TOPICAL USE OF RIFAMYCIN SV (RIFOCIN) ON BURN WOUNDS AT KENYATTA NATIONAL HOSPITAL (KNH) AS COMPARED TO SILVER SULFADIAZINE

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DECLARATION

I certify that this dissertation proposal is my original work and that it has not been submitted for approval in any other university.

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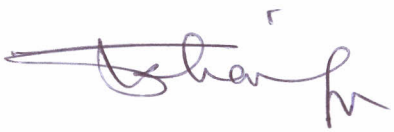
Signed  Date 7/12/07

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DEDICATION

This work is dedicated to my mother Lucy Njeri for her constant encouragement and support throughout my studies and to my sons (Eric, Joseph, Simon and John) for persevering my absence at home.

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LIST OF ABREVIATION

KNH	Kenyatta National Hospital
GIT	Gastrointestinal Tract
HIV	Human Immunodeficiency Virus
CCF	Congestive Cardiac Failure
TB	Tuberculosis
TBSA	Total Burn Surface Area
NCCLS	National Committee on Clinical Laboratories Standard 2004.
Viz.	namely
SPSS- 10	Statistical Package for Social Sciences version 10 computer software.

SUMMARY

Rifamycin SV (Rifocin) is an antibiotic isolated in the lepetit research laboratories, and has been in use in Kenyatta National Hospital for over 12 years as a topical antibiotic on burn wounds. No research has been conducted to show its effects on wound infection. This is a seven month surveillance prospective study aimed at reviewing the benefits or detrimental effects of using Rifamycin SV topically on Burns wounds.

Methodology:

Prospective study carried out from March 2006 to September 2006. Fifty patients with infected burn wound at Kenyatta National Hospital were randominised into two groups A & B. Pus swab (swab 1) was taken on recruitment of a candidate, for microscopy and culture. The isolated micro-organism was tested for sensitivity to Rifamycin and Silver Sulfadiazine. Candidates were followed up with dressing of the wound with Rifamycin (Group A) and Silver Sulfadiazine (Group B) for seven to nine days. A second swab (swab 2) taken for microscopy and culture. The isolated micro-organism was tested for sensitivity to both Rifamycin and Silver Sulfadiazine.

RESULTS: Most common pathogen isolated in burn wound was *Pseudomonas aeroginosa* (80%), and majority of the isolated pathogens are resistant to Rifamycin.

CONCLUTION: Rational use of Rifamycine on burn wound should be abandoned.

1. INTRODUCTION AND BACKGROUND

Life is a constant battle against disorder. The skin represents the primary barrier between the human protoplasm and the entropy of the external environment. Histologically, the skin is divided into the epidermis and the dermis. Epidermis consist of five histological strata from superficial to deep. These layers are the (1) Stratum corneum (2) Stratum lucidum (3) Stratum granulosum (4) Stratum spinosum (5) Stratum germinativum.

The keratinocyte, the preponderant epidermal cell, is generated in the stratum germinativum and eventually desquamates (slough) when it reaches the stratum corneum. The dermis underlies the epidermis and its vascular network functions in thermoregulation & provides metabolic support for the avascular epidermis. Fibroblasts synthesize supportive and structural polymers, including ground substance, collagen and elastin. Skin appendages include sebaceous glands, hair follicles and sweat glands.

A burn wound is a coagulative destruction of the surface layers caused by heat, chemical agents or irradiation. Burns compromises the major body defense mechanism - the skin, as well as depression of humoral and cell mediated immunity. This makes a burn patient more prone to local and systemic infections.

Infection is the main hindrance to good wound healing among other factors. Rifamycin has been used as a topical antibiotic on burns for over twelve years in Kenyatta National Hospital. However, the efficacies of its use among burn patients have not been evaluated. The aim of this study is to evaluate the effectiveness of Rifamycin in treatment of burn wound infection at Kenyatta National Hospital.

1.1. Historical Perspective

Burn wounds are a world wide problem that is even mentioned in the Old Testament: Leviticus 13:24 where it is listed among dermatological illnesses. Earliest recorded data on treatment of burns is in 1500BC by Ebers Papyus where topical treatment of burn wound with black mud, boiled cow dung and goose were applied in the first 5 days post burns [14], others followed: -

- Paulne Aegiseta (625- 690) recommended applications of moderately detergent materials, which were definitely heating or cooling: "light earths mixed with vinegar to prevent blisters formation" [3]
- Adam (1939) wrote that Hippocrates applied warm mixture and avoided suppuration by simple cleanliness - wounds were inspirited with clean water or wine and an attempt was made to keep them dry [2].
- Bouisson of Montpellier was the originator of the exposure method in treating burns…in burns the ventilation can supersede other methods... If substituted a day for a moist surface, it diminishes the chances of infection from the atmosphere. (Valenso de Tarenta 1940) [46]
- Fabacins Hildanus (1560 – 1613) wrote the first book devoted entirely to burns and insisted that the classification of burns should be a guide for treatment [20]. He recommended that blisters should be cut to avoid infections. In the very deep burns, he made incisions to let moisture escape as otherwise gangrene and infection would supervene –he was the first to perform the escharotomy.
- Dupuytren (1777 – 1835) was the first to describe ulceration of the gastrointestinal tract in burns patients in 1832. In 1842, Curling published his famous paper, which resulted in the eponym "Curling's ulcer". [48]
- Systemic treatment of shock in burn patients using saline solution was introduced around 1880 and 1897 by Peiss and Tommasoli respectively. Before then treatment of shock consisted of alcoholic drinks and opium compounds [20].
- Skin grafting for burns was first introduced by Pollock (1817 – 1897) and Copeland of Alabama (1887) was the first to describe the open or exposure method for treating burns [6,34]

- ❖ At the end of 19th century the emphasis was to avoid infection and in the 20th century, Path physiologist elucidated causes and indicated methods of systematic treatment of burns counteracting shock. [48]

Burn wound infection is still a serious complication of thermal injury although more burn patients die of pneumonia than wound infection [7]. In KNH, a study carried out by Dr. Wanjeri 1995[48], showed that the rate of burn wounds infection was 18.7% and the most commonly affected was the 31-50% TBSA category.

Thermal injury to the skin causes a massive release of humoral factors, including cytokines, prostaglandins, vasoactive prostanoids and leukotrienes[32]. Accumulation of these factors at the site of injury results in "spill over" into the systemic circulation giving rise to immunosuppresion. All arms of immune system are involved in this immunosuppresion i.e. Chemotaxis of neutrophils is decreased, as well as its phagocytic and bactericidal activity [26].

Burns wounds also have less phagocytic activity and lymphokine production by macrophages. Burn affects the T- lymphocytes function by increasing the number of Suppressor cell and decreasing the number of Helper cells. Natural killer cells activity is also diminished. In addition to loss of natural cutaneous barrier to infection, coagulated protein and other microbial nutrients in the burn wound combined with avascularity of the wound lead to microbial colonization. In some patients colonization is followed by invasion of microorganism giving rise to burn wound infections.

After the development of effective therapy for fluid and electrolyte abnormalities caused by severe burns, infection and septicemia became the leading cause of mortality [22]. In the two studies published in 1965 on the effect of topical application of antimicrobial agent, P-amino methylbenzene sulfonamide (mafenide acetate) was applied to the burn wound surface and observed a 50% reduction in the rate of infection of burn wound in <50% of TBSA[16]. Burn wound sepsis in patients with burns of 30-60% TBSA was almost eliminated as a cause of death.

Silver nitrate (0.5% solution) was also introduced as a topical antimicrobial agent in 1965. It was applied as a liquid and had a broad spectrum of antimicrobial activity. But application of silver nitrate resulted in staining (black or brown) of everything with which it was in contact. The most used topical antimicrobial agent is silver sulfadiazine which was synthesized from silver nitrate and sodium sulfadiazine. It is produced as a 1% concentration in a water- soluble cream base.

At the time that topical antimicrobial agent was introduced, thermal injury was treated with conservative therapy. The controlled growth of bacteria on the wound was achieved by daily treatment with immersion hydrotherapy. When the eschar had been removed, the underlying bed of granulation tissue was covered with skin grafts. This type of therapy was used in 1950s, 1970s into the 1980s. The most important reservoirs for microorganism that colonized the burn wounds of new patients are the collective burn wound surface and gastrointestinal tract (GIT) [23,41].

Microorganisms are transmitted by the hands of health care workers, by formites and hydrotherapy water. The risk factors for burn wound colonization or infection are the size of burn wound (TBSA) and the duration of hospitalization [23, 45, 49].

1.2. Diagnosis and Classification of Infection

The diagnosis of superficial infections is made when wound appearance portrays superficial purulent material, manifestation of low grade fever, mild to moderate leucocytosis with or without a left shift and no change in mental status. The diagnosis of invasive infection with bacteraemia is made when the wound shows deterioration of a once-healthy granulation tissue to being oedematous, pale with purulent black or violaceous material. The patient also shows extensive systemic manifestations including hypotension, tachypnoea, fever, tachycardia, altered mental status, oliguria, leucocytosis with a left shift thrombocytopenia, hyperglycemia, metabolic acidosis and hypoxia.

1.3. Predisposing Factors to Infection

Several factors can cause accelerated rate of infections which can be local or generalized. Local wound factors include – the severity of burns, the degree of contaminations from the environment such as hospital personnel, foodstuff, formites and visitors. This can be prevented by wearing of gowns and gloves when dressing wounds as well as the washing of hands following contact with each patient. Improving air handling system such as laminar flow and environmental rooms have contributed albeit minimally to decreasing infection in burns unit [48].

Radiotherapy causes stasis of blood flow causing coagulative necrosis. General factors include disease or illness that compromises the patients immune system namely anaemia, malnutrition, H.I.V infection, diseases like diabetes mellitus, Sickle cell, Congestive cardiac failure (CCF), lymphoedema or generalized arterial sclerosis especially in the elderly. Wound infection also depends on the initial course of treatment taken. Inappropriate care leads to delayed wound healing, infection and prolonged hospital stay.

1.4. Causative Organisms

Organism causing burn wound infection are mainly bacterial but other microorganisms viz fungi (Candida Albicans, Aspegillus, Mucor and Rhizophs) and virus (cytomegalovirus and herpes) have been documented. The dominant pathogen in burn units are *Pseudomonas aeroginosa* and *Staph aureus*[7].

1.5. Management

Management of burn wound involves: -

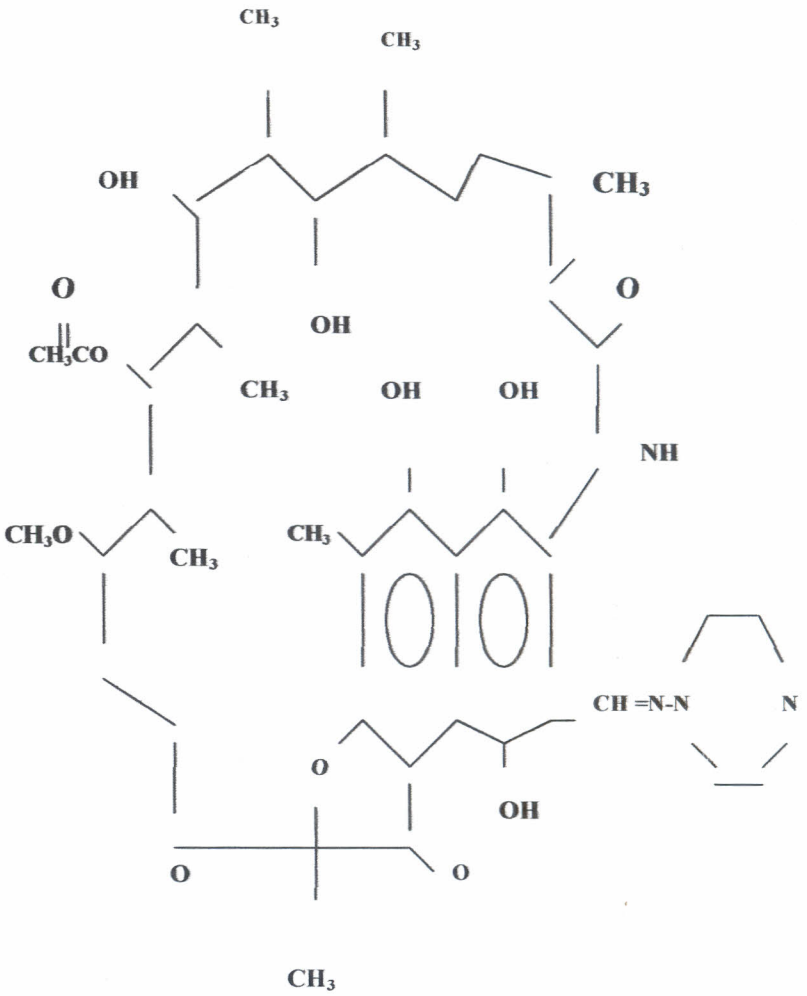
(a) **Supportive treatment:** includes fluid & electrolyte replacement, Blood transfusion if required, adequate nutrition to meet the increased metabolic demands and the increased losses, so that host resistant to infection is maintained.

(b) **Definitive treatment**: Aggressive debridement of devitalized and infected tissues, early excision of burn wound with early grafting, subeschar injections of antibiotics, excision of burn wound surface infected by true fungi such as mucor. Dressing, topical and systemic antibiotic therapy following sensitivity patterns.

1.6. Rifamycin

It is a Synthetic derivative of Rifamycin B isolated from *Streptomyces mediteranei* highly active against *Staph.aureaus* & *albus* and *Clostridium welchii*[12].

Rifamycin is soluble in organic solvents and in water of acidic PH. It has the following structure:



Structure of Rifamycin [12]

Bactericidal concentration range from 3 to 12 ng/ml to *Staph.aureas*. *N.meningitidis* and *Haemophilus Influenzae*. Minimal inhibitory concentration(MIC) range from 0.1 to 0.8 mg/ml. In concentration of 0.005 to 0.2 mg/ml, it inhibits the growth of *M. tuberculosis* in vitro. *M.kansasii* – inhibited by 0.25- 1 mg/ml.

It is as effective as Erythromycin or Lincomycin against *Streptococcus viridans* and Beta haemolyticus, *Strep.pnemucoccci*, *Bacillus antheracis*, *C-diphtheria*, *Nesseria. gonorrhoea* and *meningococci.* Only moderately active against *H. influenzae* and *Streptococcus faecalis.* Also active in vitro against many Gram negative bacilli like *E-coil*, *Proteus*, *Salmonella*, *Shigella*, *Psendomonas aeroginosa* and *Brucella.*

However unlike with Penicillin, many organisms develop early resistance to Rifamycin. It's most important property is its effectiveness against *M. tuberculosis* & *M.leprae*.
It is bactericidal and acts against both intra–and extra–cellular organisms and is effective against tubercle bacilli resistant to other standard drug and against some of the atypical mycobacterium.

Resistance Microorganism may develop resistance to Rifamycin rapidly in vitro as a one-step process and one of every 10^7 to 10^8 tuberculin is resistant to the drug. Resistance in most cases is due to mutations between codons 507 and 533 of the polymerase rpoBgene (Blanchard 1966). These appear to be the case in vivo – hence must not be used alone in the chemotherapy of TB[12]. It is the only drug which acts as persister – called a 'sterilizing' drug for tubercular lesion.

MECHANISM OF ACTION: it inhibits DNA–dependent RNA polymerase of mycobacterium and other microorganism by forming a stable drug enzyme complex, leading to suppression of initiation of chain formation (but not chain elongation) in RNA synthesis. More specifically, the B-subunit of this complex enzyme is the site of action of the drug, although Rifamycin binds only to the holoenzyme.[12] Nuclear RNA polymerase from a variety of eukaryotic cells does not bind Rifamycin and RNA synthesis is correspondingly unaffected.

Rifamycin can inhibit RNA synthesis in mammalian mitochondria,
but considerably higher concentration of the drug is required than for the inhibition of the bacterial enzymes. In higher concentration, it can also inhibit viral DNA dependent RNA polymerases and reverse transcriptases.[12]

Rifamycin is well absorbed from the gut (dose 600mg od), peak level is achieved within 2-3 hrs and therapeutically useful concentration persist for more than 12hrs. Foods interfere with its absorption resulting in lower plasma levels. The drug is largely metabolized to desacetyl Rifamycin which undergoes entero-hepatic circulation and which is active against *M-tuberculosis*. Its excreted in the urine and about 25% of the 600mg dose is excreted in an active form in 24hrs.

About 85% of the drug gets bound to serum proteins. It is distributed throughout the body and is present in effective concentration in many organs and body fluids including the CSF. It crosses the placenta barrier. Serum concentration is raised in liver disease while renal failure has little effect. It is largely metabolized by the liver.[38]

1.7. Adverse Reactions

Occur in less than 5% of patients receiving the usual doses (450-600mg)/day. Includes – skin rashes, diarrhoea, ataxia, dizziness, liver damage and leucopenia. Few cases, fatal hepatitis has been reported. Patient urine, saliva, fever, sputum, tears and sweat may become orange red in colour.

Severe anaphylaxis to topical application of Rifamycin Sv is rare. [9] Large doses of 900mg/day – have been reported to cause Acute hepatic and renal failure, allergic reaction including shock and flu-like syndrome.

The drug induces hepatic microsomal enzymes and thus could cause increased metabolism of hydrocortisone, oral contraceptives, phenytoin, sulfomylureau, warfarins, digoxin and dapsone.

2. LITERATURE REVIEW

Burn wounds infection are a serious complication of thermal Injury. Although pneumonia is now the most important cause of death in patient with thermal injury, burn wound infection remains a serious complication unique to the burn recipient. The methods used for managing burns have evolved during the past 50yrs. This evolution has been accompanied by changes in etiology, epidemiology and approach to prevention of burn wound infections. In the 1950s, 1960s, and 1970s and into the mid-1980s, burn wounds were treated by exposure methods, with application of topical antimicrobial to the burn wound. Much of the information on the epidemiology of burn wound infection was published in these decades.

Outbreaks of infection in burn units occurred and were related to contaminated mattresses [42,49] to contaminated hydrotherapy water [7,40,50]. In each of the outbreaks the causative microorganisms was resistant to the topical antimicrobial agent in use at the time of the outbreak [12, 49].

The most common causes of burn infections were bacteria with *Pseudomonas aeroginosa* being the most important species [76, 23, 28], less common causes of burn wound infection were yeasts [31,52] filamentous fungi [31,43] and viruses [32]

From the mid 1980's through the present, burn wound excision and grafting have replaced the earlier exposure therapy that made use of hydrotherapy. Gradual debridement until a bed of healthy granulations tissues has developed, is followed by coverage with autologous skin grafts. In some burn centers, early burn wound excision is accomplished in the few days after burn injury. The latter approach often involves use of temporary wound covering such as allograft, tenograft and synthetic materials. In other burn centers, burn wound excision and wound closure of large burns are staged over several weeks and grafting is done with autologous skin [15,29].

The major goal of early burn wound excision includes decreasing mortality, reducing scar tissue formation to improve cosmetic outcome and decreasing the incidence of burn wound infection & systemic sepsis. Some centers have reduced systemic sepsis originating from burn wound from 6% to just over 1%,and rate of death due to burn wound sepsis from 40% to 18%[7]

The technique for cleaning and debriding burn wounds has also evolved from immersion hydrotherapy to showering patients with a hand-held sprayer [46]. This reduces the risk of transferring surface bacteria to open burn wounds and has had an effect on the epidemiology of burn wound infections. However two outbreaks related to showering hydrotherapy have been reported [9, 44].

One outbreak, patients received immersion hydrotherapy to remove adherant dressings and then washed further with gentle stream of water from a hand-held device. The author recovered *Pseudomonas* species from hydrotherapy tubs. The outbreak cleared when hydrotherapy was replaced by local wound care in patient rooms. The other outbreak occurred in a burns unit where hydrotherapy treatments were done entirely by showering. Methicillin-resistant *Straphylococcus aureus* was recovered from cultures of samples from the stretcher used for showering and pistol grip on the hand held shower [9]. This was cleared by wound care in patient's room.

During the decades of exposure burn wound treatment, wound infection were diagnosed by symptoms & signs, by appearance of burn wound and by taking tissue biopsy of the burn wound in an area that appeared infected on clinical examination, then cultured quantitatively. [35] Burn wound infections was diagnosed by histopathological examination when microorganisms were observed to be invading viable tissue beneath the eschar.

Burn wound infection was also diagnosed by quantitative cultures that yielded $> 10^4$ cfu/g of tissue [47]. However in a study published in 1981, significant doubt was raised in quantitative cultures because of substantial variability in quantitative counts from tissue biopsy specimens that had been divided and each cultured separately. [51] Only 38% of paired quantitative results agreed within the same $\log_{10}$ unit, whereas 44% differed by-/+2 $\log_{10}$ unit or more. Hence, quantitative cultures of burn wound tissue specimens are no longer used for diagnosis of burn wound infection because of their imprecision and poor specificity [30, 51].

Biopsy is no longer used to diagnose wound infection today but it is the "gold standard" for diagnosis of infection in an unexcised burn wounds. Burn wound infection is diagnosed largely on the basis of clinical symptoms & signs of the burn wound. This is supplemented by culture of purulent exudates from burn wound or blood cultures.

Although topical antimicrobial agents continue to be used, their role is unclear for wound created by early excision and wound closure. They may be applied to the burn wound before excision and to wound that have delayed excision or cannot be excised. The untoward effects of topical antimicrobial agents, their selections of fungi and resistant bacteria for colonization of the burn wound surface, make their role unclear especially in this era of early excision and grafting.

Rifamycin is an old antibiotic popular in 1960s. The parenteral form of Rifamycin (Rifocin) is used in KNH to dress burn wounds for over twelve years. One vial of Rifamycin is mixed with 125ml of Normal Saline, and the solution used to clean and dress the wound. There are no available studies on its topical use and its effectiveness even from the mother country Italy.

3. JUSTIFICATION OF THE STUDY

Infection is a very serious complication on burn wound and interest in management of burn wound is therefore well directed. Rifamycin Sv used on wound is a parenteral preparation which is dissolved in 125mls of saline. Soaked gauzes with this solution is used to dress burn wounds. No study has been carried out at KNH despite been in use for over 12 yrs. I am convinced that this study will benefit not only the investigator but also KNH

4. STUDY OBJECTIVES

4.1 Main Objective

To evaluate the effectiveness of Rifamycin Sv on burn wound at KNH

4.2 Specific Objectives

(1) To compare results of topical use of Rifamycin on burn wound to that of Silver Sulfadiazine ointment.

(2) Identify any resistant microorganism to Rifamycin in burn wound.

(3) Prevalence of various pathogens in burn wound infections.

(4) Come up with recommendation from strength of the study on use of Rifamycin in KNH.

5. METHODOLOGY

5.1. Study Design and Setting

This is a seven month hospital based prospective study to evaluate the effectiveness of topical use of Rifamycin on burn wounds. It is a controlled study using Silver Sulfadiazine ointment, a well-established topical drug used on wounds. All study subjects were randomized into two groups A& B depending on order of entry into the study. Group A- was 1st 3rd, 5th & 7th etc (all odd numbers) entries, Group B- 2nd, 4th, 6th, & 8th (all even numbers) entries. It was conducted in Kenyatta National Hospital, the leading teaching and referral hospital in East Africa situated in Nairobi, Kenya.

5.2. Study Population and Sample Size

Sample size calculation for a comparative study of a two sided test of equal sample size:

$$N = 2 \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2}{\delta^2} \delta^2$$

N= Sample size

Z= Standard normal deviate corresponding to 95% confidence Interval

β = power of the test.(80% power) $Z_{1-\beta} = 2.58$

α = significance level usually 0.05 $Z_{1-\alpha/2} = 1.96$

δ =difference in effect of magnitude. Hypothetically taken to be 9% .

N = 41.2 but recruited 50 for this test.

5.3. Sampling

Samples are divided into two groups namely:-

(i) Study group- is Group A patients where wounds were dressed with Rifamycin.

(ii) Control group- is Group B patients where wounds were dressed with Silver Sulfadiazine ointment.

5.4. Study Subjects

The study groups are patients who met eligibility in Burns units ward 4C and surgical out-patient clinic.

(a) Inclusive criteria will be:

1. A patient with infected burn wound and granting an informed consent to participate in the study.
2. Patient both sexes aged up to 60yrs.
3. Stable patient who has been fully resuscitated.
4. Adult, parent or guardian of sound mind.
5.

(b) Excluding criteria: -

1. Patients on immunosuppressive agent
2. Patient with chronic illness e.g. known Diabetes mellitus, H.I.V, Sicklier, Renal failure or any other serious illness requiring treatment.
3. Patient in Shock.
4. Patient who refuse to join the study.
5. Pregnant ladies.

5.5 Method of collecting and handling pus swab :

Divided into two:-

(a) ***Clinical***

(i). Collection of specimen from the wound before dressing, was done under sterile procedure. The wound was exposed and the area of the wound that shows signs of infection identified. The area was cleaned with Normal Saline swab to remove the old dressings, serous fluid and all bacteria colonizing on superficial layer. A pus swab was first soaked in sterile Normal Saline then a pus sample collected at the most infected site of the wound, using a bit of force, to gather the bacteria that are at base of the wound. The sample was taken to microbiology laboratory for culture and sensitivity. All recruited patients were in their second week after burn. This corresponds to the time when burn wound get infected.

(ii). Dressing of the wound. Occlusive method of dressing was applied with bandages soaked in Rifamycin solution for group A patients and Silver Sulfadiazine ointment for group B patients. The application of the drugs on the wound was strictly adhered to manufacturer's recommendation.

(iii). Collection of specimen after dressing for seven days. It was also carried out in a sterile procedure, cleaning the wound with sterile Normal Saline and wiping out the superficial colonizing bacteria or old drug with a swab. Swab collected at the same area of the wound as the first swab, avoiding touching the skin. The sample was taken to microbiology laboratory as soon as possible for culture and sensitivity.

(iv) All specimens were collected by the investigator.

(b) ***Laboratory Method***

(1) Sample was transported to laboratory within 30minutes whenever this was not possible, STUART transport media was used to transport the swab to laboratory (composition of STUART media on **Annex**).

(2) All the swabs were routinely inoculated on 5% sheep blood alga, chocolate alga and Mac.cnokey Alpa. Plater. Blood alga and chocolate alga were incubated in candle extinction jars, at 35^0C to provide 5-8% Co_2 Mac.conkey plate incubated outside the jar.

(3) After 18-24 hrs incubation, the plates were observed for growth. Plates with adequate growth were processed further immediately while Plate with scanty growth was incubated for further 24hrs.

(4) Growth was studied according to standard bacteriological procedures such as:-

(a) colony morphology

(b) Gram strain characteristic

(c) Preliminary tests like oxidizes, catalases, coagulase etc.

(d) Detailed biochemical identification tests for final identification of organisms. These procedures involved batteries of biochemical reaction depending on outcome of preliminary tests mentioned above.

(e) Depending on identification of organisms, antibiotic tests are performed according to N.C.C.L.S protocol- 2003 (**Annex 1**) using Rifamycin and Silver sulfadiazine sensitivity discs.

5.6 Data Analysis

Collected data was entered into a computer using SPSS-10 programme which has descriptive analysis, chi tests & Fisher exact list. Analysis was by use of same software and level of significance was considered as <0.05.Analysis and comparison of results was done using the following parameters:-

a. Patient demographic studies, age group, gender etc.
b. Bacterial flora before dressing.
c. Bacterial flora after dressing.
d. Composition of gram positive and gram-negative organisms.
e. Susceptibility to antibiotics in various bacteria.
f. T.B.S.A types and level of burns.
g. Duration of dressing of the wound.
h. Systemic antibiotic used.

The outcome was presented quantitatively, descriptively, comparatively and by use of pie charts, bar charts, graphs, tables and other helpful representations. The results were subjected to discussion and conclusions drawn accordingly.

5.6 Ethical consideration

All patients above 18yrs were explained to about the study and then requested to sign a consent form after accepting to be included in the study. Patient below 18yrs had the parent or guardian explained to, and then signs a consent form on their behalf. There was no discrimination in treatment to the patients who refuse to join the study. All patients received the necessary treatment and consent forms were filled by the patients or guardian after the resuscitation treatment.

The recruited patient benefited from the study by having the results incorporated in the management of their wound. No extra attention or services were provided to the patient as compared to those who do not join the study.

Thus

1. An informed consent was granted by the patient/parent to participate in the study.
2. Strict confidentiality was ensured to safeguard the privacy of the patient.
3. The information gathered was used for the disclosed purpose of the study only, and for no other reason.
4. Data entry was by code number and not by recognizable names.
5. Approval to conduct the study was sought from the Research and Ethics Committee of KNH and was granted. Study started after approval.

5.7 Study limitations

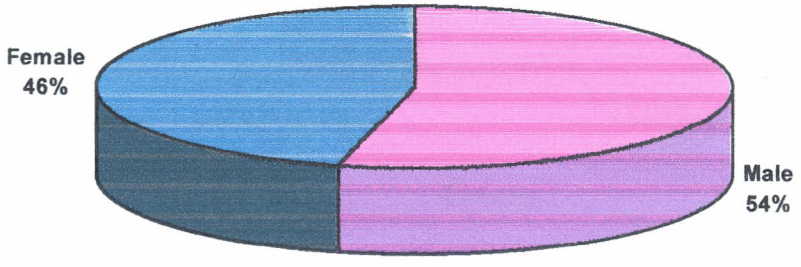
1. Sensitivity discs of Rifamycine and Silver Sulfadiazine were not locally available. This caused delay starting the study.
2. The swabs could only be collected during the day as microbiology laboratory remain closed at night and Stuart media was not regularly available. Some referred patients who arrived at night had to recruited after 24- 72hrs after admition.
3. Occasionally some patients could be changed dressing early or late before picking the 2nd swab, leading to disqualification of some patients or repeating the procedure.
4. Did not have control of the systemic antibiotic used in the course of the study, as this was determined by antibiotic available in the hospital or following culture & sensitivity results.

6.0 RESULTS

6.1 DEMOGRAPHIC DATA

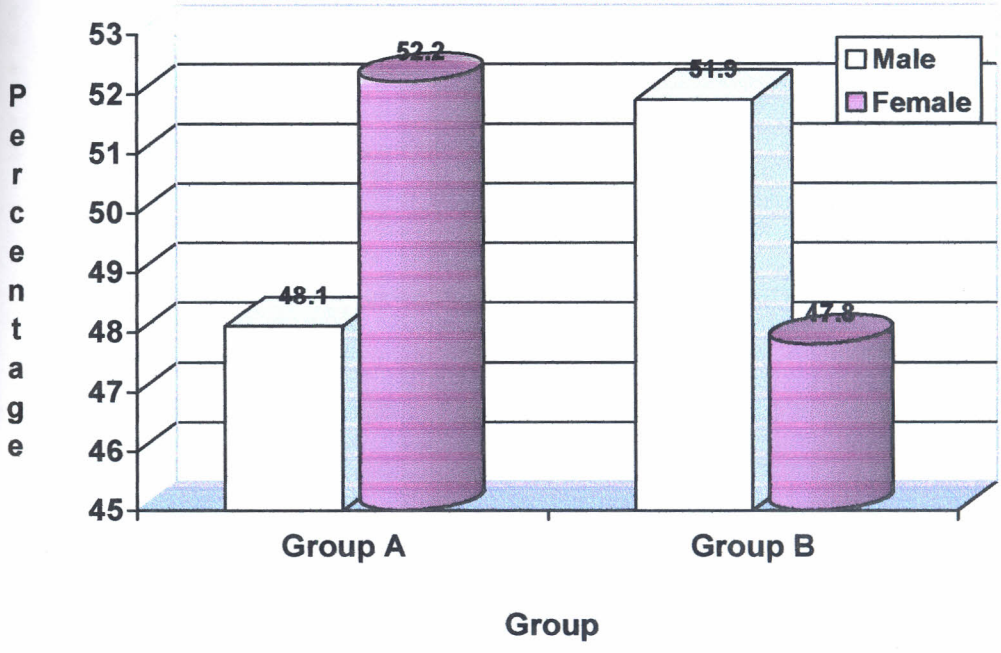
In the seven months of the study, March 2006 to September 2006 a total of 50 patients were recruited in the study . They were randominised into two equal groups A and B. Twenty-five patients in each group. In total there were 27 (54%) males and 23 (46%) females. Figure 1. The male to female ratio is 1.2: 1, probably because males are more exposed to dangerous substances and equipment.

Figure 1: DISTRIBUTION BY GENDER



Gender distribution per group, Figure 2, showed more females in group A (52.2%) and more males in group B (51.9%) Group A comprised of 13 males and 12 females, while Group B comprised 14 males and 11 females.

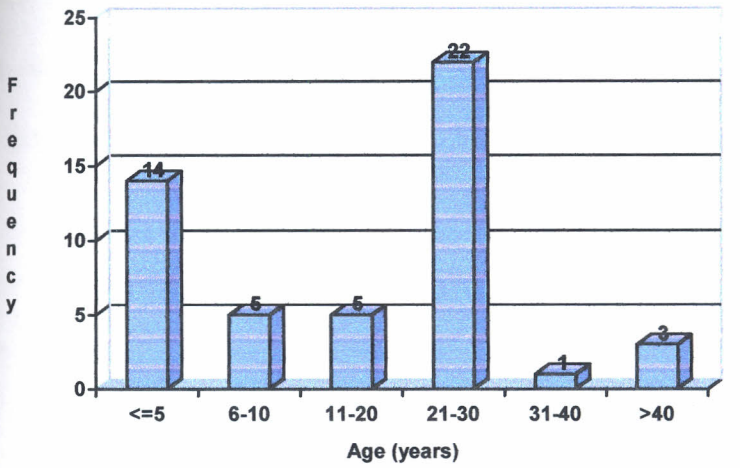
Figure 2: GENDER BY GROUP



6.2 AGE:

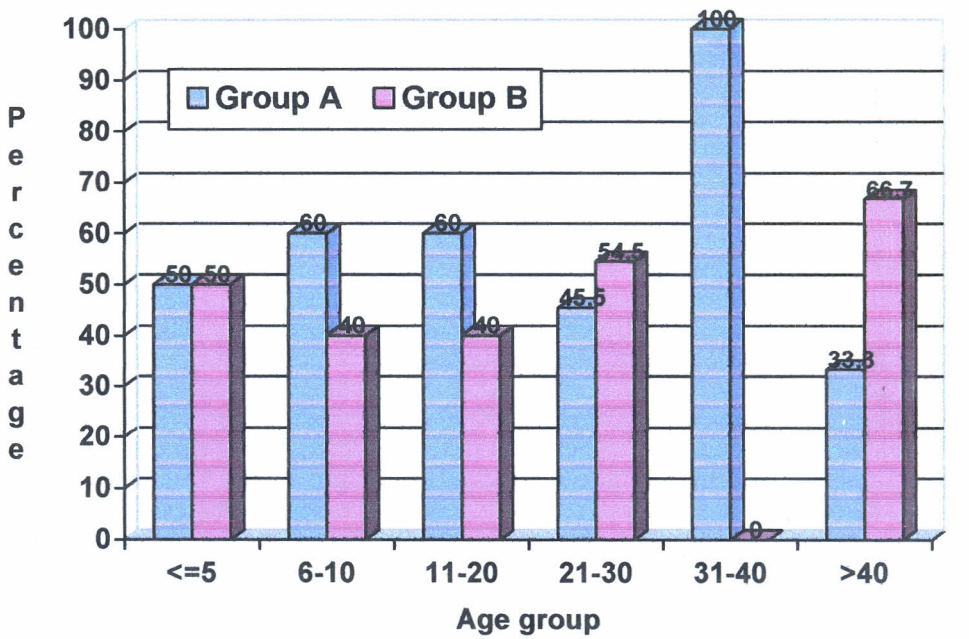
The age distribution, of patients recruited in the study is as shown in Figure 3. Most patients with infected burn wound were in the 21-30 age group (22) about 44%, followed by five years age-group about 28%

Figure 3: AGE DISTRIBUTION OF STUDY POPULATION



Age distribution by group is shown in Figure 4, and they are fairly well distributed.

Figure 4: AGE DISTRIBUTION BY GROUP OF SUBJECT



The 31-40 age group bar appear as 100% because there was only one patient who was in group A.

6.3 Co-morbidity

Thirty eight patients (76%) did not have other illness at the time of carrying out the study but two (4%) patients had Malaria, 6 (12.0%) patients had upper respiratory tract infection (URTI) and 4 (8.0%) patients had iron deficiency anemia.(Table 1)

Table 1: DISTRIBUTION OF CO-MORBIDITY

Co-morbidity	Frequency	Percentage
None	38	76.0
Malaria	2	4.0
URTI	6	12.0
Anaemia	4	8.0
Total	50	100

84% of all the patients in Group A had no associated illness and 68% in Group B. Other illnesses are as in Table 2. The epileptic patients present during the course of the study were disqualified due to lack of sound mind of the patient or lack of consent from the parent or guardians.(Table 1&2). All patients had thermal burns. There were patients with burns from others causes e.g. acidic and electrical but in the course of the study, none showed signs of infection. It was equally good for the study to compare wounds of similar nature.

Table 2: DISTRIBUTION OF CO-MORBIDITY BY GROUP OF SUBJECTS (p value 0.185)

	Frequency	Group A / %	Group B / %
None	38	21 (84)	17 (68)
Malaria	2	1 (4)	1 (4)
URTI	6	2 (8)	4 (16)
Anaemia	4	1 (4)	3 (12)
Total	50	25	25

6.4 TOTAL BURNS SURFACE AREA (TBSA)

Majority had a TBSA of between 10 – 30%

.Table 3: TBSA

	Frequency	Percent	Group A	Group B
1 - 10%	3	6	1	2
2 – 30%	41	82	20	21
3 – 50%	2	4	2	0
4>50%	4	8	2	2
Total	50	100	25	25

Thirty eight (76%) of the patients included in the study had deep burns and only two had infected superficial burns.(Table 4). Each group had 24 patients with deep burns and one with superficial burn.(Table 4).

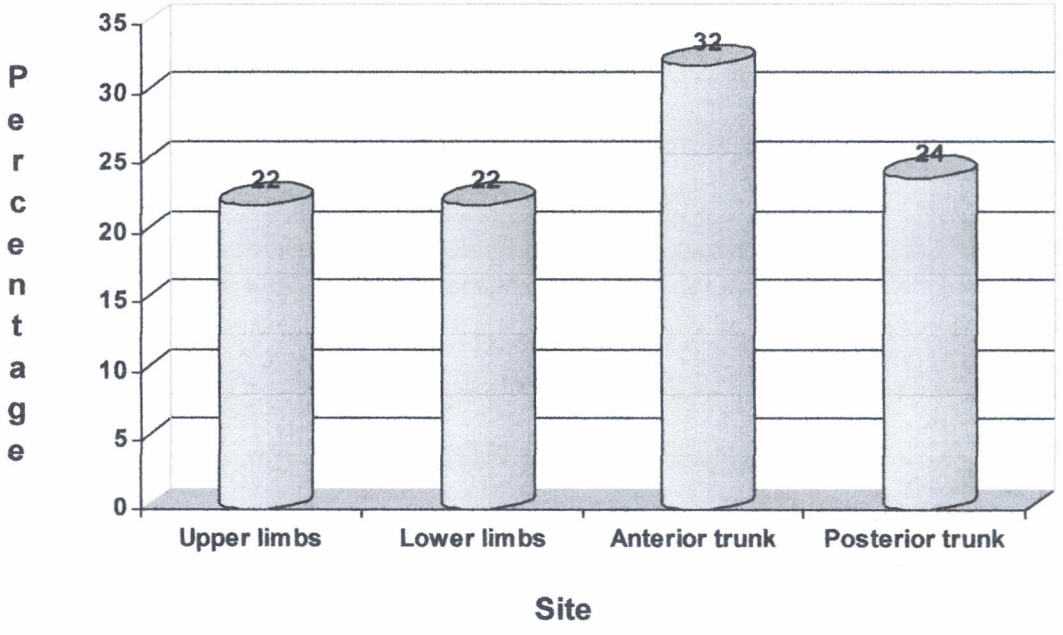
Table 4: GRADING OF BURN WOUND

	Frequency	Percent	Group A	Group B
Superficial - Deep	2	4.0	1	1
Deep Superficial-	10	20.0	7	3
Deep	38	76.0	17	21
Total	50	100.0	25	25

DISTRIBUTION OF SITE

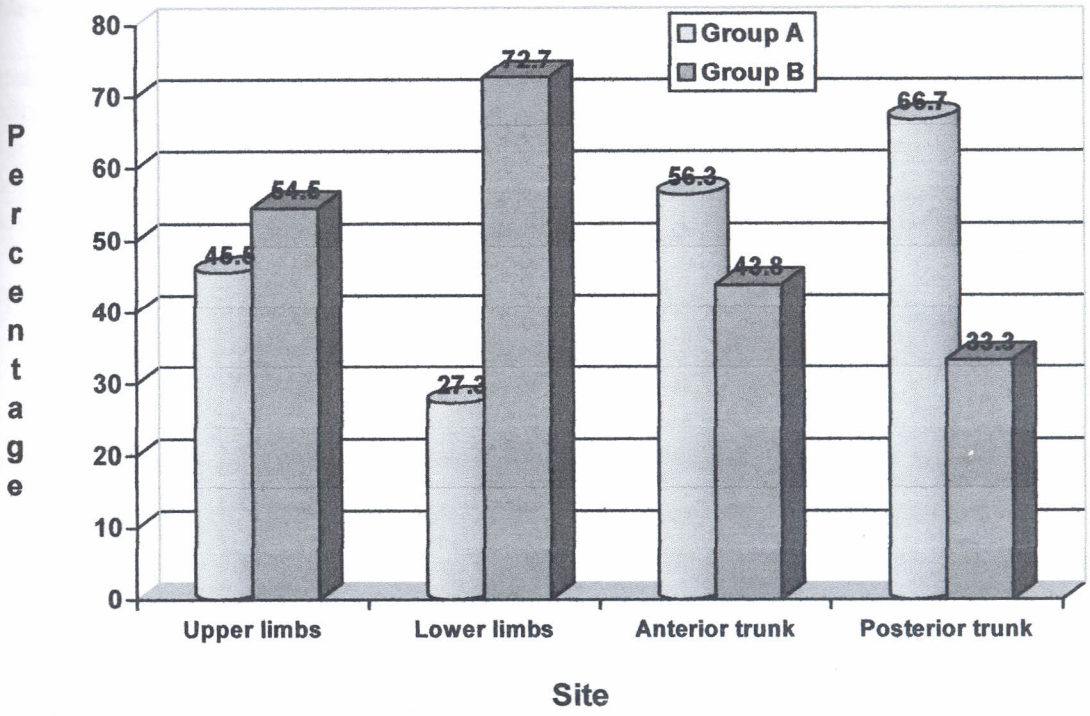
Swabs were taken on sites that appear heavily infected, but most of the patients swabs were taken on the anterior trunk (32%) .Figure 5 shows the other areas, while figure 6 shows the group distribution. There were minor differences between the two groups.

Figure 5: DISTRIBUTION OF SITE



Forty one (76%) of the patients in the study had TBSA of between 10-30%, twenty in group A and twenty one in group B.(Figure 6) This shows a fairly balanced groups for comparison. All recruited patients were in their second week after burn. This corresponds to the time when burn wound get infected

Figure 6: DISTRIBUTION OF SITE BY GROUP OF SUBJECT



6.5 DURATION OF DRESSING

Duration of dressing was dependent on level of infection. Changes of dressing to 27 patients (54%) were done after 48 hours and 22 patients were after 24 hours. Only one patient had dressing changed after 72 hours. (Table 5). Table 6 shows the duration of dressing per group of subject.

Table 5: DURATION OF DRESSING

Duration of dressing (hours)	Frequency	Percentage
After 24 hours	22	44.0
After 48 hours	27	54.0
After 72 hours	1	2.0
Total	50	100

Table 6: DURATION OF DRESSING BY GROUP OF SUBJECT

Duration of dressing (hours)	Group A	Group B	Total
After 24 hours	13 (59.1%)	9 (40.9%)	22 (100%)
After 48 hours	11 (40.7%)	16 (59.3%)	27 (100%)
After 72 hours	1	0	1 (100%)

NB: chi square not valid as one of the cells has 0, so no p value.

6.6 SYSTEMIC ANTIBIOTIC USED

There is usually a rational use of penicillin and gentamycine on burn wound where culture and sensitivity have not been carried out. Keeping the burn patient without systemic antibiotic would be viewed as an ethical and inhuman, as they are expected to get infection. This explains the frequent use of these antibiotics in about 52% of all patients. Other antibiotics in use had followed the strength of culture and sensitivity as shown in table 7&8.

30% (15) of the patients were receiving a combination of Penicillin and Gentamycin while 22% (11) received Ampiclox and 14% (7) Penicillin alone. Table 7and 8.

Table 7 DISTRIBUTION OF SYSTEMIC ANTIBIOTICS USE

	Frequency	Percent
Penicillin	7	14.0
Penicillin + minocine	1	2.0
Fluxapen	4	8.0
Penicillin + flagyl	2	4.0
Penicillin + Gentamycin	15	30.0
Penicillin + Cloxacilline	11	22.0
Penicillin + Gentamycin + Cloxacilline	1	2.0
Augmentin	4	8.0
Penicillin+Gentamycin+Meropenum	1	2.0
Tazobactrium	1	2.0
Amikacin	1	2.0
Piperazine	1	2.0
Penicillin + Tozobacterum	1	2.0
Total	50	100.0

Table 8: DISTRIBUTION OF SYSTEMIC ANTIBIOTICS USED BY GROUP OF SUBJECT

Antibiotic	Group of subject				Total
	Group A		Group B		
Penicillin	5	(71.4%)	2	(28.6%)	7
Penicillin + minocine	0	(0%)	1	(100%)	1
Fluxapen	4	(100%)	0	(0%)	4
Penicillin + flagyl	1	(50%)	1	(50%)	2
Penicillin + Gentamycin	5	(33.3%)	10	(66.7%)	15
Penicillin + Cloxacilline	6	(54.5%)	5	(45.5%)	11
Penicillin + Gentamycin + Cloxacilline	1	(100%)	0	(0%)	1
Augmentin	2	(50.0%)	2	(50%)	3
Penicillin+Gentamycin+Meropenum	0	(0%)	1	(100%)	1
Tazobactrium	1	(100%)	0	(0%)	1
Amikacin	0	(0%)	1	(100%)	1
Piperazine	0	(0%)	1	(100%)	1
Penicillin + Tozobacterum	0	(0%)	1	(100%)	1
Total	25	(50%)	25	(50%)	50

6.7 Distribution of Organisms isolated

The most common organism isolated is *Pseudomonas aeroginosa* in 80% of the swabs. This confirms Nthumba 2001 dissertation.

Pseudomonas aeroginosa was most common and was isolated in nineteen patients in group A and twenty one patients in group B.(Table 9&10) In group A, thirteen(68.4%) isolates of Pseudomonas were resistant to Rifamycine but only one was resistant to Silver Sulfadiazine. The organisms remained in the wound even after one week of dressing with Rifamycin. The twenty one patients in group B that had Pseudomonas, eighteen (81%) were sensitive to Silver Sulfadiazine and only three were resistant. But the same microorganism, seventeen (81%) were resistant to Rifamycine. Only the resistant bacteria to Sulfadiazine remained in the wound as shown by the second swab results in table 11.

Staph. aureus was isolated in nine patients in group A and all were sensitive to Silver Sulfadiazine but four (44%) isolate were resistant to Rifamycin. In group B, six patients had Staph. aureus and four(66.6%) were resistant to Rifamycin. All were sensitive to Silver Sulfadiazine.

Others are as shown in Table 9 and their distribution in each group in Table 10.

Table 9: DISTRIBUTION OF ORGANISMS ISOLATED

Organism	Number	Percent
Pseudomonas Spp	40	(80.0%)
Staph aureus	15	(30.0%)
Proteus	9	(18.0%)
Klebsiella	5	(10.0%)
E. faecalis	1	(2.0%)

Table 10: DISTRIBUTION OF ORGANISMS BY GROUP OF SUBJECT

Organism	Group A	Group B	Total
Pseudomonas	19 (47.5%)	21 (57.5%)	40 (100%)
Staph aureus	9 (60%)	6 (40%)	15 (100%)
Proteus	4 (44.4%)	5 (55.6%)	9 (100%)
Klebsiella	3 (60%)	2 (40%)	5 (100%)
E. Faecalis	1 (100%)	0 (0%)	1 (100%)

68% of all the swabs isolated had only one microorganism, 24% isolated two, and only

8% had three micro-organisms. Figure 7. The distribution in each group is shown in Table 11.

Figure 7: NUMBER OF DIFFERENT MICRO-ORGANISMS IN THE WOUND

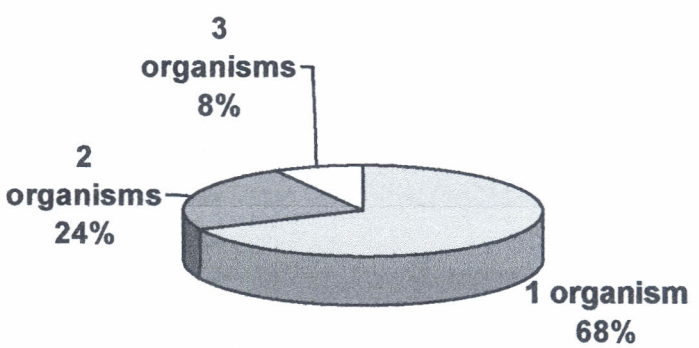


Table 11: TOTAL ORGANISMS BY GROUP OF SUBJECT

	Group of subject		Total
	1 Group A	2 Group B	
1	16 (47.1%)	18 (52.9%)	34 (100%)
2	7 (58.3%)	5 (41.7%)	12 (100%)
3	2 (50%)	2 (50%)	4 (100%)
Total	25 (50%)	25 (50%)	50 (100%)

6.8.1 LABORATORY RESULTS OF PUS SWABS BEFORE DRESSING THE WOUND.

Five different kind of microorganism were identified and each was tested with Rifamycin & Silver sulfadiazine sensitivity discs. The results are shown in Table 12, both groups combined.

Table 12: COMPARISON OF RIFAMYCINE AND SULFADIAZINE ON BURNS (FIRST SWAB)

Organism	Rifamycine		Silver sulphadiazine	
	Resistant	Sensitive	Resistant	Sensitive
Pseudomonas				
Group A 19	13 (41.9%)	6 (66.7%)	1 (20%)	18 (51.4%)
Group B 21	18 (58.1%)	3 (33.3%)	4 (80%)	17 (46.6%)
Total pseudo isol	31 (100%)	9 (100%)	5 (100%)	35 (100%)
Staph aureus				
Group A 9	5 (55.6%)	4(66.7%)	0 (0%)	9 (64.3%)
Group B 6	4 (44.4%)	2 (33.3%)	1 (100%)	5 (35.7%)
Total staph isol	9 (100%)	6 (100%)	1 (100%)	14 (100%)
Klebsiella				
Group A 3	2 (50.0%)	1(100%)	0 (0%)	3 (100%)
Group B 2	2 (50.0%)	0(0%)	2 (100%)	0 (0%)
Total Kleb. isol	4 (100%)	1 (100%)	2 (100%)	3 (100%)
Proteus				
Group A 4	0 (0%)	4(80.0%)	0 (0%)	4 (50.0%)
Group B 5	4 (100%)	1 (20.0%)	1 (100%)	4 (50.0%)
Total staph isol	4 (100%)	5 (100%)	1 (100%)	8 (100%)
E. Faecalis				
Group A 1	0 (0%)	1(100%)	0 (0%)	1 (100%)
Group B 0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total E.fae isol	0 (0%)	1 (100%)	0 (0%)	1 (100%)

6.8.2 RESULTS OF THE SECOND PUS SWAB AFTER 7-10 DAYS OF DRESSING

The above patients were tested again after dressing the wound with either

Rifamycin (Group A) or Sulfadiazine (Group B). The results are shown in Table 13.

Table 13: COMPARISON OF RIFAMYCINE AND SULFADIAZINE ON BURNS (SECOND SWAB)

Organism	Rifamycine		Silver sulfadiazine	
	Resistant	Sensitive	Resistant	Sensitive
Pseudomonas				
Group A 13	13 (76.5%)	0 (0%)	0 (0%)	13 (92.9%)
Group B 4	4 (23.5%)	0 (0%)	3 (100%)	1 (7.1%)
Total pseudo. isol	17 (100%)	0 (0%)	3 (100%)	14 (100%)
Staph aureus				
Group A 4	3 (100%)	1 (50.0%)	0 (0%)	4 (100%)
Group B 1	0 (0%)	1 (50.0%)	1 (100%)	0 (0%)
Total staph isol	3 (100%)	2 (100%)	1 (100%)	4 (100%)
Klebsiella				
Group A 2	2 (50.0%)	0(100%)	0 (0%)	2 (100%)
Group B 2	2 (50.0%)	0(0%)	2 (100%)	0 (0%)
Total Kleb. isol	4 (100%)	0 (100%)	2 (100%)	2 (100%)
Proteus				
Group A 0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Group B 2	2 (100%)	0 (0%)	2 (100%)	0 (0%)
Total Proteus isol	2(100%)	0 (0%)	2 (100%)	0 (0%)
E. Faecalis				
Group A 0	0 (0%)	0(0%)	0 (0%)	0 (0%)
Group B 0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Total E.fae isol	0 (0%)	0 (0%)	0 (0%)	0 (100%)

A combination of both results (swab 1 & 2) was also tabulated in Table 14.

Table 14: COMBINED FIRST SWAB AND SECOND SWAB RESULTS.

	Rifamycin						Silver sulfadizine					
Organism	Swab 1			Swab II			Swab 1			Swab II		
	R	S	T	R	S	T	R	S	T	R	S	T
Pseudomonas												
Group A	13	6	19	13	-	13	1	18	19	-	13	13
Group B	18	3	21	4	-	4	4	17	21	3	1	4
Staph aureus												
Group A	5	4	9	3	1	4	0	9	9	-	4	4
Group B	4	2	6	-	1	1	1	5	6	1	-	1
Klebsiella												
Group A	2	1	3	2	-	2	0	3	3	-	2	2
Group B	2	-	2	2	-	2	2	0	2	2	0	2
Proteus												
Group A	0	0	0	0	0	0	0	0	0	-	4	4
Group B	2	0	2	1	0	1	0	0	2	1	0	1
E.faecalis												
Group A	0	1	1	0	0	0	0	1	1	0	0	0
Group B	0	0	0	0	0	0	0	0	0	0	0	0

Key : R = Resistant S = Sensitive T = Total

A tabulation of the number of patients whose wounds were still infected, even after dressings, are shown in Table 15.

Table 15: SWAB II GROWTH (p value 0.0018)

	Group A	Group B	Total
Swab II isolates present	19 (70.4%)	8 (29.6%)	27 (100%)
Swab II isolates absent	6 (26.1%)	17 (73.9%)	23 (100%)
Total	25 (100%)	25 (100%)	50 (100%)

Klebsiella was identified in three patients in group A. Two had Klebsiella organism that were resistant to Rifamycin. In group B, there were three patients with Klebsiella and two were resistant to Rifamycin. All were sensitive to Silver Sulfadiazine.

Proteus was isolated in four patients in group A and were all sensitive to Rifamycin and Silver Sulfadiazine. In group B, Proteus was isolated in five patients and only one that was sensitive to Rifamycin while four were resistant. The same organisms, only one was resistant to Silver Sulfadiazine.

E. faecalis was only isolated in group A in one patient and was sensitive to both Rifamycin and Silver Sulfadiazine.

. Overall the use of topical Rifamycin in group A managed to clear microorganisms in only six patients (26.1%). Nineteen (70.4%) of the twenty five patients still had same microorganisms on swab II. Use of Silver Sulfadiazine in group B managed to clear microorganism in seventeen patients (73.9%) and only eight patients (29.6%) still had the same microorganisms in swab II. This was statistically significant as p value was 0.0018.

7. DISCUSSION

Throughout History man has had to contend with dermal wounds. In primitive societies substances derived from animal plants and minerals formed the basis of crude remedies[10] needed to staunch bleeding , reduce swelling, minimize pain, reduce swelling, minimize pain, remove damage tissue, that infection, mask foul swells and promote healing. The earliest documented records of tropical wound treatments were found in Mesopotamia (used clay tables in approximately 2500 B.C ,) then ancient Egyptians, via the Greeks to Roman medicine[10] , but the history of progress in wound came during the middle ages to the present time is incomplete[11]

During the 19th century, the discovery of chemical preservatives and disinfectants [17], as well as a better understanding of the nature of infection and inflammations, allowed increased control of wound infection. In the 20th century, the discovery and development of potent antimicrobial agents with high specificity, improved the management of infected wound. There is relentless emergency of antibiotic resistant strain of pathogens, often with multiple antibiotic resistances. This, followed by the diminished effectiveness of current therapies, a careful consideration of antibiotic used in treatment options is very important. Rifamycine is manufactured as a parental antibiotic against Tuberculosis (TB).

Researches carried out on its use on burn wound are usually as a parental antibiotic not topical use [36]. Most of the available data are concentrated on its use as second line anti-TB drug in combination with other drugs. The use of Rifamycine on burn wound in KNH needed a proper research before use.

Antibiotics are indicated in cases of overt wound infections where classical signs are evident. In laboratory studies, the evaluation of an antimicrobial agent often begins with determination of minimum inhibitory concentrations (M.I.C) to determine potency. Then continues with suspension tests (both qualitative and quantitative) to assess rates of inhibition and may include capacity tests to evaluate persistence. The use of Silver Sulfadiazine in this study was strictly as per manufacture's recommendation.

For Rifamycine, the dosage used is the kind recommended for treating T.B skin ulceration. The mode of action and penetrations was assumed to be the same in burn wound as in a TB wound. This is a weakness of the study.

The adverse effects of Rifamycine are very few. Occasionally, it is known to produce a flu like syndrome in individuals who take the drug intermittently. There have been reports of interstitial nephritis, thrombocytopenia and hemolytic anaemia. Side effects of Rifamycine after local applications are extremely rare [4,8] but cases of allergic contact dermatitis have been described. In this study none of the patients showed any allergic dermatitis.In this study, the most commonly isolated organisms from burn patients were *Pseudomonas* species followed by *Staph. aureus* and *Klebsiella* species. These results are in accordance with other studies done recently [21,25,33]and confirms Nthumba 2001 dissertation. Any antibiotic used on a burn wound should be sensitive to *Pseudomonas.* Rifamycine in this study showed resistance in 68.4% of *Pseudomonas* cultured in group A, and 81% in group B. *Pseudomonas aeruginosa* bacteremia has an estimated mortality rate exceeding 50% and is associated with fatality rates higher than those associated with other gram-negative bacteremic infections [39]

Silver Sulfadiazine was better to Rifamycine in all micro organism isolated from burns wound in this study.

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7.1 CONCLUSION

Topical use of Rifamycine on infected burn wound should be abandoned and use Silver Sulfadiazine Wounds and their management are fundamental to the practice of surgery and the surgeon's task is to minimize the adverse effects of the wound, remove or repair damaged tissues to enhance the process of wound healing and avoid useless expenses from patients.

8. RECOMMENDATIONS

1. Use of Rifamycin on infected burn wounds should be abandoned especially where Pseudomonas aeroginosa is involved.
2. Sliver Sulfadiazine appear quite effective in all microorganisms and should be the drug of choice on infected burn wound.
3. Use of Rifamycin should strictly be used on the burn wound where culture and sensitivity has been carried out and Rifamycin found sensitive to the pathogens.
4. Rifamycin is an anti T.B drug that is recommended for use in the second line of treating T.B. With increased prevalence of T.B. in our society due to HIV endemic, there should not be rationale use of Rifamycin on burn patients as this may predispose to resistant tuberculus bacilli.

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ANNEX I: QUESTIONNAIRE

Code No.....

1. Patient Name.....Age..... Sex.....IP.NO: .....
2. Duration of Burn at time of study .....
3. Cor-Morbidity (List) .....
4. Burns:

TBSA ☐	CAUSE ☐	CLASSIFICATION ☐
(i) Upto 10%	A- thermal	(A) superficial – superficial
(ii) 10-30%	B- Electricity	- Deep
(ii) 30-50%	C-Chemical	(B)Deep – superficial
(iv) >50%	D-Others	- Deep

SITE ☐

1.Head or /neck 3.Lower limp 5.Posterior trunk

2.Upper Limps 4.Anterior Trunk 6.Ext Genitalia

6. Group of subject – Group A ☐ Group B ☐
7. Duration of Dressing
   - ❖ After 12 hours. ☐
   - ❖ After 24hours ☐
   - ❖ After 48hours. ☐
   - ❖ More than 72hours. ☐
   - ❖ *After 72hours.* ☐
8. Systemic Antibiotic used: -
   - ❖ Penicillin ☐ Gentamycin ☐
   - ❖ *cephalosporin* ☐ *Other* ☐
9. Pus swab results after the dressing duration.

ANNEX 2: CONSENT INFORMATION

LETTER OF REQUEST FOR CONSENT
DEAR PATIENT/GUARDIAN

I am Dr. Josphat Njuguna Wa Njeri, a surgical registrar. This is to inform you that we are conducting a study on care of burn wounds using Rifamycin, an antibiotic currently approved for use in management of bacterial infections. The purpose of the study is to check how effective the drug wound be in removing bacterial infections on burn wounds if applied topically. We also hope to compare this result with the use of silver sulfadiazine, a well established topical antibiotic recommended for use in management of burns.

We are asking you to volunteer to participate in this study. Those eligible to the study will have pus swabs collected from the wounds before and after dressing with Rifamycin . This will not interfere with the other regular steps in wound care.

Your participation is voluntary. It is important to know the following:

- You do not have to be in this study if you do not want to.
- If you decide not to have the test done, you will continue receiving the appropriate wound care without any discrimination.
- You will be informed about the results and where necessary the result will be used in management of your wounds.
- You have the freedom of withdrawing from the study at any particular time.

BENEFITS: - the result will be incorporated in the care of the wound. This will help improve healing and possibly reduce hospital stay. If the drug is found to be effective, you or guardian will be shown how to use the drug as an outpatient.

RISK AND/OR DISCOMFORTS: You may feel discomfort when taking the pus swab. No risk or research related injury is excepted but incase of any, we will

give you immediate necessary treatment for your injuries, free of charge. There is no program for monetary compensation or other forms of compensations for such injuries. You do not give up any legal rights by signing this consent form.

PROBLEMS OR QUESTIONS: - if you have any questions about the tests or if you have a research related injury you should contact Dr. Njuguna. J. Wa Njeri at 0722 612598. If you have questions about your rights as a research participant, you should contact Prof. Bhatt, the chair of the Kenyatta National Hospital Ethics and Research committee at 2726300 Nairobi.

CONFIDENTIALITY: Efforts will be made to keep your personal information confidential. Any sample from you or information about you will be identified by code. The link between your name and code will be kept in a secure location. Any publication of this study will not use your name or identify you personally.

Yours truly,

Josphat Njuguna wa Njeri Contact 0722 612598
Study coordinator.

ANNEX III: INFORMED CONSENT AGREEMENT

A RESEARCH PARTICIPANTS

I ..... (Subject's name) having full capacity to consent for myself/my child and having attained my participation in the research study.

I have the knowledge that the investigator Dr JOSPHAT NJUGUNA WA NJERI is conducting a study on Topical use of Rifocin (Rifamycin sv). He is to examine me/my child's wound when been dressing and take pus specimen for laboratory analysis.

The implications of my participation, the nature duration and purpose, the method and means by which it will be conducted and the inconveniences and hazards which may be reasonably expected to have been explained to me by .....

I have been given the opportunity to ask question concerning the investigational study and many such questions have been answered to my full and complete satisfaction. Should any question arise, I may contact. Dr. Josphat Njuguna as Tel: 0722- 612598, P.O Box 2872 THIKA

I understand that I am free at any time during the course of this study to revoke my consent and withdraw myself from the study without prejudice. However I may be requested to have myself/my child undergo further examination if in the opinion of the doctor such an examination is necessary for my/child's well being.

I voluntarily consent to participate in the study.

SUBJECT'S NAME ..... DATE: .....

SUBJECT'S SIGN..... WITNESS: .....

STUDY NUMBER.....

INVESTIGATORS STATEMENT : I have explained the whole procedure of the test to the above and have ensured he/she have understood the procedure.

Yours truly,Dr Njuguna wa Njeri,.....(study coordinator).

ANNEX 1V: SPECIMEN MEDIA

(Ref: Monica Cheesbrough, District laboratory Practice in Tropical Countries Part II)

1. STUART TRANSPORT MEDIUM FORMULATION (g/l)

Sodium glycerophosphate 10.0, sodium thioglycollate 0.5, cystcine hydrochloride 0.5, calcium chloride 0.1, methylene blue 0.001, Agar 5.0.

2. MAC.CONKEY AGAR TYPICAL FORMULATION

Peptone 20.0, lactose 10.0. Bile salt 5.0, Sodium chloride 5.0, Neutral red 0.075, Agar 12.0.

3. KIRBY-BAUER NCCLS MODIFIED DISC DIFFUSION TECHNIQUE.

The validity of this carefully standardized technique depends on using discs of correct antimicrobial content, an inoculum which gives confluent growth, and a reliable Mueller Hinton agar. The test method must be followed exactly in every detail. After incubation at 35^0C for 16-18 hours, zone sizes are measured and interpreted using NCCLS standards. These are derived from the correlation which exists between zones sizes and Minimum Inhibitory Concentration (MIC).

Requirement

(a). Mueller Hinton sensitivity testing agar.

Prepare and sterilize the medium as instructed by the manufacture. The pH of the medium should be 7.2-7.4.pour into 90mm diameter sterile Petri dishes to a depth of 4 mm (about 25 ml per plate). Care must be taken to pour the plates on a level surface so that the depth of the medium is uniform. Control each new batch of agar by testing it with a control strain of E.faecallis (ATCC 29212 or 33186) and co-trimoxazola

disc. The zone of inhibition should be 20mm or more in diameter. Store the plates at 2-8 ^{0}C in sealed plastic bags. They can be kept for up to 2weeks. For use, dry the plates with their lids slightly raised in a 35-37^{0}C incubator for about 30 minutes.

(b). Antimicrobial discs

The choice of antimicrobials to be included in sensitivity tests will depend on the pathogen, the specimen, range of locally available antimicrobials, and local prescribing policies. Consultation between laboratory, medical and pharmacy staff is required. The range of first choice drugs should be limited and reviewed at regular intervals. Additional drugs should be included only by special request. Where there is cross-resistance, only one member from each group of related antimicrobials need be selected. An oxacilin disc is representative of the whole group of betalactamase resistant penicilins when testing staphylococci. About 1 hour before use, the working stock of discs should be allowed to warm to room temperature, protected from direct sunlight. *Important*: Decreasing control zone sizes with a particular antimicrobial disc is often an indication of deterioration of the antimicrobial due to moisture or heat.

(c) Turbidity Standard Equivalent to Mcfarland 0.5

This is a barium sulphate standard against which the turbidity of the test and control inocula can be compared. When matched with the standard, the inocula should give confluent or almost confluent growth. Shake the standard immediately before use.

KENYATTA NATIONAL HOSPITAL
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Fax: 725272
Telegrams: "MEDSUP", Nairobi.
Email: **KNHplan@Ken.Healthnet.org**

Ref: KNH-ERC/ 01/ 3396 **Date: 29th March 2006**

Dr. Josphat Njuguna Wa Njeri
Dept. of Surgery
Faculty of Medicine
University of Nairobi

Dear Dr. Njuguna

RESEARCH PROPOSAL: "TOPICAL USE OF RIFAMYCIN SV (RIFOCIN) ON BURN WOUNDS AT KENYATTA N. HOSPITAL" (P152/08/2005)

This is to inform you that the Kenyatta National Hospital Ethics and Research Committee has reviewed and **approved** revised version of your above cited research proposal for the period 29th March 2006 – 28th March 2007.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given.

On behalf of the Committee, I wish you fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of database that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely

PROF A N GUANTAI
SECRETARY, KNH-ERC

c.c. Prof. K.M.Bhatt, Chairperson, KNH-ERC
The Deputy Director CS, KNH
The Dean, Faculty of Medicine, UON
The Chairman, Dept.of Surgery, UON
The HOD, Medical Records, KNH
Supervisors: Mr. Stanley O. Khainga, Dept. of Surgery, UON
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