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# NOSOCOMIAL OUTBREAKS DUE TO *PSEUDOMONAS AERUGINOSA* AND *ACINETOBACTER BAUMANNII* IN A NEONATAL INTENSIVE CARE UNIT (NICU) OF THE UBERLÂNDIA FEDERAL UNIVERSITY HOSPITAL

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## ABSTRACT

The study documents the occurrence of two subsequent outbreaks in the NICU of HC-UFU, caused by epidemic strains of multiresistant *Pseudomonas aeruginosa* and *Acinetobacter baumannii,* that occurred between March/01 and September and between October/01 and March/02, respectively. The *P. aeruginosa* outbreak included seven neonates with conjunctivitis and three with bacteremia. A case-control study was conducted for the *A. baumannii* outbreak, with 11 and 22 neonates, respectively. The isolates of *A. baumannii* were resistant to gentamacin and ciprofloxacin. *P. aeruginosa* isolates were resistant to ampicillin/sulbactam gentamicin and ciprofloxacin. The hands of healthcare workers and environmental cultures were negative. The outbreak of *P. aeruginosa* resulted in the increase of use of imipenem, which could have favoured the emergence of a *A. baumannii* epidemic strain, despite of its susceptibility to this antibiotic. The risk factors for *A. baumannii* infection were: weight <1500g, age < 7 days, hospitalization > 7 days and use of carbapenems. Containment of the two outbreaks was achieved by introduction of strict hygiene measures and careful nursing care of the infected infants. The reservatory and the route of transmission were not found.

**Key words:** outbreak, neonate, *Acinetobacter baumannii*, *Pseudomonas aeruginosa.*

## INTRODUCTION

*Pseudomonas aeruginosa* and *Acinetobacter baumannii* are the most prevalent nonfermentative bacterial species isolated from clinical specimens of hospitalized patients (1,5). This study documents the occurrence of two subsequent outbreaks in NICU, one caused by *Pseudomonas aeruginosa* and the other by *A. baumannii*. The outbreaks occurred from March/01 to September/01 and from October/01 to March/02, respectively.

## PATIENTS AND METHODS

The *P. aeruginosa* outbreak affected ten babies. Three of them had positive blood culture and seven had conjunctivitis. A case-control study was performed during the *A. baumannii* outbreak. The epidemic strains were *A. baumannii* resistant to gentamicin and ciprofloxacin, and *P. aeruginosa* resistant to ampicillin/sulbactam, gentamicin and ciprofloxacin. Once the outbreaks were detected, surveillance cultures were taken in three opportunities from the pharynx and rectum of all infants in the NICU. The hands of most healthcare workers and environmental samples were tested. The susceptibility to antibiotics was tested in Mueller-Hinton agar using the disk diffusion method according to NCCLS guidelines (2). All *A. baumannii* isolates were screened for resistance to ceftazidime and cefpime by the Minimum Inhibitory Concentrations (MICs) (3).

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## RESULTS AND DISCUSSION

The outbreaks caused by *P. aeruginosa* and *A. baumannii* isolates, affecting ten and eleven infants, respectively, are observed in Fig. 1. *P. aeruginosa* infection was found in seven neonates with conjunctivitis and three with septicemia. Patients affected by the outbreak caused by *A. baumannii* strains presented clinical signs of sepsis. Cultures from the hands of health care professionals, environment, pharyngeal and rectal samples from neonates of NICU were negative for both organisms. The epidemic strains were susceptible to imipenem only. Risk factors included low birth weight (≤ 1500g), age ≤ 7 days, hospitalization ≥ 7 days, and the use of carbapenem (4). All *P. aeruginosa* and *A. baumnannii* isolates showed the same pattern of multiple resistance and susceptibility to imipenem. The $MIC_{50}$ and $MIC_{90}$ for ceftazidime and cefpime for *A. baumannii* were 1µg/mL and 8µg/mL, respectively. From March/01 to September/01, an increase of use of imipenem due to the occurrence of *P. aeruginosa* outbreak was observed in the unit. This fact could have favoured the emergence of *A. baumannii* epidemic strain in spite of its susceptibility to this antibiotic.

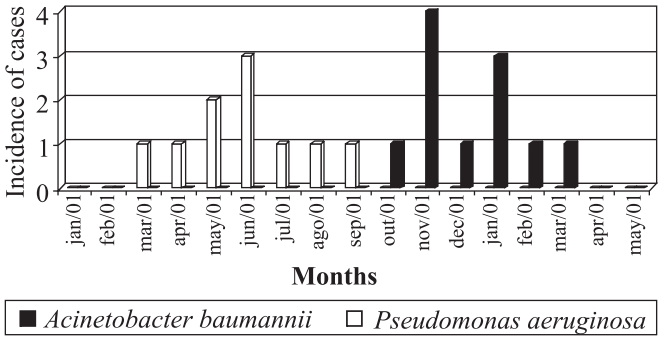


**Figure 1.** Distribution of *Pseudomonas aeruginosa* and *Acinetobacter baumannii* infected patients in a Neonatal Intensive Care Unit. Uberlândia Federal University. January, 2001, to May, 2002.

**Table 1.** Risk factors for aquisition of *Acinetobacter baumannii* infection.

| Risk factor | Case N=11 | | Controls N=22 | | p |
|---|---|---|---|---|---|
| Weight | N | % | N | % | |
| >1500g | 4 | 36.4 | 17 | 77.3 | |
| ≤ 1500g | 7 | 69.6 | 5 | 22.7 | 0.05* |
| Age | | | | | |
| > 7 dias | 7 | 63.6 | 21 | 95.4 | 0.03* |
| ≤ 7 dias | 4 | 36.4 | 1 | 4.6 | |
| Hospitalization (≥7 days) | 10 | 90.9 | 6 | 27.3 | 0.002* |
| Incubator | 11 | 100.0 | 20 | 20.9 | 0.54 |
| Antibiotic | 11 | 100.0 | 12 | 54.5 | 0.4 |
| Carbapenem | 11 | 100.0 | 0 | | 0.0000001* |

## CONCLUSION

Containment of the two outbreaks was achieved by employment of strict hygiene measures and careful nursing care of the infected infants. The reservatory and route of transmission were not found.


## RESUMO

### Surto hospitalar por *Pseudomonas aeruginosa* e *Acinetobacter baumannii* em uma unidade de terapia intensiva neonatal (UTIN) do Hospital de Clínicas da Universidade Federal de Uberlândia (HC-UFU)

O objetivo foi relatar a ocorrência de dois surtos subseqüentes na UTIN do HC-UFU, por amostras epidêmicas de *P. aeruginosa* e *A. baumannii* multirresistentes nos períodos de Mar - Set/01 e Out - Mar/02, respectivamente. O surto por *P. aeruginosa* incluiu sete neonatos com conjuntivite e três com bacteremia e um estudo caso-controle foi realizado no surto por *A. baumannii* com 11 e 22 neonatos respectivamente. Os isolados de *A. baumannii* foram resistentes a gentamicina e ciprofloxacina e os de *P. aeruginosa* a ampicilina/sulbactam além de gentamicina e ciprofloxacina. As culturas ambientais e das mãos dos profissionais de saúde foram negativas. O surto por *P. aeruginosa* resultou no aumento do uso de imipenem o que pode ter favorecido a emergência do surto por *A. baumannii* que embora suscetível a este β-lactâmico apresentou uma multiresistência importante. A análise univariada relacionou os fatores de risco predisponentes para infecção por *A. baumannii*: peso < 1500g, idade < 7 dias, hospitalização > 7 dias e uso de carbapenema. O término dos surtos foi alcançado através medidas de controle de infecção e isolamento de coorte dos neonatos infectados, não sendo possível definir o reservatório e a via de transmissão.


**Palavras-chave:** surto, neonato, *Acinetobacter baumannii*, *Pseudomonas aeruginosa.*

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