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Short Communication

Report on the newly emerging nosocomial *Burkholderia cepacia* in a tertiary hospital

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ABSTRACT

Background: *Burkholderia cepacia* is an aerobic, motile, opportunistic Gram negative bacillus that can survive in certain disinfectants. This is a report of the emerging infection with the bacteria *B. cepacia* in our hospital. The awareness of this emerging bacterium is important, as it is known to cause nosocomial infection in hospitals, especially in the Intensive Care Unit (ICU) setting. setting. *B. cepacia*, although known to be multidrug resistant, shows sensitivity to some antibiotics that can be used to treat infection caused by it.

Methods: The cases of infection and antimicrobial susceptibility of nosocomial *B. cepacia* pattern have been analyzed.

Results: A total of 38 cases with *B. cepacia* infection were isolated. Two of these cases showed the organism in two samples, totalling the sample collection to 40. The most frequent isolation of *B. cepacia* was from blood 21/40 (52.5%) and pus 9/40 (22.5%). *B. cepacia* infections were most commonly observed in the Intensive Care Unit (52.6%). Infections were more common in men than women with a mortality rate of 42%. The most sensitive antimicrobial agents were found to be Colistin (93%) and Cotrimoxazole (71%).

Conclusion: There have been 38 cases of the emerging nosocomial *B. cepacia* infection in our hospital in the period from September 2012 to February 2014. There was no case reported in the records before September 2012. Infections caused by *B. cepacia* should be made aware of and taken seriously because of its high transmissibility, intrinsic resistance to antibiotics, high mortality and most importantly its sensitivity to simple antibiotics such as Cotrimoxazole.

Introduction

Burkholderia cepacia, formerly *Pseudomonas cepacia*, is widely distributed in natural and man-made habitats, and has been isolated from soil, plant and water.[1–6] These bacteria exhibit an extraordinary metabolic versatility, allowing their adaptation to a wide range of environments and emerged in the 1980s as life-threatening and difficult-to-treat pathogens among patients suffering from cystic fibrosis.[2] It is a non-fermenting,

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gram-negative, aerobic, multidrug resistant bacillus that can survive in the presence of certain disinfectants.[7] *B. cepacia* is an opportunistic pathogen that causes disease primarily among immunocompromised populations and has been associated with outbreaks involving infections of the bloodstream, respiratory tract, and urinary tract in Intensive Care Unit (ICU) settings.[8] Early detection and treatment with appropriate antibiotics of this organism are important because of its high transmissibility in the hospital setting, intrinsic resistance to many antibiotics, and association with poor prognosis.

In this study, we report the isolation of 38 cases of *B. cepacia* along with antimicrobial susceptibility pattern of the organism during the period September 2012 to February 2014 in our hospital.

Materials and methods

This hospital received a total of 65,453 samples for culture testing in the period from September 2012 to February 2014, out of which 1741 were from the ICU. A total of 1173 samples of the ICU were found to be positive for bacterial growth. During the study period, *B. cepacia* was isolated from various clinical specimens of 38 patients of the hospital. Two samples were received from two of the patients, totalling the samples to 40. *B. cepacia* was isolated on aerobic MacConkey agar, Blood agar and for urine samples on Cystine Lactose Electrolyte Deficient (CLED) agar. Gram stain revealed small gram-negative rods. Identification of microorganisms and the *in vitro* activities of antimicrobial agents against the clinical isolates of *B. cepacia* were identified by the Vitek 2 (BioMerieux, France). Vitek is an automated system that analyzes MIC patterns and identifies the organisms tested including the antibiotic susceptibility testing by phenotype. Since automated systems are not foolproof, the identification of the isolates was confirmed by conventional biochemical testing and only the isolates positive by both methods were taken for the study. The bacteria were motile, non-lactose fermenting, catalase and oxidase positive. Glucose, maltose and lactose were utilized oxidatively. Antibiotic susceptibility test was also performed using Kirby–Bauer disk diffusion methods as per the Clinical Laboratory Standards Institute (CLSI) guidelines. No major discordance was found between the two methods. Analysis of the distribution of infection in wards, site of infection, demographic and clinical data was also performed.

Results

Isolates of *B. cepacia* from various clinical specimens of 38 patients from our hospital were included in the study. The demographic and clinical characteristics of patients is given in Table 1. The male/female ratio was 2.2:1. The mean duration of admission was 18 days with a mortality rate of 42% (16/38).

The ward wise distribution of different clinical isolates is given in Table 2. Most of the cases of *B. cepacia* infections were seen in the ICU 20/38 (52.6%). There was one patient from NICU (2.6%) and 18 from other wards (47.3%). Most of the infections were hospital acquired and due to various risk factors such as insertion of IV line, Central line, tracheostomy and Foley's catheter. Burkholderia being a contaminant was considered the infecting organism only when it was repeatedly isolated from the same patient and in consonance with the clinical features. ''Cepacia syndrome'' was found to be present in 21 patients (52.5%), in whom there was bacteraemia with rapid deterioration of lung function. Death occurred in 14 of these 21 patients. Early and aggressive management with appropriate antibiotics was instituted resulting in survival of the remaining seven patients. All the patients were treated according to the antibiotic susceptibility pattern, resulting in improvement of symptoms and general condition of patients. Two of the other patients who died had other comorbidities and confounding factors, which might have contributed to their death. The distribution of type of infection is as given in Fig. 1. Out of the 38 patients in the study, the organism was isolated from

Table 1 – Ward-wise distribution of different clinical isolates.

Wards	No. (%) of patients
Intensive Care Unit	20/38 (52.6)
Wards	17/38 (44.7)
NICU	1/38 (02.6)

Table 2 – Demographic and clinical characteristics of 38 patients with *Burkholderia cepacia* infection.

Characteristic	Value
Gender, male/female	26/12 (2.2:1)
Duration of hospitalization (days)	18 (average)
No of patients who died	16/38 (42%)

Table 3 – Clinical diagnosis of patients, in whom Burkholderia was isolated.

Clinical diagnosis	No. of cases
Respiratory infections	12
Neoplasm	6
GI infections	6
Dengue and malaria	6
Head injury	4
Septicaemia	2
Orthopedic condition	2

Note: Respiratory infections include exacerbation of COPD and pneumonitis. GI infections include 2 cases of pancreatitis and 4 cases of peritonitis.

Table 4 – Antimicrobial susceptibility pattern of *Burkholderia cepacia*.

Antibiotics	Sensitivity (%)
Tetracycline	10
Ciprofloxacin	20
Imipenem	41
Cefperazone/sulbactam	60
Cefepime	69
Trimethoprim/sulfamethoxazole	71
Colistin	93

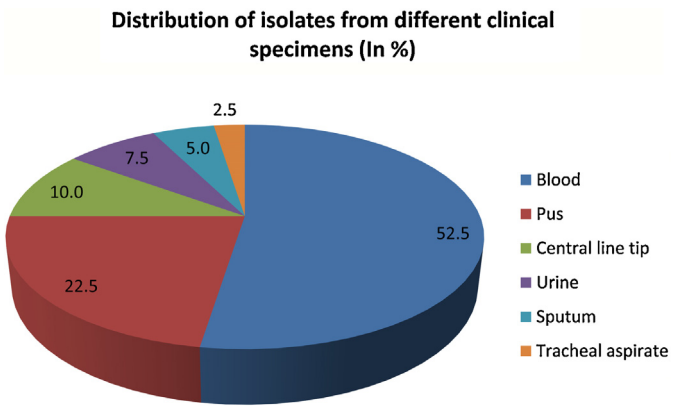

Fig. 1 – Distribution of isolates from different clinical specimens (in %).

the blood and central line of one patient and from blood and tracheal aspirate of another patient, thus resulting in a total of 40 samples. In our hospital, the most frequent isolation of *B. cepacia* was from blood 21/40 (52.5%). This was followed by pus 9/40 (22.5%), central line catheter tip 4/40 (10.0%), urine 3/40 (7.5%), sputum 2/40 (5%) and tracheal aspirate 1/40 (2.5%). The clinical diagnosis of patients with their breakup is depicted in Table 3, the most common being that of respiratory conditions.

The antimicrobial susceptibility of *B. cepacia* isolates is summarized in Table 4. 90% of the isolates were found to be multidrug resistant. The most sensitive antimicrobial agents were Colistin (93%), Cotrimoxazole (71%), and Cefepime (69%), followed by Imipenem (41%) and Tigecycline (40%).

Discussion

Gram-negative rods can be opportunistic pathogens responsible for nosocomial infections. Nonfermenting gram-negative bacteria pose a particular difficulty for the healthcare community, because they represent the problem of multidrug resistance to the maximum. Important members of the group include *Pseudomonas aeruginosa*, *Acinetobacter baumannii* and *Stenotrophomonas maltophilia*. Multidrug resistance is increasing among gram-negative nonfermenters, and a number of strains have now been identified that exhibit resistance to essentially all commonly used antibiotics, including antipseudomonal penicillins, cephalosporins, aminoglycosides, tetracyclines, fluoroquinolones, trimethoprim-sulfamethoxazole, and carbapenems.[9]

B. cepacia is a newly emerging nonfermenting gram-negative bacteria causing nosocomial infections. It is associated with a wide variety of infections, including pneumonia, bacteraemia, skin and soft tissue infection, genitourinary tract infection secondary to urethral instrumentation. Outbreaks can occur through exposure to contaminated solutions such as antiseptics, disinfectants, nebulizer solution, and dextrose solution in hospitalized patients.[4,5,7]

The multiple-antibiotic resistance of *B. cepacia* has been attributed to an impermeable selective outer membrane, an efflux pump mechanism, and/or the production of an inducible chromosomal beta-lactamase.[9] The multidrug resistance of *B. cepacia* can cause serious problems in the clinical setting because of its high transmissibility between hospitalized patients. *B. cepacia* can spread to susceptible persons by person-to-person contact, contact with contaminated surfaces and exposure to *B. cepacia* in the environment. Improved antibiotic stewardship and infection-control measures such as hand hygiene will be needed to prevent or slow the emergence and spread of multidrug-resistant, nonfermenting gram-negative bacilli in the healthcare setting.[10]

In conclusion, nosocomial infections due to *B. cepacia* were first reported in September 2012 in our hospital and 40 samples have isolated the organism since then. Death occurred in 16 of the 38 cases (42%). Various studies have documented the mortality rates between 41% and 83%.[6,10] Studies in Korea have documented mortality rates between 43% and 46%. Most of *B. cepacia* infections occurred in ICU especially in patients associated with invasive procedures. Hence, the rapid identification of the cases with strict infection control measures must be applied to avoid spread of the organisms. Awareness of infections caused by *B. cepacia* should be spread among health care workers, because of its high transmissibility, intrinsic resistance to antibiotics, high mortality and most importantly the knowledge that this organism can be sensitive to simple antibiotics such as Cotrimoxazole.

Conflicts of interest

The authors have none to declare.

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