourism and globalization of world markets, there is an increased risk of importing new and virulent strains of other organisms. The recent outbreaks of Severe Acute Respiratory Syndrome (SARS) in China, Marburg Virus in Angola, and the Avian Influenza are a few examples of new emerging diseases that can be imported into South Africa.

The changing epidemiology of disease, widening scope of practice of health care providers and increased occupational risks associated with provision of health care as well as the requirements of the National Health Act and OHSA, compel the National

EMS Directorate to establish and provide policies and guidelines, designed to prevent or minimize occupational exposure of EMP's to blood borne and body fluid pathogens, airborne pathogens, or other potentially infectious materials.

The key role players in the formulation of health policy are the National Department of Health. EMS is a core provincial competency and therefore requires the active participation of provincial EMS departments. However, until 1997 and currently in many districts in Gauteng EMS are still under the control of local authorities and EMS personnel are employed under different employment contracts. Some of these local authorities exert powerful leverage and have been resisting the efforts to be brought under the control of the Province. As a result of the restructuring and tension between provinces and local authorities, EMS specific policies have not being developed. The current decentralization of services to the district as well as service level agreements with local authorities provides EMS the opportunity to gain the buy-in of all role players.

The current models for infectious disease control are disease specific and vertical. The decisions relate to the development of control methods using the biomedical model. Infectious diseases are understood to be acquired by *individuals* (thus a focus on treatment and cure) but are also viewed as diseases which are communicable to others in *& population* (thus a parallel emphasis on prevention).

The current perspective focuses on short-term outcomes, and is viewed as 'health sector interventions' only, other social and policy sectors are not necessarily deemed relevant to the control of infectious disease.

A broad concept of 'infectious disease policy' will assist in developing ways of addressing the 'creation of healthy employees' and not simply the treatment and prevention of infectious disease. With the emergence or recrudescence of diseases like AIDS and MDR-TB public health policy can no longer afford to ignore the importance of wider socioeconomic and structural change in providing the basis for a betterment of health. [47]

5.2. Standard Operating Procedures

SOPs help to integrate departmental operations, linking the work of managers and planners with the activities of other workers. SOPs provide a direct link between the tasks assigned to individual department members and the laws, regulations, standards, and policies that control EMS operations.

The important components of an infection control SOP are

a. basic measures for infection control, i.e. standard and additional precautions;
b. education and training of health care workers;
c. protection of health care workers, e.g. immunization;
d. identification of hazards and minimizing risks;
e. routine practices essential to infection control such as aseptic techniques, use of single use devices, reprocessing of instruments and equipment, antibiotic usage, management of blood/body fluid exposure, handling and use of blood and blood products;
f. effective work practices and procedures, such as environmental management practices including management of clinical waste, support services (e.g., food, linen),
g. use of therapeutic devices;
h. surveillance;
i. incident monitoring;
j. infection control in specific situations; and research

Although, the EMS specific SOP's of KwaZulu Natal, Gauteng and Eastern Cape as well as the generic SOP's of the other six provinces, address the major components of an infection control SOP as listed above, there are significant shortcomings in the SOP's with respect to the identification of hazards, minimizing risks and effective work practices and procedures, such as environmental management practices.

Well-written standard operating procedures (SOPs) provide direction, improve communication, reduce training time, and improve work consistency. Standard operating procedures used in combination with planned training and regular performance feedback lead to an effective and motivated workforce.

5.2. Education and training

Infection control training and education of staff is the cornerstone of an effective, facility wide program for the prevention and control of occupationally acquired infections. Knowledge and understanding of microbiology underpins infection control patient care practices of paramedics, as with all health care workers. Recognition of the early signs of infection informs timely provisional identification of the type of infectious disease, its aetiological cause and the type of precautions needed to prevent transmission to others. Studies conducted in the U.S.A. and Australia demonstrated that paramedic knowledge of infectious disease aetiology and modes of transmission was poor. Therefore, it is essential that a considerable period of time during formal education is dedicated to communicable diseases and infection control. There are no individual standards that apply specifically to infection control education and training for EMS employees in South Africa.

The goals of infection control training are to:

- Assure that health professionals understand how blood borne and other pathogens can be transmitted in the work environment: patient to healthcare worker, healthcare worker to patient, and patient to patient.
- Apply current scientifically accepted infection control principles as appropriate for the specific work environment.
- Minimize opportunity for transmission of pathogens to patients and healthcare workers.
- Familiarize professionals with the law requiring this training and the professional misconduct charges that may result from failure to comply with the law.[49]

On going in service training and education are critical in enhancing EMS personnel compliance knowledge of communicable diseases and infection control policies and adherence to SOP's. Only KZN and Gauteng have a program for on going training and education of EMS personnel.

When infection control programs were less complex and there were fewer requirements for education and training, department managers and individual staff members per se

could provide all the infection control training for all staff as well as keeping records of attendance. As training and education needs have become more complex there is a requirement for dedicated infection control practitioners to perform this duty. However, none of the provinces have infection control practitioners for EMS. Kwa-Zulu Natal is in the process of employing district trainers who as part of their functions will perform infection control training.

5.3. Limitations of the study

While the present study is the first of its kind in South Africa and provides important baseline data, there are a number of limitations.

- Selection Bias-The key informants for the study were senior managers in EMS. However, the operations within EMS are controlled by District managers.
- Recall Bias- A numbers of senior managers were newly appointed, limiting the quality of information that was obtained.
- Information Bias- Information was not easily available with respect to exposures and absenteeism and despite the promises of senior managers to forward them to the investigator, none were forthcoming.

5.4. Summary

The discussion in this chapter highlight the changing context, the position of the various actors, the content of the policy and the process involved in developing a policy. Education and training is the cornerstone of a successful implementation of the policy and the standards for infection control training is presented in this chapter. The chapter concludes with the limitation of the study.

Chapter 6: Conclusion and Recommendations

This chapter concludes the report with an overall summary of the key findings of the study. Recommendations for the way forward are discussed in terms of policy development, education and training, organizational development and further research to be performed.

6.1. Conclusions

The risk of exposure to communicable diseases for EMP's is high, particularly given the unique environments in which they are required to work. Despite the high risk environment in which EMP work, and the legislative imperatives of the National Health Act 61 of 2003 and the OHSA, this study found that although there are various legislations and regulations within the generic form, which address the issues of communicable diseases and infection control in the healthcare setting there are none that directly address EMS and the pre hospital environment. Furthermore, there are marked variations in the development, implementation and monitoring of SOPs for communicable diseases and infection control for EMS personnel across the 9 provinces, with little time dedicated to communicable diseases and infection control education during the basic EMP course as well as during in service training. This warrants a review of infection control practices and education programs in the pre-hospital environment. EMS need to address specific and ever-increasing challenges in infection control, by establishing evidence-based practices that add value to patient care.

The first decade of democracy in South Africa has seen the rapid development of policies that were of a generic nature. Simultaneously, the health services have been restructured from a hospital centred approach to a district based primary health care approach. In this period of rapid transition, EMS was neglected.

The rapidly changing epidemiological disease profile and the need to reinforce the generic policies with sector specific policies have provided the context for EMS to introduce the communicable diseases and infection control policy for protection of ECP's in the pre-hospital environment.

6.2. Recommendations

In order to address the gaps identified, and to lay a sound policy and programmatic foundation the following recommendations are proposed. The recommendations address the following key areas:

- Policy Development,
- Surveillance and incident monitoring
- Education and In service training,
- Further research to improve infection control practices in the EMS sector.

6.2.1. Policy Development

In order to comply with the requirements of the National Health Act and OHSA, the National EMS Directorate needs to establish and provide policies and guidelines, designed to prevent or minimize occupational exposure of EMP's to blood borne and body fluid pathogens, airborne pathogens, or other potentially infectious materials.

The infection control policy must:

- set relevant national objectives consistent with other national health care objectives;
- develop and continually update guidelines for recommended health care surveillance, prevention, and practice;
- develop a national system to monitor selected infections and assess the effectiveness of interventions;
- harmonize initial and continuing training programme for EMS personnel;
- facilitate access to materials and products essential for hygiene and safety; and
- Encourage health care establishments to monitor health-care associated infections and to provide feedback to the professional's concerned.[50]

A specific recommendation modified from Manitoba Health in Canada and the State of Alaska Health Services Department [51] that is suggested for a Communicable Disease and Infection Control Policy for EMS in South Africa is attached as Appendix 6.

6.2.2. Surveillance and Incident Monitoring

Surveillance and Incident monitoring

The District and station EMS manager should conduct;

- Inspections of station facilities
- Observation of on-scene activities
- Analysis of reported exposures to communicable diseases
- A semi-annual quality and compliance report.

The following are but critical examples of performance and health status indicators that need to be analyzed over pre-determined periods of time. Each would have a target set in advance and measurement of performance would be against that benchmark. The baseline data could be used to judge the extent of the improvement.

- Hep B Immunization uptake rate (% of all personnel)
- Absenteeism rate per shift (% of all personnel on a specified shift)
- Needle stick injury incidence (per predetermined time period)

Policy Evaluation

The Infection Control Policy will be required to be evaluated at least annually by the EMS Manager to ensure that the policy is both appropriate and effective.

In addition, the Infection Control Policy will be evaluated as needed to reflect any significant changes in assigned tasks or procedures; in medical knowledge related to infection control; or in regulatory matters.

The Chief Medical Officer for EMS will actively participate in program evaluations to ensure that the program remains state of the art.

6.2.3. Formal Education and training

The widespread and expanding extent of the current HIV and AIDS epidemic and its related infections in South Africa, coupled with the findings from the present study compel recommendation of the following requirements:

An infection control module standardized across all provinces should be designed and then designated for inclusion in the curriculum of all EMS training institutions.

An initial infection control training prior to assignment of tasks where occupational exposure to blood, body fluid, and aerosolized products of coughing may occur. A refresher course should take place at least annually and continuous training and reinforcement regarding Infection Control procedures within the districts and stations.

Periodic circulars providing notification of and updates on outbreaks and the corresponding protective measures to be implemented should be widely circulated to all emergency medical service employees when the need arises.

The first possible opportunity to initiate and influence protective work practices in prospective EMS personnel occurs during the initial formal education process. An infection control module standardized across all provinces should be designed and then designated for inclusion in the curriculum of all EMS training institutions.

The design of such a module should be based upon imparting knowledge of endemic contagious disease symptoms and signs. Sequentially, the endemic syndromes encompassing different combinations of these symptoms and signs should be taught, to include HIV/AIDS, TB, Hep B, Anthrax, Marburg, Ebola, Polio, and Malaria. Then, matching the syndromes with the type of precautions that are indicated (respiratory vs. contact vs. body fluid vs. combinations thereof) can complete the link of diagnosis with appropriate protection.

Training should address practical situations that workers face, including both common and unusual circumstances. Training should involve students in addressing mock, practical scenarios of infectious disease patient care and exposure, motivating them to continually monitor and evaluate their practices.

Training must comply with the South African Qualification Authority standards and OSHA Regulation and should include the following:

• A general explanation of the epidemiology of blood-, body fluid-, and air-borne diseases. The symptoms and physical examination signs of these diseases

• An explanation of the modes of transmission and portals of entry of blood-, body fluid-, and air-borne pathogens

• An explanation of the department exposure control plan and how the employee can obtain a copy.

• An explanation of the normal duty tasks that place employees at risk of exposure to blood, body fluids, and respiratory secretions

• Information on the types, proper use, location, removal, handling, decontamination, and disposal of personal protective equipment and medical equipment

• An explanation of the basis for selection of personal protective equipment;

• Information on the hepatitis B vaccine, including information on its efficacy, safety, and the benefits of being vaccinated, notification that the vaccine and vaccination will be provided at no charge.

• Information on the taking appropriate actions and contacting appropriate service personnel following a hazardous exposure to blood or other potentially infectious materials

• An explanation of the procedure to follow if an exposure incident occurs, including the method of reporting the incident and the medical follow-up that will be made available.

• Information on the post-exposure evaluation and follow-up that the department is required to provide following an exposure incident.

• An explanation of the signs and labels and/or colour-coding required for biohazard materials; information on the proper storage and disposal of biohazard materials.

• An opportunity for interactive questions and answers.

Infection control trainers must be knowledgeable in all the program elements listed above, particularly as they relate to emergency services provided by the department.

A companion programme needs to be developed for call centre operators to train them to ask augmented, standardized questions during infectious disease outbreaks, in an effort to identify potential patients with communicable diseases. This serves to forewarn EMS practitioners en route to emergency scenes where contamination is a possibility.

6.2.3.1. <u>In service education and training</u>

A province-specific in-service training programme should ensure that new workers receive initial training on modes of infectious disease transmission and their prevention prior to beginning patient care. This should include education about the risk of exposure to infectious materials and diseases in their province-specific work environment; and the signs and symptoms of the infectious diseases with which they are likely to come into contact. They should receive training on how to take appropriate preventive measures and execute emergency procedures safely, including the appropriate maintenance of engineering controls and use of personal protective equipment. All of this training should be consistent with respective province-specific prevention and protection protocols, guidelines for which are discussed previously.

Written records of all training sessions should be maintained for three years after the date on which the training occurs.

Training records should include:

- The dates of the training sessions,
- The contents of the training sessions
- The names and qualifications of persons conducting the training
- The names of session attendees
- The proportion of staff trained in each area of training provided.

6.2.2.2. Monitoring of the outputs of the training programme

The Infection Control trainers should conduct on site spot checks on a quarterly basis to monitor compliance with infection control policies.

Key performance indicators should be developed to determine the performance of EMS personnel post training. These indicators should be collected monthly and compared with each other.

6.3. Research

Prior to designing and implementing any new programme it is recommended that the following additional research be performed to guide the future strategic route to be adopted;

a) A survey of all directors of training institutions to generate information on the present status of communicable disease education and prevention training (models of best practices) as well as content that they recommend for inclusion.

b) A survey of the knowledge and practices of EMS personnel with respect to communicable diseases and infection control.

c) In depth research on the design and accreditation of a Communicable Diseases and Infection Control Policy module for EMS personnel.

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8. Appendices

8.1. Appendix 1: Schedule of Appointments

Table 7: Schedule of Appointments

Date	**Province**	***Person Met***
08/03/2005	Free State	*MrNWSithole*
09/03/2005	Northern cape	*Mr F Mohamed*
16/03/2005	Limpopo Province	*Mr B Kerupershad*
22/03/2005	Gauteng	*Dr V Wessels*
31/03/2005	Kwazulu Natal	*Mr T.Dludla*
05/04/2005	Eastern Cape	*Mr HBruiners*
06/04/2005	Western Cape	*Dr C Robertson*
07/04/2005	National	*Mr P.Fuhri*
12/04/2005	Mpumulanga	*DrKHugo*
13/04/2005	*North West*	*Mr B Redlinghys*

8.2. Appendix 2: Interview of the National EMS Director

A-1 Does the National Department of Health have a formal policy document and regulations regarding prevention of contagious disease transmission in EMS work?

A-2 If so, how are these regulations transmitted to the provincial EMS services?

A-3 Has the National Department of Health initiated any formalized follow-up program with provincial EMS service directors concerning the establishment, updating, and compliance monitoring of these regulations?

A-4 Does the National Department of Health have regulations addressing the management of EMS occupational exposure to blood and body fluids that may carry HIV?

A-5 If so, how is awareness of these regulations disseminated throughout EMS systems in the country?

A-6 If so, has the National Department of Health organized post-exposure prophylaxis and follow-up of EMS workers occupationally exposed to blood and body fluids?

A-7 Would the National Department of Health is willing to endorse an educational program of transmissible disease prevention if the results of **Surveys II and III** demonstrated a need for such?

A-8 what is the process by which new material is introduced into the EMS training curriculum in South Africa?

A-9 Does the National Department of Health have any current recommendations as to the content of such a training course?

8.3. Appendix 3: Interview of the Provincial Directors

1) Are you aware of any National Department of Health policy or regulations regarding prevention of contagious disease transmission in EMS work?
2) If so when did you become aware of such a document or policy?
3) What percentage of these regulations have you implemented?
4) Which are the regulations you have implemented?
5) How long ago have you implemented them?
6) What external (outside the EMS service) constraints have you experienced in attempting to institute the NDOH regulations and guidelines?
7) What internal challenges have you experienced in attempting to institute the NDOH regulations and guidelines?
8) Does your provincial EMS service provide in-service lectures, teaching active-duty personnel protection from contagious disease transmission?
9) How often are these lectures given?

10) Does your provincial EMS service provide personal protective equipment to protect active-duty personnel from contagious disease transmission?
11) Does your provincial EMS service provide training in the use of protective equipment to protect active-duty personnel from contagious disease transmission?
12) How often is this training provided?
13) Does your EMRS have a formal policy on occupational exposure to bloods or body fluids?
14) What measures does your provincial EMS service take when an EMS caregiver reports an occupational exposure to blood or body fluids?
15) How many EMS practitioners were employed in your provincial EMS service in the 2004?____
16) What is the percentage of absenteeism per shift?
17) How many cases of occupational exposure to blood or body fluids were reported in 2004?
18) How many employees received post exposure prophylaxis?
19) How many employees developed TB in the past year?
20) How many days were lost due to contagious diseases like Influenza? (Obtained from sick notes record)?
21) How much does it cost to replace an employee at EMRS?
22) How many employees have left the service or died to ill health in the past year?
23) How many practitioners in your provincial EMS service during the last 6 months 2004 have received formal lectures or training in precautions against contagious disease transmission?
24) Are you willing to implement such a training module as part of in service training of employees?
25) What are your requirements for such a programme?

8.4. Appendix 4: Authorization from Department of Health

DEPARTMENT Of HEALTH
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• Wifil! !UfVfc0riealth. gov.:
Telef6on/Tel«phoiM» : {012} 312 0676 Verw/Reference;

To Wham It May Concern:

EMERGENCY MEDICAL SERVICES - THE MANAGEMENT OF PATIENTS VWTH CC MUNICAfltE DISEASES

The presenter of this tetter, Or Gzyi r Mahomed: School of Family and Public Health - university of KwaZulu-Watal, has been appointed by this Department to develop a policy on the management of itpmta wtih communicable diseases in th* pre-hospital environment,

The various facets of the project «t delude She following;

* To determine the extent to which senior management of EMS are aware of the extent to wWert personnel Ml aware of; trained and practice universal precautionary measures to guarf against communicable disease transmission;
* To assess the existing policies generated for the protection of EMS personnel from communicable diseases;
* To review the measures taken am! foSow-up surveiJeoce conducted by EMS service manafler* to ensure that their personnel ere protected torn communicable diseases;
* To assist in the development of a training module to address the p p a In currant knowledge; and
* To make (%comni«nd atoms ferths d^vetoprflent of standard operating procedures which are relevant to South Africa

The product of this project will be a shared resource of both the national and provincial department* of Health and *vM* enaWe a stend*rt to be- created In the management of patents wift communicable (BMMMM.

Kindly afford Dr Mahomed the necessary cooperation and assistance in realizing the project

Should you hay® any enquiries with regards to this matter please do not hesitate to cortact Mr P Fuhrl on 383 454 6S73,

{"hanking yew in advance for your assistance.

Kind regards

DIRECTOR I^IERAL: HEALTH

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8.5. Appendix 5.1: Ethics Approval from UKZN

UNIVERSITY OF
KWAZUIU-NATAL

11 May 200*

DrOHl
Community Health
Nelson R Mandaia Schoot of Madame

Dear Or Mahomed

PROTOCOL ; gpideinfologteaJ study of the Interaction between Bmergancy Medical Reset* Services and Communicable M M M N . O H Mahomed, Community Health.
Ret: MfMN

A twfc-Ccnntiiee of trit Resea-r* Ethui. ^umri'Jtsy ..i-b ;e*~d the abOYementioned application and the protocol was approved on 31 January 2005 pending appropriate responses to quarts -aseo^-iauprcva r.y the P— ^**r: "atari Commits** These conditions ha«s no* beer ties the stud/ * i v* » .,; *<.al arid may begin ws at today's date: 11 May 2088.

This approve!!« valid ior oris year from 31 January 2005, To ensure continuous approval, an appi-catton for ntc«d ReMl • HK rid be si * . , *

May I take this opportunity to wish you everything of the best with your study. Please send 9* Biomedical Research Ethics CorranNtttt a copy of your report once completed

Yours sincerely

\B^
m^mOTo
Char . Biomedical Research Ethics Committee

sC: P*ofesso[r] C C J^abhai Ccmmunity Health
Mr S Sifeoto, Postgradyate Edtteaton Gaum tM

8.5.1. Appendix 5.2: Letter of Approval from Post Graduate Education Committee

UNIVERSITY Of
KWAZULU-NATAL

9 May 2005

Or O H Mahomed
Community Heattft
fcWaon R MafKteis School of Medicine

Dear Dr Mahorntd

PROTOCOL ; Epidemiological study of the interaction between Emergency Medical Rescue Services and Communicabie Disease*. O H Mahomed, Community HeeMfc, Set.: H021/0S

The Postgraduate Educate! O ran se ocmsictefed ttwbovwmniwied application and made varisw* reeomm«ff«tetons These recorrwrtendaSans fc«ve been i protocol Is upproved tor your MMed degree,

Say I take this opportunity to wish you every success wih yotif study.

Yewrs sincerely

iy

PROFESSOR M ADHiKARI
Chair i Pos^jraKJuate Educate* Committee

ex. Professor C C Jinatshai, ComiWi«%
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College of Health Sciences, Nelson 8 Mandela School of Medicine
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8.6. Appendix 6: National Training Standards for Infectious Diseases for EMS.

CONTENTS -

Definitions, recognition, stgas and symptoms, spread masagesem sod special preeauti«<» :
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8.7. Appendix 7: Suggested Communicable Diseases and Infection Control Policy for EMS in the pre-hospital environment in South Africa.

Preamble

The Infection Control Program is applicable to all members, career, and volunteer, providing rescue or emergency medical services. It is effective immediately.

Policy Statement

Communicable disease exposure is an occupational health hazard. Communicable disease transmission is possible during any aspect of emergency response, including in-station operations. The health and welfare of each member is a joint concern of the member, the officers, and this EMS service. While each member is ultimately responsible for his or her own health, the department recognizes a responsibility to provide as safe a workplace as possible. The goal of this policy is to provide all members with protection from occupationally acquired communicable disease.

It is the policy of this department:

• To provide emergency medical services to the public without regard to known or suspected diagnoses of communicable disease in any patient.

• To regard all patient contacts as potentially infectious. Standard precautions will be observed at all times and will be expanded to include all body fluids and other potentially

• To provide all members with the necessary training, immunizations, and personal protective equipment (PPE) needed for protection from communicable diseases.

• To recognize the need for work restrictions based on infection control concerns.

• To prohibit discrimination of any member for health reasons, including infection and/or seroconversion with HIV/HBV virus.

• To regard all medical information as strictly confidential. No member's health information will be released without the written consent of the member.

Purpose: To provide a comprehensive infection control system that maximizes protection against communicable diseases for all EMP's, and for the public that they serve.

Responsibilities of role players in the EMS pre hospital environment

Responsibilities of the Employing Agency

Occupational Health and Safety Regulations requires all employers to take all "practical" steps to prevent harmful worker exposure to all infectious organisms. This includes:

- employee notification and exposure follow-up
- employee education
- employee vaccination
- safer work practices
- ensuring that medical waste, chemicals, soiled laundry and laboratory samples are handled according to accepted standards and government regulations
- a system for infectious waste collection that minimizes the risk of exposure to their workers as well as to the waste transportation and disposal workers

Responsibilities of the Infection Control Officer (or other designated individual)

Each district should designate an Infection Control Officer to support and enforce compliance with the Infection Control Guidelines. This individual (or designate) will be responsible for:

- ensuring the Infection Control Guidelines are instituted
- ensuring adequate personal protective equipment (PPE) that meets all current requirements for each base and responding vehicle

- coordinating communication between the EMS personnel, and appropriate medical support regarding exposure to an infectious disease that represents a risk to the provider
- conducting spot checks of on scene and base operations to ensure compliance with the Infection Control Program
- coordinating the immunization program

Responsibilities of Individual EMS Personnel

Each EMS personnel will assume responsibility for his/her health by:

- maintaining up to date immunizations
- using personal protective equipment (PPE) as mandated by the employing agency
- reporting any suspected exposure to a blood borne pathogen or other infectious disease to the Infection Control Officer
- reporting any communicable diseases which pose a risk for transmission (occupational or non occupational) to the Infection Control Officer (or designate)
- following all other aspects of the Infection Control Program

Responsibilities of Referring Health Care Facilities

When carrying out an inter facility transfer, it is the responsibility of the referring health care facility to inform the EMS personnel, as well as the receiving facility, of the presence or possible presence of a communicable disease, in so far as it relates to the medical care being provided or is deemed to be a serious and immediate threat, and the measures that are required to prevent the spread of the disease.

Exposure control plan

PURPOSE: To identify those tasks and corresponding job classifications for which it can be reasonably anticipated that an exposure to blood, other body fluids, aerosolized products of coughing, or other potentially infectious materials may occur, to establish a

schedule for implementation of the department's infection control plan, and to identify the procedure for evaluating exposure incidents.

Exposure determination

The following job classifications are reasonably anticipated to involve exposure to blood, body fluids, or other potentially infectious substances in the performance of their duties:

- Provisions of emergency medical care to injured or ill patients
- Rescue of victims from hostile environments, including burning structures or vehicles, contaminated bodies of water, or oxygen deficient atmospheres
- Extrication of persons from vehicles, machinery, or collapsed excavations or structures
- Training, as in CPR, First aid, etc.
- Recovery and/or removal of bodies from any situation cited above
- Job classifications with high probability of contact with infectious substances:
- All EMS Responders Vehicle Operators
- Rescue Personnel

Job classifications with low to moderate probability of contact with infectious substances:

- Student Interns/Observers Administrator
- Clerical Staff

Standard Operatin£ Procedures

SOPs identify specific procedural guidelines for all aspects of response and station environments where disease transmission can be reasonably anticipated, as well as training, administrative aspects of the program, and post-exposure evaluation.

Health Maintenance Policy

a) Employment Medical Examinations and Vaccinations

EMS personnel shall not be assigned to emergency response duties until an entrance physical assessment has been performed by a physician and the person has been certified as fit for duty.

All EMS personnel should be evaluated for their susceptibility to Rubella (German Measles) and Varicella Zoster (Chickenpox), and Hepatitis B and EMS personnel will be offered Hepatitis B vaccination (unless known to be immune) after an explanation of the risks and benefits of this vaccine. EMS personnel who decline Hepatitis B vaccination will be required to sign a "Declination of Hepatitis B Vaccination Form". Providers who initially refuse vaccination may receive this vaccination on request at a later date.

EMS personnel will be advised to maintain an up-to-date immunization status and offered Tetanus, Hepatitis B and Influenza vaccinations if required.

Work restrictions may be required by a physician when the provider is at risk of contacting or exposing others to an infectious disease (ie. infection of exposed skin such as impetigo). Any provider returning to work after a communicable disease (occupational or non-occupational) must be cleared for fitness to work by a physician,

Public Health Nurse or Infection Control Officer prior to resuming emergency response duties.

The following information will be documented on the employee provider's record by the Infection Control Officer:

- immunization screening records
- circumstances of exposure to communicable diseases
- management of exposures

Communication between physicians and management of employing agencies will focus on the fitness to work (with recommended restrictions if indicated) rather than upon specific medical information, including diagnosis.

Tuberculosis Screening

The most effective method for screening for tuberculosis is by skin testing with a purified, non-infectious extract from the tuberculosis bacterium known as the "Mantoux Test."

Tuberculin skin testing should be carried out prior to employment, on an annual basis (recommended), and after any high risk exposure (eg. close unprotected contact - mandatory). Tuberculin skin testing (1-step) will be done immediately after exposure and repeated at 2-3 months. If the area of induration is 10 mm or greater the individual is classified as "Tuberculin Reactor".

This indicates that the individual has been previously infected with tuberculosis although it is impossible to know when this occurred (may have been years previous). Therefore, a positive reaction does not distinguish between active, inactive or previously treated disease. A recent BCG immunization may also cause this type of reaction

Active infection is suggested in those who have had an initial skin test • less than 5 mm and within two years changes to 10 mm or greater of induration or less than 5 mm which increases to greater than 14 mm within two months of contact with a case of infectious tuberculosis. If the area of induration is between 5 mm and 10 mm the test is considered "indefinite". The skin test will be repeated in one week at a different site on the forearm with the result that the area of induration is now greater than 10 mm. This is known as the booster effect and occurs because the body's immune system does not recognize the initial skin test but is "reawakened" by the repeat test one week later. If the area of induration is less than 5 mm the individual is considered a "non-reactor" This usually indicates that there has been no previous infection with tuberculosis.

Skin testing is recommended for providers with a previous skin test less than 10 mm who have breathed the same air for four hours as a patient with infectious tuberculosis (i.e. inside an ambulance). In these cases skin testing is not useful until at least three months after the exposure has occurred. Nevertheless, a test shortly after the exposure is useful to determine the provider's baseline status.

Chest x-rays will be done

- if the skin test is positive after 48 hours
- if the skin test is positive after 2-3 months
- as recommended by the physician
- chest x-ray, sputum examination and sputum cultures may be indicated in providers who have experienced a cough or sputum production lasting longer than one month regardless of the results of skin testing

Recommended frequency of skin testing for EMS personnel is as follows:

- annually for non reactors
- within 30 days of employment if there is no previous record of skin testing or if the skin test
- measured less than 10 mm on a previous occasion
- reactors do not require any further skin testing but require follow up with a physician
- three months after exposure to a patient with active tuberculosis

Base Environment and Infection Control

Each EMS station shall have designated separate areas for

- Equipment decontamination and disinfection.
- Storage of clean patient care equipment and personal protective equipment (PPE) used for infection control purposes
- Storage of biomedical waste (e.g. sharps)

Decontamination areas will be marked with biohazard signs and should be properly equipped. Biological waste storage areas will be marked with biohazard signs that conform and are maintained according to government regulations.

Contaminated sharps will be stored in closed puncture resistant containers (sharps boxes) with appropriate bio-hazardous markings. Other contaminated materials will be stored in leak proof bags and disposed of with regular garbage. If outside contamination of a storage or disposal bag is visible, a second bag with identical markings will be placed over the first. (Note: This is the only circumstance where double bagging is required)

Reusable bins and containers used to store biological waste will be inspected, cleaned and disinfected weekly (if in use) with recommended disinfecting solutions. If the bin or container is contaminated on its outside, it should be disinfected immediately

All biohazard waste will be disposed of in accordance with provincial and local regulations and will be performed by an approved licensed contractor designated by the service or by agreement with a local health care facility.

Infection Control Supplies for Emergency Vehicles

The following must be kept in each ambulance vehicle

- disposable gloves of various sizes (patient care)
- utility gloves (for cleaning)
- alcohol-based hand scrub (minimum 60% alcohol)
- disposable face masks of the following types:
- tight-fitting facial seal masks for protection against airborne pathogens (N95)
- surgical or procedure masks for droplet protection
- goggles and face shields
- pocket masks with one way valves
- fluid resistant gowns (i.e. OR gowns)
- sharps containers
- waterproof bags for waste (i.e. linen and other contaminated material)
- bags for normal waste
- disinfectant solutions
- fluid spill clean up kits

Routine Practices and Additional Precautions

Emergency response often is unpredictable and uncontrollable. Routine practices should be used for all patients regardless of their condition. Therefore all body fluids are considered infectious.

PPE is chosen to provide barrier protection against all body fluids. Each district is responsible for the supply, repair, replacement and safe disposal of PPE. The Infection Control Officer or designate, will determine proper stock supply levels of PPE both for bases and for response vehicles and will ensure the base stock of PPE is adequate.

The available PPE will include disposable gloves, utility gloves for disinfection purposes, face masks, eye protectors, fluid impervious gowns, sharps containers, leak proof disposal bags. Full face shields are optional

Routine Practices

Hand Hygiene (Hand Washing)

Hands must be washed immediately before contact with a patient, after any direct contact with a patient.

Plain soap and water may be used for routine hand washing. Alcohol-based hand scrub (waterless hand washes) may be used as a substitute for soap and water. Where there is visible soiling, hands should be washed with soap and water prior to using waterless hand wash. Where soap and water are unavailable, cleanse hands first with water and wipe clean with a towel prior to using waterless hand wash, then wash with soap and water when they are available (e.g. at the receiving hospital)

Fingernails should be kept short to facilitate hygiene. Artificial nails, gel nails and nail extenders can harbour micro organisms, and should not be worn while on duty

Fluid resistant gowns are designed to protect clothing from splashes such as during emergency childbirth or vigorous bleeding (disposable gowns are useful for this purpose)

A Gown, apron or coveralls should be used when cleaning contaminated equipment or the interior of an emergency response vehicle

Scene Operations

The. blood, body fluids, and tissues of all patients should be considered potentially infectious and Routine Practices must be used for all patient contact. On arrival at the scene, the situation should be quickly assessed to see what PPE is required based on the situation (i.e. presence of blood, other body fluids or a possible infectious disease)

An infectious disease should always be suspected if one of the following is present

- fever
- rash
- weeping skin lesions
- cough
- diarrhoea
- jaundice

The number of personnel coming into contact with patients where the possibility of contact with an infectious disease, blood or other body fluids is present should be kept to a minimum.

. While complete control of the emergency scene is not possible, scene operations should attempt to limit splashing, spraying or aerosolisation of body fluids as much as possible.

Sharps Containers

Needles should not be recapped as the most common occupational blood exposure occurs when needles are recapped. Used needles and other sharps should be disposed of in puncture proof sharps containers. Needles should not be recapped, resheathed, bent, broken, or separated from disposable syringes.

Sharps containers must be easily accessible on scene (carry in jump box, etc., as well as in the vehicle).

All used sharps should be accounted for and needles or other sharps should not be forced into a sharps container - if force is required the sharps should be placed into a different container

CPR Equipment

Disposable resuscitation equipment should be used whenever possible for CPR, the order of preference is:

- disposable bag valve mask
- disposable pocket mask with one way valve

All personnel must have access to pocket masks with one way valves to eliminate the need for mouth to mouth resuscitation and must be kept readily available during on scene operations. If mouth to mouth resuscitation is performed for any reason, it should be reported to your supervisor as an Incident Report (or similar)

Personnel should use the same precautions to protect themselves when handling a dead body as they would use if the patient were still alive.

At conclusion of on scene operations, all potentially contaminated patient care equipment should be removed and placed in leak -proof bags for appropriate disposal or decontamination and reuse.

Post-Response Infection Control

Upon return to base, contaminated equipment must be removed and placed in an appropriate container.

Disposable equipment and other waste generated during on scene operation must be stored in the disposal area in appropriate leak proof containers

Sharps containers, when three quarters full, must be closed and placed in the bio-hazardous disposal area

Bio-hazardous waste should be bagged appropriately and disposed of according to local regulations. Gloves and gown (or apron) should be worn for all contact with contaminated equipment or materials. Other PPE will be used depending on splash or spill potential. Heavy-duty utility gloves may be used for cleaning, disinfection or decontamination of equipment.

Disinfection must be performed with a commercially available chemical germicide. Any damaged equipment must be cleaned and disinfected before being sent out for repair

The manufacturer's guidelines must be used for the cleaning and decontamination of all equipment unless otherwise specified.

- durable equipment (backboards, splints,) must be washed with hot soapy water, rinsed with clean water and disinfected with an approved disinfectant and must be allowed to air dry
- delicate equipment (radios, cardiac monitors, etc.) must be wiped with disinfectant and allowed to air dry

Contaminated boots and shoes must be scrubbed with a hot solution of soapy water, rinsed with clean water, and allowed to air dry.

Contaminated work clothes G^{um}P suits, t-shirts, uniform pants) must be removed and exchanged for clean clothes. Personnel must shower if body fluids were in contact with skin under work clothes.

Contaminated work clothes should be laundered at the base using hot water and if this is not possible, an agreement should be made with another facility to do this laundry.

Liquid waste containers containing urine, oral secretions, etc. should be emptied by carefully pouring into a utility toilet preferably done at the receiving health care facility and if containers are reusable, place them with other equipment to be disinfected; otherwise dispose of them as contaminated waste

All soiled wet linen and clothing must be contained in leak proof bags. And laundry staff sorting soiled linen must wear protective gloves and waterproof gowns.

There is a vast array of commercially available disinfectants available, and it is recommended that EMS utilize the same disinfectants as a local health care facility

There should be a designated person trained to do cleaning and decontamination and this person should be trained to use appropriate protective barriers, including water repellent aprons or gowns, gloves, masks and goggles, glasses or a face shield, and in the safe cleaning and handling of supplies and equipment. If there is no designated person to do cleaning and decontamination, all workers must be trained in these duties

Employees should understand that protective barriers do not guard against all accidents or protect from careless handling of equipment.

Cleaning up Spills of Blood, Body Fluids, or other Infectious Materials

EMS personnel are often required to clean up potentially infectious materials and therefore should ensure they are adequately protected to perform this task.

They should wear gloves and a gown if clothing contamination is likely. If the spill contains broken glass or other objects, these should be removed and discarded without contact with the hands using rigid sheets of cardboard as a "pusher" and "receiver" to handle such objects and should be discarded with the objects into an appropriate bio-hazard container

Since most disinfectants are less active, or even ineffective, in the presence of blood, spilled liquid should be absorbed with disposable absorbent material (i.e. paper towels, gauze pads, or tissue paper wipes). If the spill is large, granular absorbent beads or gels can be used. After absorption of the liquid, all contaminated materials should be discarded in the waste container. The disinfected spill site should be disinfected using a commercial disinfectant or liquid household bleach. All disposable materials used to decontaminate the spill should be placed into a suitable disposal container.

Cleaning an Ambulance or Emergency Response Vehicle

EMS personnel must ensure that their response vehicle is suitably cleaned in preparation for an emergency response. The vehicle must be cleaned after each call if possible or the vehicle must be cleaned on a regular basis, regardless of whether or not a response was undertaken. The schedule for routine vehicle cleaning must be at a minimum of once every two weeks if a call was not done during that period.

Appropriate PPE should be used when cleaning a response vehicle. All equipment should be removed from the vehicle storage locations prior to cleaning. As part of the routine cleaning, all visible contaminants on surfaces should be removed by scrubbing with soap and hot water. After pre cleaning with soap and water, the vehicle should be wiped or sprayed with a disinfectant solution followed by air drying.

All the equipment used in cleaning the vehicle (i.e. cloths, brushes, mops, etc.) should be placed into a fresh decontamination solution and allowed to soak for 30 minutes or laundered. They should then be removed and rinsed with water and allowed to air dry.

All soapy water as liquid waste should be disposed off after use by carefully pouring into a utility toilet or appropriate drain.

Each district must have a written policy on the following:

- location of designated areas and a cleaning schedule for each base
- who will be doing the cleaning
- what method will be used (i.e. types of tools and disinfectants) - Table 7
- disposal of sharps containers
- infectious waste (for disposal)
- infectious instruments (for disinfection)
- infectious linens (for disinfection)
- location of MSDS

Post-Exposure Protocol

The routine post-exposure protocol relates to the transmission of blood-borne infection agents (e.g. HIV, Hepatitis B, and C).

Immediate post-exposure management includes administration of the appropriate first aid, removing blood contaminated clothes if blood has soaked through the fabric and cleaning the affected area with soap and water or with an antiseptic solution. If the exposure was percutaneous (e.g. needle stick injury, cut, and scratch) rinse and wash with water and soap or with an antiseptic solution. There is no evidence supporting the practice of forcing the wound to bleed. Following a mucosal exposure, the exposed area should be thoroughly rinsed with water and the exposed area should be washed with soap or with an antiseptic solution.

Personnel having an occupational exposure should immediately report the exposure to his or her supervisor. Needle stick injuries should be reported to the infection control officer as soon as possible. In all situations, the current version of the Post -Exposure Protocol for blood borne pathogens developed by the National Department of Health should be followed. Personnel should fill out an Exposure Report Form for any of the following significant exposures; needle stick injury, break in skin caused by a potentially contaminated object, splash of blood or other potentially infectious material onto or into eyes, mucous membranes, or non intact skin, mouth to mouth resuscitation without a one way valve pocket mask.

A significant exposure includes significant exposure to the following body fluids; blood, cerebrospinal fluid (CSF), synovial fluid, pleural fluid, pericardial fluid, amniotic fluid, peritoneal fluid, semen or vaginal secretions, or any body fluid that contains visible blood. If a significant exposure to a significant body fluid has occurred, the employee should verbally notify the supervisor immediately. The supervisor will assess the situation to verify if a significant exposure occurred. The supervisor will advise the worker involved what steps to take. If a significant exposure occurred, medical evaluation will be done by a physician at a Hospital's Emergency Department. The report will include details of the task being performed, the means of transmission, the

portal of entry, and the type of PPE in use at the time, and other information as requested in the Exposure Report Form. The supervisor will review the communicable disease exposure report and forward it to the Infection Control Officer or other individual designated to manage occupational health. The Infection Control Officer (or designate) will evaluate the report for exposure hazards and will complete the communicable disease exposure report and initiate the appropriate follow-up for the exposure, based on guidelines established by the Department of Health.

The Infection Control Officer (or designate) will refer personnel for infection control retraining or for stress management counselling if indicated. Spousal counselling should also be available.

The source patient should be traced to the receiving medical facility (if possible). A request can be made of the source patient (either by staff at the receiving medical facility or occupational/staff health, depending on regional policy) so that the presence of an infectious disease is known or testing carried out and returned as quickly as possible.

The source patient has the right to refuse testing (including HIV testing) under present regulations. The provider's occupational health agency or personal physician will provide appropriate diagnostic work up if a communicable disease exposure has occurred. Services should include long term follow up, and personnel and spousal counselling. Hospital facilities should notify the Chief Medical Officer of EMS (or designate) of any patient transported by EMS personnel with a diagnosis of a transmissible disease (e.g. tuberculosis, Neisseria meningitidis)

When so notified, the Chief Medical Officer of EMS (or designate) should contact the Infection Control Officer for the transporting service who will then contact the providers involved and if necessary, arrange for post exposure prophylaxis.

Surveillance and monitoring

The District and station EMS manager should conduct;

- Inspections of station facilities
- Observation of on-scene activities
- Analysis of reported exposures to communicable diseases
- A semi-annual quality and compliance report.

The following are but critical examples of performance and health status indicators that need to be analyzed over pre-determined periods of time. Each would have a target set in advance and measurement of performance would be against that benchmark. The baseline data could be used to judge the extent of the improvement.

- Hep B Immunization uptake rate (% of all personnel)
- Absenteeism rate per shift (% of all personnel on a specified shift)
- Needle stick injury incidence (per predetermined time period)

Policy Evaluation

The Infection Control Policy will be evaluated at least annually by the EMS Manager to ensure that the policy is both appropriate and effective.

In addition, the Infection Control Policy will be evaluated as needed to reflect any significant changes in assigned tasks or procedures; in medical knowledge related to infection control; or in regulatory matters.

The Chief Medical Officer for EMS will actively participate in program evaluations to ensure that the program remains state of the art.