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Submission date: 28-Aug-2024 01:03PM (UTC+0700)
Submission ID: 2439581569
File name: ISHJ_Vol_2_no_3_Sept_2024_hal_29-41.pdf (1.18M)
Word count: 3661
Character count: 20697

The International Science of Health Journal
Vol.2, No. 3 September 2024
e-ISSN: 2986-6820; p-ISSN: 2986-6855, Pages 29-41
DOI: https://doi.org/10.59680/ishel.v2i3.1348
Available online at: https://jurnal.stikeskesdam4dip.ac.id/index.php/ishel

Cases Report On The Management Of Hospital Acquired Pneumonia In Ischemia Stroke Patients

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Abstract, *Pneumonia is defined as acute inflammation of the pulmonary parenchyma caused by bacteria, viruses, fungi, parasites. Nosocomial pneumonia (Hospital Acquired Pneumonia) is pneumonia that is acquired while being hospitalized, at least after 48 hours of treatment and not in the incubation period. The average incidence of HAP is 5-15 per 1000 residents of hospital cases, while in the intensive care unit it is around 25%, where 70-80% of episodes of pneumomia occur when using a ventilator. Sentry Antimicrobial surveillance research found that 80% of nosocomial pneumonia bacteria are caused by six pathogenic bacteria, namely Staphilococcus aureus, Pseudomonas aeruginosa, Klebsiella species, E coli, Acinetobacter species and Enterobacter species. It was reported that a 68-year-old woman came to the emergency room four days before entering the hospital with a sudden decrease in consciousness while resting. Patients admitted with GCS 10 were treated in the room with a diagnosis of ischemic recurrent stroke + type 2 DM + Hypertension + Anemia. After eleven days of being treated in the room, the patient experienced shortness of breath, decreased saturation and GCS was decreasing, diagnosed with ischemic stroke + HAP + respiratory failure, intubated and connected to a ventilator in the ICU.*

Keywords: *hospital acquired pneumonia, empirical antibiotics, Klebsiella species*

1. BACKGROUND

Pneumonia is an acute inflammation of the lung parenchyma caused by bacteria, viruses, fungi, parasites. Pneumonia is classified as community pneumonia Acquired Pneumonia) which is acquired outside the hospital/community and nosocomial pneumonia, namely pneumonia which is acquired while being treated in hospital after at least 48 hours of treatment and not within the incubation period, is known as Hospital Acquired Pneumonia (HAP). Sentry Research Antimicrobial Surveillance found that 80% of nosocomial pneumonia bacteria were caused by six pathogenic bacteria, namely Staphilococcus aureus , Pseudomonas aeruginosa , Klebsiella species, E coli, Acinetobacter species and Enterobacter species. The choice of empiric antibiotic therapy depends on the patient's characteristics/ comorbidities , severity of disease, history of previous antibiotic use, location of infection.

Recommendations for the use of antibiotics in HAP are: selection of empirical antibiotics based on the antibiogram local , HAP with low mortality and no risk of MRSA can be given antibiotics that include MSSA including: piperacillin - tazobactam , levofloxacin , imipenem or meropenem , PAH with a high risk of mortality (requiring mechanical ventilation or septic shock but without risk of MRSA, then choose a combination of two antibiotics different antipseudomonal groups (beta lactams and fluoroquinolones or beta lactams and

Received: June 30, 2024; Revised July 18, 2024; Accepted August 17, 2024; Online Available: August 28, 2024

aminoglycosides), the duration of antibiotic administration is seven days, except for pneumonia caused by gram-negative non- fermenting (Pseudomonas and Acinetobacter) with high relapse rates , consideration is given for up to 14 days, Discontinuation of antibiotics is based on clinical assessment, changes in sputum, chest x-ray , leukocytes, PaO2/FiO2 and procalcitonin values .

2. THEORETICAL STUDY

Diagnosis of the cause of pneumonia is by finding bacteria in the sputum. Sputum collection can be done non -invasively (sputum from spontaneous coughing, nasotracheal suction of sputum, endotracheal aspiration or invasive (bronchoscopy , bronchial lavage).

Pathogenesis of pneumonia:

- Sources of pathogens for HAP are health care equipment, the environment (air, water, equipment) and transfer of microorganisms between patients and medical staff or between patients.
- Colonization related to host conditions and treatment, such as degree of underlying disease, previous surgery, exposure to antibiotics, other medications, and exposure to invasive respirators is important in the pathogenicity of HAP and VAP
- oropharyngeal pathogens or spillage of secretions containing bacteria nearby Endotracheal tube cuffs are the main route of entry for bacteria into the lower respiratory tract.
- Inhalation/inoculation of pathogens directly into the lower respiratory tract, hemogenous spread through infected intravenous catheters and bacterial translocation through the lumen of the gastrointestinal tract
- Infected biofilm on the endotracheal tube and subsequent distal airway embolization may be important in the pathogenicity of VAP.
- paranasal sinuses may be potential reservoirs for nosocomial pathogens and contribute to bacterial colonization oropharynx , but this is still controversial, varies depending on the patient population at risk and decreases with changes in the natural course of the disease and its management.

Diagnostic Criteria:

The diagnosis is made if a chest x-ray shows infiltrates /air bronchogram plus several of the symptoms below:

- Cough symptoms

- Changes in sputum characteristics
- Body temperature ≥ 38◦C
- Shortness of breath, chest pain
- Physical examination revealed signs of consolidation and rales
- Leukocytes > 10000/μL or < 4500/μL

Indications for ICU admission if:

- CURB 65 value > 3
- Pneumonia Severity Index

CURB-65

Clinical Factors	**Mark**
Confusion (restless)	1
Urea > 7 mmol/l (146 mg/dL)	1
Respiration rate > 30 x/m	1
Systolic blood pressure < 90 or diastolic < 60	1
Age (age) > 65 years	1

Interpretation:

Score 0 – 1 : Low mortality (1-5%) outpatient

Score 2 : Moderate mortality (9.2%) hospitalized

Score >3 : High mortality (22%) in ICU

Pneumonia Severity Index

Characteristics	**Score**
Age	
Man Age (years)	
Woman Age (years)	-10
Occupant orphanage decrepit	+10
Disease comorbid	

Malignancy	+30
Liver Disease	+20
Fail heart congestive	+10
Disease cerebrovascular	+10
Disease kidney	+10
Inspection	
Physique	
Disturbance awareness	+20
Respiratory rate ≥	
30 x/m	+20
Pressure blood systolic < 90 mmHg	+20
Temperature body < 35℃ or > 40℃	+15
Pulse rate > 125	
x/m	+10
Inspection Laboratory	
Arterial pH < 7.35	+30
Blood urea nitrogen > 30 mg/dL	+20
Sodium < 130 mmol?L	+20
Blood sugar > 250 mg/dL	+10
Hematocrit < 30 %	+10
PaO2 < 60 mmHg	+10
Inspection Radiology	
Pleural effusion	+10

Severe pneumonia is based on the IDSA/ATS classification if it meets at least three minor or one major criteria

Major criteria

- Requires mechanical ventilation
- Septic shock and requiring vasopressors

Minor criteria

- Respiratory rate > 30 x/m

- PaO2/FiO2 < 250 mmHg or requires non- invasive ventilation
- Chest x-ray shows infiltrates multilobular
- Decreased consciousness/disorientation
- Uremia (BUN > 20 mg / dL)
- Leukopenia (leukocytes < 4000/mm3) caused by infection
- Thrombocytopenia (thrombocytes < 100,000/mm3)
- Hypothermia (temperature < 36 C)°
- Hypotension requiring aggressive fluid resuscitation

Hospital Acquired Pneumonia (HAP) is pneumonia that is acquired in hospital or is not in the incubation period when treated and occurs more than 48 hours after hospital treatment. Ventilator Associated Pneumonia (VAP) is pneumonia that occurs more than 48 hours after intubation endotracheal . The incidence of HAP is an average of 5 -15 per 1000 cases of hospitalization while in intensive care units it is around 25% where 70-80% of pneumonia episodes occur while using a ventilator. Generally the cause of nosocomial pneumonia comes from endogenous flora. Sentry Research Antimicrobial Surveillance found that 80% of nosocomial pneumonia bacteria were caused by six pathogenic bacteria , namely Staphilococcus aureus , Pseudomonas aeruginosa , Klebiella species, E coli, Acinetobacter species and Enterobacter species. Data from several pulmonary teaching hospitals in Indonesia showed that the most common pathogenic bacteria that causes HAP is Klebsiella pneumoniae , Acinetobacter baumannii , Staphylococcus aureus and Pseudomonas aeruginosa .

Recommendations for the Use of Antibiotics

• Selection of empirical antibiotics based on local antibiogram

- HAP with a low risk of mortality and no risk of MRSA can be given antibiotics that cover MSSA, including: piperacillin tazobactam , cefepime , levofloxacin , imipenem or meropenem
- If there is a risk of MRSA add anti-MRSA: vancomycin or linezolid
- HAP with a risk of MDRO and a high risk of mortality (requiring mechanical ventilation or septic shock) but without a risk of MRSA, then choose an antibiotic combination of two different antipseudomonal classes (beta lactam and fluoroquinolone or beta lactam and aminoglycoside)

• Selection of empirical antibiotics for VAP should include S aureus , Pseudomonas and other gram-negative rods.

- VAP with a low risk of MDRO can be given antipseudomonal monotherapy (piperacillin-tazobactam , cefepime , ceftazidime , meropenem , imipenem , aztreonam , ciprofloxacin or levofloxacin)
- The duration of antibiotic administration in HAP/VAP is 7 days. Pneumonia caused by gram-negative non- fermenting (Pseudomonas spp and Acinetobacter spp) where the relapse rate is very high, consider giving up to 14 days
- Definitive P aeruginosa therapy is given in combination in patients with septic shock or a high risk of mortality
- Discontinuation of antibiotics is based on clinical assessment, changes in sputum (amount, purulence), chest x-ray , leukocytes, PaO2/FiO2 and normal procalcitonin values .

3. CASE REPORT

An 18 year old woman came to the Surgical Polyclinic at Dumai Regional Hospital with complaints of a lump in her left breast. The lump started to enlarge ± 1 month ago. Initially the lump was small like a marble but over time it got bigger and bigger as a quail egg. Sometimes accompanied by pain. When touched, there is a lump in the left breast, mobile , smooth surface, feels soft. There is no tenderness, no signs of inflammation, the nipple does not appear inverted . Denied history of drug or food allergies. The patient has never experienced the same complaint before. There are people in the family who experience similar illnesses.

On physical examination, it was found that his general condition looked good, his consciousness was GCS 15, his vital signs were within normal limits. On physical examination, localized status of the left breast showed that the mammary skin color was the same as the surrounding skin color, no thickening of the mammary skin was found , both breasts appeared symmetrical, no mass was palpable, dimpling mamae , retraction papilla mammae , papilla direction mammae pointed, no visible redness, discharge (-), nipple inverted (-), peau d'orange (-). Meanwhile, when palpated, it was found that when palpated the lump in the left breast was persistent, the surface was smooth, mobile , felt soft, the size of a quail egg, there was no tenderness and enlargement of the lymph node.

Blood laboratory examinations showed normal results. On ultrasound examination the following results were obtained: in the mammae sinistra , cutis and subcutis were normal, at 10 – 11 hours a hypoechoic mass appeared with dimensions of 38.8 x 38.5 x 24.3 mm. Effects of mammary tumors sinistra , suspect FAM.

A 68 year old woman came to the emergency room with the main complaint of decreased consciousness. Since four days before entering the hospital, the patient experienced a sudden loss of consciousness while resting. The patient's family said the patient did not respond when he first woke up. Complaints of vomiting, severe headaches and previous seizures were denied. There was a history of weakness in the right limb three years before entering the hospital accompanied by a slanted mouth and slurred speech. Referral patients from outside hospitals are treated for two days. The current treatment history is that the patient is taking the drugs candesartan , clopidogrel and citicoline .

The patient has a history of diabetes and high blood pressure since three years ago, irregular control. Physical examination in the emergency room showed that he was aware of GCS E3M4V3, blood pressure 140/80 mmHg , respiratory rate 22 times per minute with oxygen saturation 97% with a nasal cannula of 4 liters per minute , pulse rate 97 times per minute , temperature 37 ºC, anemic conjunctiva . There were no signs of increased intracranial pressure and signs of meningeal stimulation . Nerve examination cranial nerves were found , lll isochorous round pupil, diameter 3 mm/3mm, positive light reflex, nerves lll,lV , Vl is obtained doll's eye phenomenon , nerve V obtained a positive corneal reflex, nerve Vll corners of the mouth are symmetrical, nerve X gag reflex is positive, nervus Xll tongue rest in media. Physiological reflexes +/+, pathological reflexes -/-, motor strength is difficult to assess, impression of right lateralization . Heart sounds were regular , no murmurs or gallops were found . Vesicular lung sounds , no rhonchi or wheezing were found . Supporting examinations showed: Hb 9.1 g/dl, Ht 26.36%, platelets 242000/μl, leukocytes 7570/μl, count of types: neutrophils /lymphocytes/monocytes/ eosinophils / basophils : 75.60/12.80/9.30 /2.00/0.30. Rapid Antigen SARS-COV 2; (-), Immunoserology : CRP 17.7 mg / dL Procalcitonin 1.63 ng / ml. Chest radiographs showed cardiomegaly with aortic elongation and calcification, no infiltrates or nodules were visible in both lungs. CT Scan: Infarction lacunar multiple in the left basal ganglia and capsule left internal . Atrophy cerebral senilis , Diagnosis of Stroke infarction

4. RESULTS AND DISCUSSION

Patient clinical criteria can be used using the Sequential (Sepsis- Related) Organ Failure score Assessment (SOFA). SOFA scores are easier to understand and simple. If a patient who has an infection has a SOFA score ≥ 2 then there is suspicion of sepsis. In this patient, consciousness decreased, respiratory frequency increased and the source of infection was found in the lungs.

The diagnostic criteria for HAP (Hospital Acquired Pneumonia) are established, namely if the patient has been in hospital for more than 48 hours. Clinical Modification Pulmonary Infection Score (CPIS) can be used to help diagnose the difference between infiltrates in HAP and non-infectious factors (atelectasis , pulmonary embolism, pulmonary hemorrhage , cardiogenic pulmonary edema , drug reactions).

A CPIS value ≥ 6 indicates that the infiltrate is caused by infection

MODIFICATION OF CLINICAL PULMONARY INFECTION SCORE (CPIS)

Mark	**0**	**1**	**2**
Aspirate trachea	seldom	Lots *	Many+ purulent
Piston photo	No There is infiltrate	diffuse	Local *
temperature (C)	≥ 36.5 and ≤38.4	≥38.5 and ≤ 39.5 *	≥ 39 or ≤ 36
Leukocytes (mm^3)	≥4000 and ≤ 11000	≤4000 and ≥11000	≤4000 or≥1100+ segments stem *
rat P/F io (mm Hg)	≤ 240 or ARDS		≤ 240 or No proven the presence of ARDS
Microbiology	negative		Positive *

This patient had a CPIS score of 7, meaning the infiltrate was caused by infection

Antibiotic Recommendations

- Selection of antibiotics is based on the local antibiogram
- PAH with a low risk of mortality and no risk of MRSA can be given antibiotics including methicillin sensitive staphylococcus aureus (MSSA) such as: piperacillin tazobactam , cefepime , levofloxacin , imipenem or meropenem .
- If there is a risk of MRSA, anti-MRSA can be added, namely vancomycin or linezolid

- HAP with a risk of MDRO and a high risk of mortality (requiring mechanical ventilation or septic shock) then choose a combination of antibiotics of 2 different antipseudomonal groups (B lactam and fluoroquinolone or B lactam and aminoglycoside)
- empirical antibiotics for VAP should include S aureus , Pseudomonas and other gram-negative rods.
- VAP with a low risk of MDRO can be given antipseudomonal monotherapy (piperacillin-tazobactam , cefepime,c ceftazidime , meropenem , imipenem , aztreonam , ciprofloxacin or levofloxacin)
- VAP with a risk of MDRO is treated in the ICU with a resistance rate of gram- negative bacteria > 10%, so an antibiotic combination of 2 different antipseudomonal classes is chosen (B lactam and fluoroquinolone or B lactam and aminoglycoside).
- The duration of antibiotic administration for HAP/VAP is 7 days. Pneumonia caused by non- fermenting gram- negative bacteria (Pseudomonas spp and Acinetobacter spp) where the relapse rate is very high, consider giving up to 14 days.
- Discontinuation of antibiotics is based on clinical assessment, changes in sputum (amount of purulence), chest x-ray , leukocytes, PaO2/FiO2 and if the procalcitonin value is normal.

Table 1 Hap Empirical Antibiotic Choices Without High Mortality Risk

Without MRSA risk	**With MRSA risk**
Cefepime 2 g IV/8 hours Or Levofloxacin 750 mg IV/ day Or Imipenem 500 mg IV/6 hours Meropenem 1 g IV/8 hours Or Piperacillin = Tazobactam 4.5 g IV / 6 hours	Cefepime 2 g IV/8 hours Or Levofloxacin 750 mg/ day Or Ciprofloxacin 400 mg/8 hours Or Imipenem 500 mg/6 hours Meropenem 1 g/8 hours Or Piperacillin Tazobactam 4.5 g IV/6 hours Plus Vancomycin 15 mg/kg/8-12 hours (loading dose 25-30 mg/kg)

	Or · Linezolid 600 mg/iv/12 hours

Table 2 Antibiotic Choices with High Mortality Risk (History of Intravenous Antibiotic

Administration in the Previous 90 Days)

Combination of 2 Ab (avoid 2 B lactam • Cefepime 2 gr IV / 8 hours Or • Levofloxaxin 750 mg / day Or • Ciprofloxacin 400 mg /8 hours Or • Imipenem 500 mg /6 hours • Meropenem 1bgr/8 hours or • Piperacillin-Tazobanctam 4.5 g IV/6 hours	Plus • Vancomycin 15 mg/kg/ 8-12 hours (consider loading dose 25 – 30 mg/kg) Or • Linezolid 600 mg IV/12 hours

Table 3 Empirical Antibiotic Choices Vap

Risk MDR and MRSA	Without MDR risk
Antipseudomaonal combination of 2 goals different : **Goal B lactam:** **· Ceftazidime 2 gr IV/ 8 hours** **Or** **· Imipenem 500 mg IV/6 hours** **· Meropenem 1 g IV/8 hours Or** **· Aztreonam 2 g IV/8 hours** **Or** **· Piperacillin Tazobactam 4.5 g IV/6 hours** **Group non B lactam** **Fluproquinolone** **· Ciprofloxacin 400 mg IV/8 hours**	**Antipseudomonal monotherapy (choose wrong One)** **Goal B lactam** **▪ Cefepime 2 g IV/8 hours** **Or** **▪ Ceftazidime 2 gr IV / 8 hours** **Or** **▪ Imipenem 500 mg IV/6 hours** **▪ Meropenem 1 g IV/8 hours** **Or** **▪ Aztreonam 2 gr IV/8 hours** **Or**

▪ **Levofloxacin 750 mg IV/24 hours**	▪ **Piperacillin tazobactam 4.5 g IV/6 hours** **Add goal non B lactam**

List of history of antibiotic use in this patient during treatment

- Days 1 to 12 in the room
  Ceftriaxone 2gr/24 hours
  Laboratory: leukocytes: 7570/μL, procalcitonin 1.63 ng /ml
- Days 13 to 15 in ICU
  Meropenem 1 g /8 hours
  Levofloxaxin 750 mg /24 hours
  Laboratory: leukocytes: 29540/μL. procalcitonin 21.40 ng / ml
- Days 16 to 22 in ICU
  After the culture and resistance results come out
  Amikacin 1 g /24 hours
  Levofloxacin 750 mg /24 hours
  Laboratory: leukocytes: 7310/μL, procalcitonin 0.49 ng /ml
- Day 23
  Antibiotics stopped
- Day 24
  The patient moves rooms

Diagnostic criteria for antibiotic failure:

- Clinical: symptoms of persistent fever or hypothermia, tachypnea > 25 x/minute, tachycardia > 100 x/min, hypotension, change in consciousness.
  Signs: acute respiratory failure, hypotension, septic shock, oliguria or multiple organ failure
- Therapy: replacement of antibiotics: escalation, additional antibiotics, addition of vasopressors , using a ventilator, being treated in the ICU, requiring relaparotomy or debridement .
- Laboratory: leukocytosis/ neutrophilia , increased CRP, increased procalcitonin , increased urea
- Microbiology: in vitro test: resistant microorganisms (+)
- Chest radiology: persistent infiltrate , worsening.

On the third day, the patient in the room was diagnosed with HAP and given ceftriaxon injection antibiotic therapy for 11 days. Based on follows Up , it was found that the patient had increased shortness of breath, increased pulse, fever, desaturation , rhonchi in both lung fields until respiratory failure occurred so that the patient had to be intubated and assisted with mechanical ventilation (the patient was treated in the ICU). Laboratory results showed leukocytosis (29540/μL) and increased procalcitonin (21.4 ng /ml). The results of the thorax photo showed infiltrates . On the first day of admission to the ICU, the patient was given empirical antibiotic therapy : meropenem 1 g /8 hours and levofloxacin 750 mg /24 hours. After the culture results came out (3rd day of treatment in the ICU) the bacteria that caused Acinetobacter were found. baumannii with the sensitive antibiotic amikacin , the patient was treated for seven days, the patient's condition improved and finally he moved to another room.

5. CONCLUSIONS AND RECOMMENDATIONS

- Early recognition of early symptoms of sepsis and prompt and appropriate treatment are very important to obtain optimal results
- Guidelines and selection of empirical antibiotic therapy depend on patient characteristics/ comorbidities , severity of disease, history of previous antibiotic use, location of infection and local antibiogram.
- The response to antibiotic therapy can be assessed after 48 - 72 hours of antibiotic use by assessing the clinical appearance (symptoms and signs), laboratory parameters and radiological evaluation.

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