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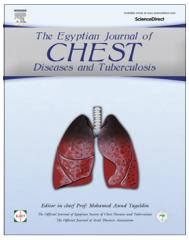

ORIGINAL ARTICLE

Pattern of hospital-acquired pneumonia in Intensive Care Unit of Suez Canal University Hospital

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KEYWORDS

Intensive Care;
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Abstract *Background:* Hospital acquired pneumonia occurs more than 48 h after hospital admission and was not present at the time of admission, while ventilator associated pneumonia occurs after 48–72 h of endotracheal intubation or within 48 h of extubation. HAP is the second most common nosocomial infection and accounts for approximately 25% of all infections in the Intensive Care Unit worldwide.

Purposes: To identify the etiology, initial evaluation, prevention, and treatment of adult patients with ICU HAP, and VAP in Suez Canal University hospital and their management strategies.

Methods: This study was conducted in the department of ICU, Suez Canal University Hospital; Ismailia, Egypt in the period from May to August 2013. All the patients were subjected to clinical and radiological assessment, Endotracheal aspirate samples for culture, and sensitivity to determine the causative organisms, Clinical Pulmonary Infection Score was done in order to determine the severity of HAP.

Results: 89% of patients were suffering from VAP, while 11% were suffering from HAP, with mean age of 63.8 ± 10.47 years. Methicillin-resistant *Staphylococcus aureus*, and *Klebsiella pneumoniae* represented the most common isolated organisms that accounted about 65% of the studied population. The isolated microorganisms were resistant to Amoxicillin, MRSA showed highest sensitivity (44.4%) to Vancomycin and (27.8%) to Imipenem. *K. pneumoniae* were sensitive mainly to Imipenem (75.9%) and to Levofloxacin (44.8%).

Conclusion: Gram-negative organisms were isolated in 46% of cases, gram-positive organisms in 41% and the isolated organisms showed high resistance to most of the tested antibiotics.

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Introduction

Hospital-acquired pneumonia (HAP) is considered one of the most common nosocomial infections which accounts for approximately 25% of all infections in the intensive care unit (ICU) [1].

The difference between HAP and community acquired pneumonia (CAP) is the susceptibility of patients with HAP to pneumonia from different and potentially virulent pathogens [2].

While, HAP is closely related to ventilator-associated pneumonia (VAP) that refers to pneumonia that arises more than 48–72 h after endotracheal intubation, and the cause of infection is multidrug-resistant (MDR) bacteria [3].

There are many risk factors associated with HAP, and VAP and the presence of environmental and pharmacological factors [4].

The diagnosis of HAP is mainly diagnosed clinical through the endotracheal aspirate (ETA) cultures, white blood cell (WBC) count, serial chest radiographs, and arterial blood gases (ABG) [5].

The treatment of HAP started with broad-spectrum empiric antibiotics; then shifted to narrow-spectrum specific therapy to minimize the risk of resistance and adverse drug reactions over the treatment period, guided by microbiological results due to that the precise pathogen of HAP is usually unknown [6]. So, each ICU should design its own scheme for treatment on the basis of their microbiological results which has a major impact on patients' morbidity, mortality, and the economic aspect of their treatment [7].

We therefore aimed to identify the etiology, initial evaluation, prevention, and treatment of adult patients with ICU HAP, and VAP in Suez Canal University hospital (SCU) as well as the proper management strategies of patients with ICU HAP, and VAP.

Patients & methods

Patients

This study was conducted on 100 patients admitted to the department of ICU, SCU Hospital; Ismailia, Egypt who developed HAP or VAP during the period from May 2013 to October 2013 with an inclusion criteria of age range from 18 to 81 years old, of both sexes, showing symptoms & signs of pneumonia (productive cough with purulent sputum, and fever $\geqslant$38 °C, or hypothermia $\leqslant$36.3 °C).

With chest radiography showing newly developed signs of pneumonia (opacity of one lung segmental lobe, or bilateral opacities primarily in the bases of the lungs). HAP occurs more than 48 h after hospital admission, but was not present at the time of admission. VAP occurs after 48–72 h of endotracheal intubation.

We excluded patients with lung tumor, trauma, collapse, heart failure, pulmonary edema, patients with no radiographic shadows suggestive of pneumonia and or Neonates/pediatrics patients.

Methods

All patients were subjected to full history taking, clinical examination, laboratory investigations in the form of Complete blood count (CBC), arterial Blood Gases (ABG) {Roche OMNI C blood gases machine, made in Japan for Siemens Medical System, Inc, Issaquah, WA98029-7002USA}, Endotracheal aspirate (ETA) in order to make culture and sensitivity to determine the causative organisms.

All specimens were inoculated onto Blood agar, MacConkey agar, Mannitol salt agar, Chocolate agar, and Muller Hinton agar, incubated at 37 °C for 24 h. Gram stain and susceptibility test were performed to all specimens in order to diagnose the causative organism. Bacterial growth in these specimens is then quantitated and defined by the presence of bacteria above the predetermined threshold concentration (BAL $>10^4$ colony forming units [CFU]/ml). Plain posteroanterior and/or anteroposterior chest X-ray was performed to confirm the diagnosis, that showed newly developed evidence of pneumonia (opacity of one lung segmental lobe, or bilateral opacities primarily in the bases of the lungs).

The protocol of empiric antibiotic treatment employed in the SCU hospital before the culture results is to give Ceftazidime 1 g twice daily, plus Ampicillin/Sulbactam 1.5 g 3 times a day was given to 79% of the patients on admission to cover the most vulnerable gram positive, and gram negative microorganisms.

The Severity of HAP & VAP was assessed using Modified Clinical Pulmonary Infection Score (CPIS) [8] (Table 1).

Patients should have their CPIS recalculated daily, if the CPIS is less than 6, infection is unlikely and the decision to treat with antibiotics should be carefully considered.

Statistical analysis

Values are shown throughout the manuscript as number and percent as well as mean and standard deviation (SD). Results were compared using the Student *t*-test. A *P*-value equal or less than 0.05 was considered significant in all statistical tests. Statistical analyses and data blotting were performed using Microsoft excel by Microsoft Inc. and SPSS (SPSS 20.0 by SPSS software Inc.).

Table 1 Modified Clinical Pulmonary Infection Score (CPIS) chart.

Diagnostic feature	CPIS points		
	0	1	2
Tracheal secretions	Rare	Abundant	Abundant and purulent
Chest radiograph infiltrate	None	Diffuse	Localized
Temperature (°C)	$\geqslant$36.5 and $\leqslant$38.4	$\geqslant$38.5 and $\leqslant$38.9	$\geqslant$39 or $\leqslant$36
White blood cells ($\times10^9$/L)	$\geqslant$4.0 or $\leqslant$11.0	$<$4.0 or $>$11.0	$<$4.0 or $>$11.0 plus band forms $\geqslant$0.5
PaO_2/FiO_2 mmHg	$>$240 or ARDS		$\leqslant$240 and no ARDS
Microbiology	Negative	Positive	Positive plus positive Gram stain