

**KLEBSIELLA OUTBREAK AT
MAHATMA GANDHI HOSPITAL**

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DECLARATION

I, Kumarasen Thumbiran, declare that:

(i) The research reported in this case study, except where otherwise indicated, is my original research.

(ii) This case study has not been submitted for any degree or examination at any other university.

(iii) This case study does not contain other persons' data, pictures, graphs or other information, unless specifically acknowledged as being sourced from other persons.

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Signature:

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DEDICATION

I dedicate this case study to my sons Yougasen and Yashodan. I hope this case study inspires them to make a difference.

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Abstract

Staff shortages and lack of space at Prince Mshiyeni Hospital in Umlazi, south of Durban, was blamed for an outbreak of Klebsiella that has claimed the lives of five babies. Contaminated intravenous equipment and poor infection control measures were found to be the source of an outbreak of Klebsiella Pneumoniae, which killed twenty-one babies in another KwaZulu-Natal hospital. "Several flaws were identified" with infection control methods, according to the report that was released and compiled by medical microbiologist Professor Willem Sturm of the Nelson R Mandela School of Medicine in Durban. Initial investigations at the Mahatma Gandhi Memorial Hospital north of Durban, found Klebsiella Pneumoniae on the hands of 10% of staff. Interviews revealed that the nursery was usually overcrowded, under-equipped and under-staffed, which worked against adherence to infection control. Early in the investigation at this hospital, a link was found to the babies' intravenous treatment and after other possibilities were ruled out, medication information for seventeen of the babies showed that they had received regular intravenous injections. The spread was attributed to multiple-use of units of the medication to save costs, inadequate hand washing practices and inappropriate hand wash facilities. Recommendations included sealing off the nursery with strict hygiene controls and abandoning the practice of multiple uses of units of intravenous preparations. "Such preparations should be used only once. Multiple-use for one patient should also not be done" Furthermore, long sleeves on gowns, white coats and uniforms, or personal wear should be forbidden, and rings and watches should not be worn on hands and wrists as these interfere with hand washing. Such recommendations, though pertinent, do not disguise the seriousness of this situation in our hospitals.

1. INTRODUCTION

The danger infectious diseases pose is increasingly growing on a worldwide scale. This is mainly due to dramatic changes in human behaviour, broader social, economic and technological developments, and mutations in pathogens. In South Africa, however, this emergent threat to the health care system has not been accorded the consideration it deserves.

The devastating effect worldwide outbreaks such as SARS, Marburg hemorrhagic fever and Klebsiella Pneumoniae have in neo-natal units in terms of morbidity and mortality, and the accompanying financial burden placed on individuals, families, and society at large, cannot be under-estimated. The outbreaks of Klebsiella Pneumoniae nationally in South Africa, have served as a reminder of the need for urgent action to ensure efficient management of infectious diseases.

The three hundred and fifty bed Mahatma Gandhi Memorial Hospital in Phoenix, north of Durban, opened its doors for the first time in 1997. It has a large maternity section, where about 10% of newborns every year in South Africa are born. Despite being modern and sophisticated by the standards of many South African public hospitals, Mahatma Gandhi has gained notoriety recently for the deaths of newborn infants, from causes that should be easily preventable, and for attempting to cover up these deaths (Rosenthal, 2008: 87). The picture on the next page shows the setup of the nursery at Mahatma Gandhi Memorial Hospital. It can be seen how close patients are to one another and this can lead to cross infection.



Madide in Daily News (2006: 12)

Over May and June 2005, twenty-two babies died from Klebsiella infection. It emerged that more than a month before these deaths, the hospital approached the provincial health department to raise concerns about potential outbreaks of infection. Shortly after these deaths were exposed in the media, a report was leaked showing that more than forty babies had also died from hospital-acquired infections, including Klebsiella, in 2003. However, many of the parents were not informed of the reason for their babies' deaths. Some were told that the deaths had been from natural causes when the blood reports showed Klebsiella infection. The source of the leaked report stated that "The deaths of these babies were covered up to such an extent that only a few people were aware of the tragedy taking place in our hospital". The picture on the next page clearly shows the paediatric section where patients are examined. There is limited space to work in for the medical staff.



Paediatric section of Mahatma Gandhi Hospital (Daily News, 2006: 1)

The Health Minister's response to the public exposure was to conduct a quick investigation and release a report which attributed the outbreak to poor hand washing, an overcrowded, under-staffed and under-equipped neo-natal unit and the sharing of incubators, cribs and monitoring equipment. There was also a lack of basic hygiene facilities including washing basins, and furthermore, dead bodies were stored in the same place in which equipment was disinfected. However, the report concluded that no one individual or section of the hospital was to blame. Over the past three years, there have been numerous complaints about poor conditions and under-staffing at the hospital. For example:

- In February 2000, the provincial health MEC visited the hospital on a fact-finding mission following a spate of allegations of negligence and inhumane behaviour by staff members towards patients. One particular example concerned a woman who lost her baby at the hospital after being told by nurses that she would have to abort the baby, and was refused admission to the maternity ward.

- In September 2004, the story of Nomphumelelo Mfeka was reported on in the media. The patient was in the hospital for nearly two months waiting for surgery to remove a bullet lodged in her thigh. She had repeatedly been told she could not be operated on because the hospital did not have orthopaedic anaesthetists.
- In May 2005, the Health MEC paid another sudden visit to the hospital because she had been “inundated with negative allegations from the media”. Patients had complained about waiting for hours and that nurses were rude and abrupt. It was reported that the maternity section had only ten delivery beds, but saw 11 000 babies delivered a year – an average of thirty a day. According to a local non-profit service group, Voice, the hospital serves about 1,3 million people, but is equipped to function as a clinic rather than a hospital.

Healthcare-associated infections make up an important public health problem in developing countries. In many hospitals, infection control procedures are inadequate through the lack of financial resources, poor infrastructure, overcrowding, poor hygiene, deficient laboratory services, poor management, insufficient technology and a shortage of trained staff. The most effective solution entails greater governmental commitment and application of infection control procedures consistent with available resources (Pittet, 2007: 45).

Infectious diseases are a global concern and the second most common cause of death. Of the 12 million deaths that occur globally, 95% occur in developing countries, where disease prevention and control policies are non-existent, inadequately adapted or under-funded by governments. Healthcare-associated infections (HCAIs) make up an important health problem throughout the world and pose a major threat to patient safety. HCAIs impact on the population in numerous ways. HCAIs affect patients directly, causing increased morbidity and mortality, may lead to disability and ultimately reduce the quality of life. HCAIs

also impact on the healthcare system by extending hospitalisation of affected patients and increasing the costs of diagnosis and treatment. HCAs may be transmitted from the healthcare environment into the community and could damage the reputation of healthcare institutions (Hanson, 2008: 65).

For governments of developing countries, limited resources are the main challenge to implement infection control procedures. Throughout the last few decades, infection control programmes in developing countries have increased particularly in Africa. Public pressure to improve the quality of hospital care and the increased cost resulting from HCAs in healthcare systems, have played important roles in this development.

A high frequency of HCAs in a healthcare facility is an indicator of the poor quality of healthcare services. While advanced research is being conducted in this country, training in handling infectious diseases is almost non-existent and there are few infectious-disease specialists. According to the South African Health Professionals Council, infectious-disease specialists are not registered as a separate category. Also, there is no database on the number of hospital infections and the majority is not classified as notifiable. Infection is a worldwide problem and infants are particularly at risk. Neo-natal infection is the sixth leading cause of deaths amongst infants and babies. Infection contributes to South Africa's high infant mortality rate, which stands at 60 in 1000 or 6% compared with 5,6 in 1000 in Britain. According to Lynch *et al* (2007: 108), this indicates that it is "Already a serious problem in the US and the UK, but it is likely to get worse in this country".

In developing countries, the majority of funding is traditionally allocated to hospitals in urban centres which often have academic affiliations. In some hospitals, adequate supplies to help control infections of normally sterile body sites, mucous membranes and non-intact skin are not available. Overcrowding and understaffing particularly in the Intensive Care Units (ICU), results in decreased hand hygiene compliance. Furthermore, frequent movement of

patients and staff between hospital wards results in an increased risk of transmission of multidrug-resistant micro-organisms.

According to research by the Burden of Disease Unit of the Medical Research Council (MRC), neo-natal infection caused 3000 deaths in 2000. According to Statistics South Africa, the number of people who died from certain infectious diseases and parasitic diseases increased by almost 70 000 deaths from 39 939 to 107 305, between 1997 and 2003 (Morris, 2008: 23).

Such transmission is often exacerbated by overcrowding, with patients sometimes sharing beds and supplies. There may be a lack of commitment to healthcare by policy-makers in the developing world and allocation of funds is often disproportionate to the priorities set by providers. Corruption and non-formal payments are frequent and information systems are not fully developed. There are limited grants available for research, and no legislation mandating accreditation of hospitals or infection control programmes.

2. KLEBSIELLA OUTBREAK AT KING EDWARD VIII HOSPITAL

On 10th March 2006, King Edward VIII Hospital management received notification of Klebsiella Infection in four adult patients and instituted urgent immediate interim measures to control the infection and not the outbreak. These measures included temporary closure of the ICU and intensive infection control measures such as barrier nursing. According to the ICU section, Dr. Gopalan advised that all four affected patients were isolated but were critically ill from their original ailments. To date, two patients have already completed the Klebsiella treatment while the rest were completing the treatment subsequently, reported Dr. Gopalan.

Professor Willem Sturm of the Mandela School of Medicine confirmed that there was no Klebsiella outbreak at the hospital. Professor Sturm conscientised the public of the fact that every human being has Klebsiella but it only becomes

deadly if one is sick and the immune system is down. In this regard, there was no need for panic because Prof Sturm emphasised that the four patients had different Klebsiella, ruling out the possibility of an outbreak.

On 30 November 2007, Leon Mbanjwa (Health spokesperson KZN) reported that five babies died from the deadly bacteria at the Prince Mshiyeni Memorial Hospital in Durban's Umlazi area. Details on the deaths at the 922-bed hospital were not immediately available. Mbanjwa said an investigation into the possible outbreak of Klebsiella was ordered on 21 November (Journal of Postgraduate Medical Education, 2007: 82).



One of the survivors in the deadly Klebsiella outbreaks (Sowetan, 2006: 4)

As noted, in 2005, a Klebsiella outbreak at Durban's Mahatma Gandhi Memorial Hospital claimed the lives of 22 newborn babies. The picture above is of one of the survivors of the Klebsiella outbreak. A subsequent investigation revealed that the outbreak was linked to a failure of infection control measures. A previous report by Professor Willem Sturm, who led the task team to investigate the 2005

outbreak, attributed it to insufficient hand-washing by Neo-natal Intensive Care Unit staff. The contamination was caused by the multiple use of intravenous bottles to administer Vamin-Glucose (Reiner, 2008: 42). A more detailed discussion on the Mahatma Gandhi outbreak follows.

MAHATMA GANDHI HOSPITAL INVESTIGATION

The tragedy that unfolded at this hospital turned the focus onto Infection Control at public hospitals. Steps had to be evaluated and new measures put in place to make sure there will not be a repeat.

Detection of outbreaks

The following sources of reporting outbreaks were noted:

- Surveillance data;
- Medical Practitioner;
- Affected persons/groups;
- Concerned citizens; and
- Media.

Some key questions were raised and the following reasons were highlighted:

- Control and Prevention measures;
- Research Opportunities;
- Training;
- Public, Political or Legal concerns; and
- Program Considerations.

Some of the control and prevention measures are mentioned below:

- Are cases continuing to occur?
- Is the outbreak over?
- Why should one investigate outbreaks?

Training was considered an integral component for skills development through practice and experience, and should include the following:

- Diplomacy;
- Logical thinking;
- Problem-solving ability;
- Quantitative skills;
- Epidemiologic know-how; and
- Judgment.

Political will is critical to deal with incidents similar to what transpired at Mahatma Gandhi Hospital. There was a outcry from the public after this incidents and an investigation had to conducted to find out exactly what happened.

- Over-riding scientific concerns in the decision to conduct an investigation; and
- The imperative to be “responsibly responsive” even if the concern has little scientific basis.

Some program considerations have to be given due consideration, as highlighted below:

- Identify populations overlooked;
- Recognise intervention strategy failures, and
- Identify changes in the agent or events beyond the scope of the program.

After any incident there has to be an investigation to determine what transpired and how to prevent this from happening in the future. The process that was used in the Mahatma Gandhi Hospital investigation is highlighted hereafter.

Steps of an Outbreak Investigation

The following steps are needed to perform a full investigation:

- Step 1: Prepare for field work;
- Step 2: Establish the existence of an outbreak;
- Step 3: Verify the diagnosis;
- Step 4: Define and identify cases;
- Step 5: Perform descriptive epidemiology;
- Step 6: Develop hypotheses;
- Step 7: Evaluate hypotheses;
- Step 8: Execute additional studies;
- Step 9: Communicate findings; and
- Step 10: Follow up recommendations.

Each step in the process will be briefly outlined in the discussion that follows.

Steps of an Outbreak Investigation

Step 1: Preparing for Field Work

Preparation for field work is significant because it takes care of the logistics.

Investigation

- Scientific knowledge;
- Supplies; and
- Equipment.

Administration

- Administrative procedures e.g. travel documents, cash advances; and
- Personal matters.

Consultation

- Know expected role; and
- Local contact persons.

Step 2: Establishing the Existence of an Outbreak

- Compare the current number of cases with the number of cases from comparable period during the previous years;
- Surveillance records;
- Hospital records, registries, mortality statistics;
- Data from neighboring areas; and
- Community survey.

Step 3: Verify the diagnosis

- A set of standard criteria should be established for deciding who are the sick persons related to the outbreak (“case-patients”); and
- Narrow or broad diagnosis specified (confirm, probable, suspect).

Step 4: Define and Identify cases

- Tabulate and orient data: person, place, time;
- Frequencies;
- Mapping; and
- Epidemic Curve.

Step 5: Perform Descriptive Epidemiology

- Compare with known sources or similar outbreaks; and
- Design questionnaire.

Step 6: Develop hypotheses

- Perform epidemiologic study: cohort and case-control; and
- Compare risk factors among ill (cases) vs not ill (controls).

Step 7: Evaluate hypotheses

- Collect food, water, and/or environmental samples; and
- Determine what happened with the implicated source or food.

Step 8: Execute additional studies

- Primary public health reason;
- Prevent additional cases; and
- Prevent outbreaks in the future.

Step 9: Communicate findings through:

- Writing and disseminating full reports;
- Meetings and discussions;
- Local and mass media;
- Local government officials;
- Local health workers;
- Concerned authorities;
- Regional health authorities; and
- Department of Health.

Step 10: Follow up recommendations

- What activities have been undertaken;
- If health status has improved; and
- If health problems have been reduced.

As noted, this is a thorough process that it is essential to follow when conducting such an investigation.

3. FACTORS CONTRIBUTING TO THE OUTBREAK

Structural design was identified as one of the factors that contributed to the outbreak. The main entrance of the nursery is in close proximity to the obstetric wards. There is no wall that prevents easy flow of air and there is a need for an air-lock room with a hand wash basin. Ideally, the air-lock room ought to have an air pressure that is higher than the corridor but lower than the nursery to control

airflow and the possible movement of various species of bacteria (Jarvis, 2008: 32). The present kangaroo nursing area needs to be walled off from the obstetric wards and an air-lock room be built between the kangaroo nursing area and the nursery.

The four areas for different levels of care at the nursery should be partitioned and should have different levels of air pressure. There is also a need for extra and larger hand-wash basins for the nursery and isolation cubicles. These basins should be equipped with elbow operated taps and wall-mounted soap and paper-towel dispensers. Disinfection and sluice rooms also need to be established (Harbarth, 2007: 95).

4. WORK PROCESSES AND HUMAN BEHAVIOUR

Infection control measures have to be set to deal with several flaws identified with regard to behavioural aspect of infection prevention. Before these interventions were made, *Klebsiella Pneumoniae* was found on the hands of 10% of the staff. It is thus recommended that long-sleeved clothes *not* be worn. Wrist-watches and rings should not be allowed and hands should be washed up to elbow level.

There should also be continuous education and training on infection control. More authority should be delegated to an infection control officer to allow for appropriate intervention to be made immediately to prevent infection and deal effectively with identified cases (Fisher *et al*, 2007: 202). *Klebsiella Pneumoniae* was found in bottles of one of the intravenous preparations (Vamin-Glucose). This requires that extra precautionary measures be taken in preparing these solutions as contamination at the production level has not been ruled out. Multiple use of intravenous medication should be stopped.

5. STAFF AND STAFFING CONCERNS

Staff raised the following concerns:

- The lack of dedicated Infection prevention and control posts on staff establishments at all levels, from institutional to national level;
- The reported existence of institutions without a full-time, dedicated infection control officer. The infection prevention and control function in such cases was done on an ad-hoc basis. A registered nurse who performs infection control situations was cited as a reason for such arrangements;
- This casual approach to Infection Prevention and Control, associated with lack of clear job descriptions for ICP;
- Due to staff shortages, inadequate orientation and in-service training for nursing agency staff on infection control issues before they are allocated in the wards;
- High staff turnover as a contributory factor to the shortage of trained ICO;
- Staff shortages, resulting in closure of certain wards, including isolation units. This has led to the exposure of patients with contagious conditions to the rest of the patients in units not designed to contain such conditions; and
- An identified need to establish realistic infection control staffing norms that are relevant and viable for South Africa (Bermudes, 2008: 77).

6. ENVIRONMENTAL CLEANING

There is a clear lack of cleaning standards for the health care environment. Training of cleaners is largely neglected. In some facilities, the cleaning service is not properly managed, as cleaning supervisors are not trained. Poor collaboration and consultation between procurement divisions and infection control units in the procurement of cleaning chemicals, results in cleaning products and chemicals being purchased that are not properly understood and thus not appropriately used by the cleaners (Arab, 2008: 22).

Due to inefficient career paths, cleaning departments are often burdened with a largely aging staff component that is no longer optimally productive. Inefficient cleaning services turn health facilities into environments conducive for microbial growth and spread.

7. COMBAT STRATEGY

In order to break the chain of the incidence of all communicable diseases via air, droplets and contact by carrying out investigations as well as identifying the source of contamination, are viewed as significant processes. Taking preventive measures to control the spread of those diseases so as not to create any health problem to the public is noted as critical (Ambler, 2008: 90).

Specific objectives relating to the above strategy

If the following specific objectives can be carried out effectively, the chain of incidence can be broken:

- Reduce the endemic of communicable diseases to a minimum level;
- Reduce the frequency and duration of outbreak diseases; and
- Increase the awareness among the community regarding communicable diseases and preventive measures through health education.

Approaches to improvement

The following measures will ensure that there is an integrative approach to improve infection control:

- Strengthen the surveillance system;
- Create proper control and preventive measures;

- Identify the more effective integration in controlling communicable diseases in health care services;
- Identify and use the latest technology in controlling communicable diseases;
- Enforce the law with regard to communicable diseases;
- Develop a relationship between agency in controlling and preventing communicable diseases; and
- Involve the community directly in communicable disease control programs through effective health education (Sanders, 2007: 77).

Challenges

The public health sector faces many challenges. The number of citizens who use these facilities puts an enormous burden on the limited resources that are available. This impacts negatively on areas such as infection control. Some of the challenges are highlighted below:

- Lack of area specific infection control policies;
- Lack of infection control training programs for institutional personnel;
- Lack of condition-specific infection control policies;
- Lack of infection control manuals;
- Lack of outbreak investigation and outbreak management skills;
- Lack of hand washing facilities, isolation facilities, and waste management facilities;
- Lack of rational antibiotics use monitoring systems;
- Lack of effective surveillance system for nosocomial infections at institutional, regional, provincial and national level; and
- Non-involvement of Infection Control in procurement decisions.

Factors impacting on challenges

- A shift from the basics;
- Lack of national policy;

- No focused attention on Infection Control by professional councils.
- Brain drain;
- Staff shortage; and
- Unclear mandate at national, provincial and facility level.

8. GOVERNANCE

The national, provincial and local tiers of government and civil society at large have very specific roles to play and responsibilities to take on when preventing and managing infections. The roles of the different tiers are as follows:

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

8.1.1 The National Department of Health establishes a national Infection Prevention & Control directorate within the Cluster: Office of Standards Compliance; and

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

8.2 The Provincial Infection Prevention & Control Committee/Unit

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

8.3 The District Infection Prevention & Control Committee

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

8.3.2 The Committee meets at least quarterly or more frequently as the need arises.

Public sector medical staff operate within a legal framework. The different legislation that directly affects the staff is highlighted hereafter.

9. LEGAL AND REGULATORY OBLIGATIONS

- Section 7 of the Constitution, Act 108 of 1996, affords everyone a right to live in an environment that is not harmful to his/her health or well-being;
- The Occupational Health and Safety Act, No 85 of 1993 Section 8(1), that obliges an employer to provide as far as is reasonably practicable, a safe working environment; and
- Section 13, which imposes a duty on every employer to as far as is reasonably practicable, cause every employee to be made conversant with the hazards to his health and safety, attached to his work, and the precautionary measures to be taken with respect to those hazards.
- The Environmental Conservation Act (No 73 of 2000) in terms of which all wastes containing Hazardous Biological Agents that can cause exposure to disease can only be disposed of on sites specifically designed for this purpose.
- The Foodstuffs, Cosmetic and Disinfectants Act (No 54 of 1972), in terms of which the significant hazards in food should be identified and controlled to ensure that food will not cause harm, chemically, biologically or physically when prepared, used or eaten according to its intended use.

10. MILLENNIUM DEVELOPMENT GOALS (MDGs)

The case study of Mahatma Gandhi Hospital is a typical example of the failures of the Millennium Development Goals (MDGs) in South Africa.

Reaching the MDG on reducing child mortality will require universal coverage with key effective, affordable interventions. These include care for newborns and their mothers; infant and young child feeding; vaccines; prevention and case management of diarrhoea, pneumonia and sepsis malaria, and control, prevention and care of HIV/AIDS. In countries with high mortality, these interventions could reduce the number of deaths by more than half (Zaidi, 2007: 73).

To deliver these interventions, the World Health Organisation (WHO) promotes three main strategies:

- Integrated management of childhood illness;
- Expanded programme of immunisation; and
- Infant and young child feeding.

Attention to newborn health needs to be incorporated into each of these delivery strategies, complemented by interventions aimed at making pregnancy safer.

Some key recommendations follow that emanated of this case study.

11. RECOMMENDATIONS

The following recommendations are made for the Mahatma Gandhi Hospital, based on this case study:

- 11.1. Reconstruction of the nursery to allow for better infection prevention is essential.

- 11.2. Abandoning the practice of multiple use of units of IV preparations and intra-ocular medication throughout the hospital, is imperative. Such preparations should be used only once. Multiple-use for one patient should also not be done.
- 11.3. Long sleeves on gowns should be compulsory, with white coats and uniforms forbidden. Long sleeved personal gear should not be allowed, nor should watches, rings or other jewellery be worn on hands and wrists. These interfere with proper hand washing. In high care areas, hand washing needs to include the arms up till the elbow.
- 11.4. Continuous education and training on infection prevention practices should be the norm. This is best done in the format of professional audits, and should be run as a province-wide program, addressing all major areas of infection prevention.
- 11.5. There is a need to institute an early warning system and for a rapid response team to be able to act more speedily in events of this nature.
- 11.6. An Infection Control laboratory at Inkosi Albert Luthuli Central Hospital (IALCH) should be established to allow for rapid molecular characterisation of organisms involved in alleged outbreaks. This is linked to recommendations 4 and 5 above.
- 11.7. Proper hand washing should not be replaced by chloro-hexidine sprays or gloves. Gloves become contaminated as well. Hands inside gloves create an environment in which bacteria multiply better than on dry hands.
- 11.8. Standard Operating Procedures should be put in place for the use of gloves, gowns and aprons.

11.9. The infection control officer should be given more authority so that he/she can instruct staff to stop malpractice if he/she observes this.

12. CONCLUSION

While a single individual or sections of the hospital cannot be responsible for these unfortunate tragic deaths, a single individual and sections of the hospital can take steps to ensure that this never happens again. Successful prevention of outbreaks depends on many factors such as political and managerial commitment and authority at all levels, strong partnerships and good communication between all tiers of government, the private sector and other relevant stakeholders. The establishment of the required structures and making available the necessary resources to implement the strategy, will also be of the utmost importance. Every effort should be made to build and improve capacity for management of infectious diseases, infection control practice, epidemiology and surveillance at different levels, and to ensure that all activities are based on evidence-based practices. The KwaZulu-Natal Department of Health has an Infection Control Policy which has to be put in practice by the Infection Control Officer at the hospital.

The loss of life at a hospital is at times unavoidable. The challenge is to ensure that lives are not lost due to practices that could be prevented. There are many challenges facing the public sector health departments and there has to be an integrative approach with all role-players to ensure that this does not happen again.

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TO WHOM IT MAY CONCERN

8 November 2010

This case study, entitled *Klebsiella Outbreak at Mahatma Gandhi Hospital*, by K Thumbiran, has been edited to ensure technically accurate and contextually appropriate use of language.

In the editing process, attention was given to the following in particular:

- Diction, to ensure correct and effective word choice;
- Grammar (concord and punctuation, to ensure consistency);
- Formatting (numbering, referencing and spacing), and
- Sentence construction (refinement, structure and flow), to avoid redundancy and repetition and in order to sustain a scholarly academic style and argument, for this level of research.

Yours sincerely

A handwritten signature in blue ink that reads "C Israel". The signature is written in a cursive style with a long horizontal stroke at the bottom.

Dr CM ISRAEL
BA Hons (UDW) MA (UND) MA (US) PhD (UNH)
Language Editor