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Successful management of an outbreak of *Acinetobacter* baumannii infection in a tertiary care burns unit

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Abstract

Acinetobacter baumannii has become a notable and worrisome pathogen in the hospitals world over, and nosocomial outbreaks in the intensive care units and the burn units have been reported. It poses high morbidity and mortality at hospitals throughout the world. The Acinetobacter Baumannii-calcoaceticus complex is responsible for most of these infections, mainly the multidrug-resistant strain. It accounts for 1-3% of hospital infections and predominantly affects immune compromised patients. Burn wounds provide favourable alcove for microbes to dwell. Patients with burn injury are at a high risk of infection as a result of the nature of the burn injury and the immuno-compromised status along with prolonged hospital stay and invasive diagnostic methods and treatment procedures. These outbreaks are mostly caused by MDRAB which pose greater threats in vulnerable patients. In the month of March 2020, four patients in the burn unit simultaneously started having fever with chills. Blood culture, wound swab culture and Urine cultures were sent. Meanwhile, all these patients were started empirically on injection Tigecycline, Netilmicin and Vancomycin along with antipyretics. They were kept on strict vitals, input-output monitoring. They were also administered high calorie high protein diet. Daily dressings were done with sterile gauze and paraffin coated tullegrass gauze, following hand hygiene and personal hygiene measures. Multi Drug Resistant bacteria are well recognised for causing most important current public health problems and an outbreak occurs due to lapses on part of both patient and administrative side. Here the outbreak appeared to be initiated from Dressings trays, ward doors and hands which was confirmed by similar sensitivity patterns on culture media. The study also showed that proper implementation of hand hygiene methods, disinfection of ward and more number of dressings decreased the incidence of bacteria thus bringing the outbreak under control.

Keywords: multidrug resistance, acinetobacter baumannii, disinfection, multi-drug resistance

Introduction

Acinetobacter baumannii has become a notable and worrisome pathogen in the hospitals world over, and nosocomial outbreaks in the intensive care units and the burn units have been reported [1, 2]. It poses high morbidity and mortality at Hospitals Throughout the world [3]. The Acinetobacter Baumannii-calcoaceticus complex is responsible for most of these infections, mainly the multidrug-resistant strain [4]. It accounts for 1-3% of hospital infections and predominantly affects immune compromised patients [2].

In humans, Acinetobacter species remain as normal skin flora occasionally cultured from moist skin of healthy humans where as in hospitalised patients it is seen to colonise in respiratory tracts and gut of the patients. It can be easily transmitted thereby remaining viable in hospital setups for long due to multi-drug resistance, ability to resist desiccation and binding to inanimate surfaces which is the main cause of an outbreak [5]. Patients can also acquire infections from medical equipments such as intravenous lines, catheters, endotracheal tubes, ventilators, Trolleys, food supplies at the hospital or even the health care providers [6]. Burn wounds provide favourable alcove for microbes to dwell. Patients with burn injury are at a high risk of infection as a result of the nature of the burn injury and the immuno-compromised status along with prolonged hospital stay and invasive diagnostic methods and treatment procedures [7]. These outbreaks are mostly caused by MDRAB which pose greater threats in vulnerable patients. The Infectious Diseases Society of America (IDSA) identified A. Baumannii among the top seven pathogens threatening our healthcare-delivery system andas a prime example of unmet medical need [8]. We present an outbreak of MDR A. Baumannii which was managed Succesfully in the Burns unit of Government Medical College Hospital, Jammu in the month of March 2020.

Material and Methods

The Burns unit in our hospital comprises of 12 beds, arranged equidistantly in 2 cubicles (6 beds in each cubicle). The newly admitted patients are managed in the first cubicle. After the initial resuscitation and stabilization, they are shifted to the second cubicle.

On an average, the burn ward receives 12 patients in a month. The burn ward also has central ventilation with automatic indoor temperature adjustment.

The patients with burn injuries are subjected to all baseline investigations such as complete blood counts, renal function tests, liver function tests, blood grouping, chest X-ray, ECG and wound culture and sensitivity. Patients are resuscitated with IV fluids as per the Parkland formula, along with analgesics, antacids and antibiotics.

Burn wound swabs which were sent for Culture sensitivity reporting to the microbiology department were processed according to standard microbiological techniques. MDRAB was defined as A. baumannii resistant to three or more antimicrobials of the following: aminoglycoside, β-lactam-β-lactamase inhibitor, antipseudomonal carbapenem, antipseudomonal cephalosporin, and fluoroquinolone [9]. Sterile swabs moistened with sterile distilled water were used to swab items in the burn ward, like dressing room trolley, transport trolley, patient's beds, silver sulfadiazine ointment, water taps etc. Sampling from the hands of health care workers (HCWs), including burn dressers, doctors, nurses, were also done to assess the potential of hand carriage. They were immediately inoculated onto 5% sheep blood agar plates and in BHI broth and incubated overnight in air at 37∘ C. Microorganisms were identified by conventional methods and were tested for susceptibility to Ampicillin/Amoxycillin, Amoxy clavulanic acid, Piperacillin-tazobactam, Cefotaxime/Ceftriaxone, Cefepime, Imipenem/Meropenem, Amikacin, Gentamycin, Ciprofloxacin/Levofloxacin, Cotrimoxazole, Tetracycline/ / Minocycline using Kirby Bauer disc diffusion method according to CLSI guidelines [10].

Outbreak description

In the month of March 2020, four patients in the burn unit simultaneously started having fever with chills. Blood culture, wound swab culture and Urine cultures were sent. Meanwhile, all these patients were started empirically on injection Tigecycline, Netilmicin and Vancomycin along with antipyretics. Aditionally, these four patients were isolated from other burn patients. They were kept on strict vitals, input-output monitoring. They were also administered high calorie high protein diet. Daily dressings were done with sterile gauze and paraffin coated tulle grass gauze, following hand hygiene and personal hygiene measures. However, consultation from other departments such as ENT, obstetrics and Gynecology, Orthopedics, Neurosurgery departments were also done as per requirement and their instructions followed and treatment modifications if required.

Patients were then followed up for their resolutions of symptoms such as fever and wound health. It was seen that the patients who were put on tigecycline and netlimycin showed no spike in body temperature from the very next day as well their wound health improved.

Wound swab cultures which were sent from the patients admitted under Burn unit showed growth of MDRAB resistant to Piperacillin+ Tazobactam, levofloxacin, minocycline, cephalosporins, cotrimoxazole, Meropenem.

Culture reports from microbiology department showed that Acinetobacter Baumannii was isolated from all 4 patients. The species presence were also confirmed by various biochemical tests such as

1. Gram staining: gram negative cocci which were arranged in pairs and few in chains
2. Oxidase: negative
3. Showed growth at 42*C
4. Oxidative fermentation glucose test: showing oxidative pattern
5. Ferments 10% lactose
6. Non-motile
7. Negative for indole and urease test

The isolates were MDRAB showing resistance to ceftriaxone, cefotaxime, ciprofloxacin, Piperacillin, tazobactam but showed sensitivity to amikacin, gentamicin and tigecycline. The isolates were obtained mainly from bed handles, dressing trays and doors. However the samples taken from nursing staff, doctors on duty and dresser tested negative for the same. The Infection Control Committee of the hospital was informed and was asked to appropriate measures. The sanitation department set up a strategy which spanned over 2 weeks and included measures such as training of health Care worker about possible measures such as hand hygiene, aseptic prevention, personal protection, proper biomedical waste management according to standard protocols [11]. Soap dispensers were put up in ward and washrooms. Restricted movements of staff and the attendants to the ward were done and if done then proper shoe covers and head covers made to put so as to avoid cross contamination of the wound. Dressers in burn unit were made to change gloves, wear masks, gowns and wash hands before and after dressing of each patient.

All bandages were autoclaved properly and kept safely in sterile containers and never in open. Number of Dressings of patients with burn surface area more than 30 % were increased. Doctors, nurses and dressers room were disinfected as per standard protocol every day. In case of discharge or any death of the patient the area was cleaned throughout with disinfectants. Bed sheets were changed every day. Environment cleaning and disinfection was increased 3 times a day. Rational use of antibiotics was practised. Ensuing precautions the case-load decreased to 3 cases in month of April and 1case in May 2020. Samples from beds, trolleys so forth showed negative cultures for Acinetobacter baumannii. We were Succesful in treating all four burn patients and they were subsequently discharged after the wounds healed.

Discussion

Multi Drug Resistant bacteria are well recognised for causing most important current public health problems and an outbreak occurs due to lapses on part of both patient and administrative side. Here the outbreak appeared to be initiated from Dressings trays, ward doors and hands which was confirmed by similar sensitivity patterns on culture media. The study also showed that proper implementation of hand hygiene methods, disinfection of ward and more number of dressings decreased the incidence of bacteria thus bringing the outbreak under control. However, the control of MDRAB still proves to be a major task in immunologically compromised burn patients. Hence isolation of patient, contact precaution, education of staff and attendants is very important. To conclude, environment factor play an important role in causing outbreak of potentially life threatening MDRAB infection and can be controlled with early detection with strong clinical suspicion, backed by evidence based management. Most importantly, maintaining proper hygiene, sanitation and proper sterilization of the environment holds the key to a successful outcome.

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