




Nursing care management in an *Acinetobacter Baumannii* infection: clinical case

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ABSTRACT

Introduction: The infection caused by *Acinetobacter Baumannii* is a worldwide public health problem due to the resistance developed by the bacteria to antibiotics and new nosocomial outbreaks. **Objective:** Describe the evidence of a clinical case that took place in the City of Chihuahua, Mexico, presenting positive results when a care plan was implemented on the patient and nursing staff. **Methodology:** An assessment was carried out based on the Marjory Gordon's functional health patterns; a nursing taxonomy was used to prepare diagnosis labels aimed to the patient and nursing staff. **Case presentation:** A 34 year-old patient was admitted to the intensive care unit of a public hospital due to a car accident; subsequently, wounds and catheter cultures were positive for *Acinetobacter Baumannii*. **Conclusions:** The nursing taxonomies were effective to stabilize the patient's health when his hemodynamic status was compromised. It is suggested to complement with the results of scientific evidence when the diagnosis labels and care plan are addressed to nursing professionals.

Key words: Critical care; Nursing care; Infection; Awareness; Public awareness(DeCS).

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Gestión del cuidado de enfermería en infección por *Acinetobacter Baumannii*: caso clínico

RESUMEN

Introducción: La infección por *Acinetobacter Baumannii* representa un problema de salud pública a nivel mundial debido a la resistencia a los antibióticos que ha desarrollado la bacteria y los nuevos brotes nosocomiales. **Objetivo:** Describir la evidencia de un caso clínico que se desarrolló en la Ciudad de Chihuahua, México, presentando resultados positivos al implementarse un plan de cuidados en el paciente y profesionales de enfermería. **Metodología:** Se realizó una valoración a partir de los patrones funcionales de salud de Marjory Gordon; se empleó una taxonomía de enfermería para elaborar etiquetas diagnósticas dirigidas al paciente y profesionales de la disciplina. **Presentación del caso:** Se trata de un paciente de 34 años de edad que ingresó a la unidad de cuidados intensivos de un hospital público por accidente automovilístico, posteriormente los cultivos de heridas y catéteres resultaron positivos de para *Acinetobacter baumannii*. **Conclusiones:** Las taxonomías resultaron efectivas para estabilizar la salud del paciente cuando estaba comprometido su estado hemodinámico. Se sugiere complementar con resultados de evidencia científica cuando las etiquetas diagnósticas y plan de cuidados sean dirigidos a los profesionales de enfermería.

Palabras clave: Cuidados Críticos; Atención de Enfermería; Infección; Concienciación; Sensibilización Pública (DeCS).

Gestão do cuidado de enfermagem na infecção por *Acinetobacter Baumannii*: caso clínico

ABSTRATO

Introdução: A infecção por *Acinetobacter Baumannii* representa um problema de saúde pública em todo o mundo devido à resistência aos antibióticos desenvolvidos pela bactéria e a novos surtos nosocomiais. **Objetivo:** Descrever a evidência de um caso clínico desenvolvido na cidade de Chihuahua, México, apresentando resultados positivos quando implementado no paciente e nos profissionais de enfermagem. **Metodologia:** Foi realizada uma avaliação com base nos padrões funcionais de saúde de Marjory Gordon; uma taxonomia de enfermagem foi usada para desenvolver rótulos de diagnóstico para pacientes e enfermeiros. **Apresentação do caso:** Paciente de 34 anos, internado em unidade de terapia intensiva de um hospital público por acidente de carro; posteriormente, as culturas de feridas e cateteres foram positivas para *Acinetobacter Baumannii*. **Conclusões:** As taxonomias da enfermagem foram eficazes na estabilização da saúde do paciente quando seu estado hemodinâmico estava comprometido. Sugere-se complementar os resultados de evidências científicas quando os rótulos diagnósticos e o plano de cuidados são endereçados aos profissionais de enfermagem.

Palavras chave: Cuidados críticos; Cuidados de enfermagem; Infecção; Conscientização; Sensibilização pública (DeCS).

INTRODUCTION

Acinetobacter refers to a group of bacteria of the gram-negative coccus type that is found in water, ground, and skin; this type of bacteria shows a low degree of virulence, but this type of infection occurs more and more in hospitalized patients, especially in the ICU. Acinetobacter is able to grow in wounds without causing infection. However, one of the most frequent types is the Acinetobacter baumannii (AB), a pathogen that causes 80% of the cases of illnesses and it is mainly associated to pneumonia, infections in the urinary tract, skin, and bacteraemia^(1,2).

One of the most common forms of AB transmission is through direct contact with the patients due to its presence in the hands of healthcare workers; additionally, the bacteria is present in surfaces and medical equipment, even in some cases where the air of the rooms was examined, the culture result was positive, thus, increasing the risk due to environmental exposure.

The evidence shows that there is a relationship between the AB infection and the patients who receive mechanical ventilation, with intravenous or urinary catheters, and individuals who have been previously exposed to pharmacological treatment with carbapenem antibiotics⁽²⁻³⁾.

AB infection has taken relevance as a worldwide public health problem, as a result of the resistance that this type of bacteria has developed toward antibiotics of broad spectrum, including carbapenem antibiotics. The World Health Organization (WHO) informed about a list of pathogens that urgently require pharmacological studies in order to develop new antibiotics, placing carbapenem antibiotics that are resistant to AB in priority level 1, or critical priority, of three possible levels. However, it is important to mention that rigorous clinical studies should be carried out to each patient due to the broad difference with respect to the resistance to antibiotics that this group of bacteria has shown⁽³⁻⁴⁾.

Due to new AB nosocomial outcrops and its resistance to antibiotics, health education is presented as an efficient tool to develop awareness with respect to this infection. Health care management performed by the nursing professional in the ICU should include a critical assessment that considers the aforementioned risk factors and asepsis and antisepsis measures, in addition to train the multidisciplinary health team and relatives in order to contribute in the prevention or timely diagnosis of AB infection.

Therefore, the clinical case of a patient with AB infection is presented. He was admitted in the ICU of a secondary level public hospital located in Chihuahua, Mexico; a care plan was developed based on a nursing taxonomy addressed to stabilize the patient's health, who was in critical condition when he was released from the operating room, and another in order to provide training to nursing

professionals, after the result to AB was positive, and, thus, promote the awareness about the risk of infection caused by this pathogen; in addition to the actions performed by the multidisciplinary health team of the hospital to prevent future outcrops.

METHODOLOGY

The study was based in the stages of the nursing process⁽⁵⁾; assessment took place through the 11 functional patterns of Marjory Gordon⁽⁶⁾, which allowed obtaining information regarding the patient's health status. The reasoning used, based on the domains, determined the nursing diagnosis according to the taxonomy of the North American Nursing Diagnosis Association⁽⁵⁾ (NANDA); after that, a nursing care was planned pursuant to the taxonomy of Nursing Outcomes Classification⁽⁷⁾ (NOC) and Nursing Interventions Classification⁽⁸⁾ (NIC), establishing the results expected for the interventions.

CASE PRESENTATION

A 34-year old male patient who had a car accident was admitted at the ICU coming from the operating room, after he had an exploratory laparotomy, fixation of the right femur due to exposed fracture and severe head injury. According to questions made to the patient's relatives, he does not have any personal pathological background, and is a social drinker and smoker. When he was admitted at the ICU, a prophylactic antibiotic treatment using third generation cephalosporin and clindamycin was applied. Lab results were: 10.10 g/dL hemoglobin; 429,000 mm³ platelets, and 17,000 uL leukocytes. After 7 days of stay in the ICU, catheter, wound, and bronchial secretion cultures were performed, resulting positive for AB.

Assessment for functional patterns

Pattern 1: Health perception

Not assessed.

Pattern 2: Nutritional-Metabolic

He is overweight, with a body mass index of 26.4 kg/m². He is under fasting.

Pattern 3: Elimination

He has a Foley type urinary catheter, size 16, without urine output at the moment of the assessment. The kidney function (creatinine, blood urea nitrogen, and urea) was within acceptable parameters, showing negative water balance when he left the operating room.

Table 1. Nursing care plan of the patient with infection due to *Acinetobacter baumannii*

NANDA	NOC	NIC
Deterioration of the gas exchange (00030). Related condition: Imbalance in ventilation-perfusion Defining characteristics: Abnormal breathing pattern. Tachycardia	Breathing status: ventilation. 0403 Indicators: 040315- Orthopnea Breathing status: gas exchange; 0402 Indicators: 040211- Sat O ₂	Airway management 3140 Activities: •Place the patient in the proper form to maximize ventilation potential •Listen to breathing sounds, observing reduced or absence of ventilation areas and presence of adventitious sounds Management of mechanical ventilation: invasive 3300 Activities: •Control the conditions that indicate the need to use ventilatory support •Control the activities that increase consumption of O ₂
Reduction of cardiac output (00029). Related condition: Afterload alteration Defining characteristics: Alteration of blood pressure Long capillary refill	Circulatory status: 0401 040101 Systolic blood pressure 040102 Diastolic blood pressure 040104 Mean blood pressure	Heart care 4044 Activities: •Perform an exhaustive assessment of the peripheral circulation. •Monitor the cardiovascular status. Fluid management 4120 •Supervise the hydration status •Monitor the hemodynamic status, including CVP, MAP, PAP, and PCWP

Pattern 4: Activity-Exercise

Ventilation support through endotracheal tube and pulmonary fields well ventilated with crackling sounds; he showed multiple abrasive wounds in the chest, a body temperature of 38.7 °C, cardiac frequency of 123 x', respiratory frequency of 34 x', arterial pressure of 87/46mmHg, average arterial pressure of 58, and depending on 0.4 mcg/kg/min of norepinephrine. He has a clean surgical wound, with well-approximated (wound) edges, right pelvic member with splint, and showing capillary refill of 4 seconds. He is in complete bed rest.

Pattern 5: Sleep-Rest

Under sedation effects with 18.5 mcg/kg/min of midazolam, 18.5 mcg/kg/min of fentanyl, and 27.7 mcg/kg/min of propofol.

Pattern 6: Cognitive-Perceptive

The number in the Richmond Agitation-Sedation Scale is -4; he shows non isocric pupils (left = 2mm, right = 4mm).

Pattern 7: Activity-Exercise

Not assessed.

Pattern 8: Role-Relationships

He lives in his own house, married, with three (3) children.

Pattern 9: Sexuality - Reproduction

Not assessed.

Pattern 10: Stress tolerance

Not assessed.

Pattern 11: Values-Beliefs

Not assessed.

Nursing Care Plan

(Table 1 and 2).

Continue (Table 1)...

<p>Injury risk (00035). Risk factors: •Intra-hospital infection •Exposure to pathogens Related condition •Alteration in the psychomotor functioning Population at risk: •Deterioration of primary defense mechanisms</p>	<p>Risk control: 1902 Indicators: 190202 Control of environmental risk factors 190204 Develop effective risk control strategies</p>	<p>Isolation 6630 Activities: •Name a member of the nursing personnel to talk to the patient and to address the rest of the personnel. •Supervise temperature, cleaning, and safety of the isolation zone. Infection control 6540 Activities: •Properly clean the area after it was used by a patient. •Isolate people exposed to transmissible diseases. •Apply the proper isolation precautions that were assigned.</p>
<p>Ineffective cleaning of the airways (00031). Related factors: •Excessive mucus Defining characteristics: •Excessive amount of sputum •Adventitious breathing sounds Related condition •Artificial airways</p>	<p>Breathing status: 0410 Indicators: 041007 Pathological breathing sounds 041020 Accumulation of sputum</p>	<p>Management of artificial airways 3180 Activities: •Suction the trachea and oral cavity, and after that the nasopharynx area to remove secretions above the ET tube ball in order to reduce the risk of aspiration. •Keep the ET tube ball at 15-20 mm/Hg during mechanical ventilation •Listen to bilateral pulmonary sound presence •Keep the head board elevated at 30-45° •Verify color, amount, and consistency of the secretions •Carry out chest physiotherapy</p>
<p>Hyperthermia (00007). Related factors: •Dehydration Defining characteristics: • Hot skin when touching it • Tachycardia Related condition: •Injury</p>	<p>Severity of the infection: 0703 Indicators: 070307 Fever 070335 Colonization of the vascular access</p>	<p>Bath 1610 Activities: •Perform the bath at a comfortable temperature. Temperature regulation 3900 Activities: •Establish a monitoring device of continuous internal temperature. •Use ice packs or cold gel packs •Adjust the setting temperature to the patient's needs Management of a central venous access device 4054 •Use strict aseptic techniques when the catheter is handled/moved, it is moved or it is used to administer medications in order to reduce blood infection related to the catheter. •Use no needle devices to favor a closed system. •Change fluid infusion systems each 72 hours. •Inspect the entry site on a daily basis to look for erythema, pain, painful sensitivity, heat, or swelling, since devices are associated to a higher infection risk.</p>

Source: NANDA, NOC y NIC, own development.

Table 2. Nursing care plan for the nursing professional of the ICU

NANDA	NOC	NIC
<p>Insufficient knowledge (00126). Related factors: •Insufficient information •Insufficient knowledge about available resources Defining characteristics: •Insufficient knowledge •Inadequate realization of tests</p>	<p>Knowledge: infection control: 1842 Indicators: 184202 Factors that contribute to the infection transmission 180706 Infection control procedures 184207 Importance of hand washing 184219 Risk of drug resistance</p>	<p>Counselling 5240 Activities: •Provide objective information, as needed and as applicable. •Inform about select aspects of the own experiences or of the personality to give authenticity and confidence, where appropriate. •Infection control 6540 Activities: •Apply the proper assigned isolation precautions. •Teach the care personnel the proper hand washing technique.</p>
<p>Willingness to improve knowledge (00161). Defining characteristics: •He/she states the desire to improve learning</p>	<p>Health beliefs: perception of threat: 1704 Indicators: 170401 Perception of threat to health 170406 Perceived severity of the disease or injury</p>	<p>Development of a program 8700 Activities: •Identify alternative proposals to address the needs or problems. •Assess alternative proposals detailing cost, necessary resources, feasibility, and necessary activities. Facilitate learning 5520 Activities: •List the information in a logic sequence. •Differentiate "critical" content against "desirable" content.</p>
<p>Inefficient planning of the activities (00199). Related factors: •Unrealistic perception of events Defining characteristics: •Insufficient resources •Fear towards the task to perform •Lack of a plan</p>	<p>Cognition: 0900 Indicators: 090009 Process information 090011 Make proper decisions Health beliefs: Perceived capacity to act: 1701 Indicators: 170108 Confidence in the capacity to carry out a health activity</p>	<p>Support during decision making 5250 Activities: •Facilitate making decision regarding collaboration. •Use Internet-based interactive computer software or helps to make decisions, as complement to professional support. Health education 5510 •Identify internal and external factors that can improve or reduce motivation to follow healthy conducts. •Formulate the objectives of the Health Education Program. •Identify resources (personnel, space, equipment, money, etc.) necessary to implement the program.</p>

Continue (Table 2)...

<p>Willingness to improve health literacy (00262). Defining characteristics: •Express the desire to improve the knowledge of the current health determinants both in social and physical settings</p> <p>•Express desire to obtain enough information to navigate through the health system</p>	<p>Participation in the decisions made about health care: 1606 Indicators: 160603 Look for proven information 160606 Identify priorities of health results 160608 Use techniques to solve problems in order to obtain the desired results</p>	<p>Orientation in the health system 7400 •Determinate and facilitate the communication among health professionals and patient/family, if any. Teaching: Procedure/Treatment 5618 •Mention the need to use special measures during the procedure/treatment, if applicable. •Strength information provided by other members of the health-care team, if applicable. Teaching: Disease process 5602 •Explain the physiopathology of the disease and its relationship with anatomy and physiology, on a case by case basis. •Identify possible etiologies, where appropriate. •Identify changes in the physical status of the patient.</p>
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Source: NANDA, NOC y NIC, own development.

CONCLUSIONS

The present clinical case shows the evolution of a 34 year-old patient with multiple injuries, who was admitted at ICU and subsequently he was diagnosed with an AB infection. A care plan was developed and implemented based on NANDA, NOC, and NIC taxonomies, where the emphasis was placed on improving the patient's hemodynamic and respiratory status since his life and function were compromised, in addition to the care towards surgical wounds and catheters. It is important to mention that patients hospitalized in the ICU, under mechanical ventilation and long stays, are part of a population in risk of developing associated AB pathologies(9, 10).

Due to the increase in the infection rate produced by AB and its difficult management, it is necessary to develop a culture of specialized care and awareness about such culture. Since pharmacotherapy as sole treatment to manage infections caused by this type of bacteria has failed, thus, evidence shows a group of interventions that have provided good results, that is, restricted use of carbapenem antibiotics, monitoring of the risk factors in patients who are admitted at the ICU, continuous training to the multidisciplinary health care team regarding hand washing, observing the recommendations regarding environmental disinfection protocols, isolation of patients whose culture was positive for AB, and carrying out cultures of medical furniture and equipment when the patient is released from the ICU(11-13).

After the application of the care plans that were developed, the patient recovered his hemodynamic status. The antibiotics used were Ceftazidime-avibactam, which were successful at reducing the infection. However, not all the cases show the same positive results(14,15); additionally, the recommendations of the evidence regarding isolation, monitoring, and cleaning of the area were observed, thus, preventing the risk of cross infection and the patient was changed to general hospitalization without ventilation support. Nursing professionals stated the importance of continuous training regarding infection outbreaks and showed availability to acquire new knowledge; moreover, they were trained with respect to the use of information and communication technology to look for the best evidence.

On a different note, it is necessary that when developing care plans a standardized language to describe human response, expected results, and interventions based on scientific evidence is used, taking into consideration the complete assessment of the patient and the clinical judgment of the nursing professionals(6). NANDA, NOC, and NIC taxonomies were adapted to the needs of the patient and his family. However, when developing interventions about disease awareness and health training addressed to nursing personnel, the use of taxonomies as the sole method is insufficient; therefore, it is suggested to complement it with scientific findings and practice based on evidence that adapt to the needs of the nursing professionals and their context.

To address an AB infection, in order to prevent cross infections and reduce the risk of new outbreaks, a group of in-

terventions where a multidisciplinary health team participates is required; the nursing professional plays an important role when participating in health education. It is suggested to complement NANDA, NOC, and NIC taxonomies with updated scientific results and adapt them to the own context when dealing with interventions addressed to the nursing professionals, since evidence available about the effectiveness of this taxonomy in research is scarce(16).

CONFLICTS OF INTERESTS

The authors stated they do not have any conflict of interest.

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