Journal of Experimental and Clinical Pharmacy (JECP)
Doi: 10.52365/jecp.v5i2.1445
http://jurnal.poltekkesgorontalo.ac.id/index.php/JECP/
2025, 5(2), 126-136

Research Article

Overview of Pneumonia Treatment in Hospitalized Geriatric Patients at One of the Gorontalo Provincial Hospitals: Case Report

Dizky Ramadani Putri Papeo*, Mohamad Nur Fadjri Kai, Moh. Arya Avrilio Isa, Nabila Natasya Sumaga, Sitti Rahmawaty Sisilia Mursidi, and Afifa Aliya

Department of Pharmacy, Gorontalo State University, Indonesia

ARTICLE INFO

Received : 15.May.2025
Revised : 23.Jul.2025
Accepted : 11.Aug.2025

***Corresponding Author:**
Dizky Ramadani Putri Papeo
Department of Pharmacy, Gorontalo State University, Indonesia
E-mail addresses:
dizky@ung.ac.id

ABSTRACT

Pneumonia is a common respiratory infection affecting all age groups, particularly the elderly, who are more susceptible due to comorbidities and age-related decline in immune function. This case report aims to evaluate the role of clinical pharmacy in the management of community-acquired pneumonia (CAP) in a geriatric patient. A descriptive qualitative method was conducted through retrospective analysis of medical records, including clinical presentation, diagnostic findings, pharmacological and non-pharmacological interventions, and patient outcomes. The pharmacological therapy included ceftriaxone and azithromycin as antibiotics, mucolytics, bronchodilators, antipyretics, gastrointestinal protection, and vitamin supplementation, with clinical pharmacy involvement in therapy optimization and monitoring. Non-pharmacological strategies involved oxygen therapy, semi-Fowler positioning, effective coughing techniques, and hydration support. The patient showed marked clinical improvement with increased SpO_2 from 95% to 98%, a reduction in respiratory rate from 30 to 22 breaths/minute, and symptom resolution by day four. This report highlights that the integration of clinical pharmacy interventions significantly contributes to effective and safer management of CAP in elderly patients.

Keywords: Pneumonia; therapeutic therapy; geriatric

eISSN 2775-1368

INTRODUCTION

Pneumonia is an acute infection or inflammation of the pulmonary parenchyma caused by various microorganisms such as bacteria, viruses, fungi, and parasites, or by to inhalation of toxic substances and physical trauma. It can affect all age groups and typically presents with symptoms such as cough, shortness of breath, and increased respiratory rate. Pneumonia is classified into community-acquired pneumonia (CAP), hospital-acquired pneumonia (HAP), and ventilator-associated pneumonia (VAP), with CAP being the most common and potentially fatal form (Natasya 2022).

Based on World Health Organization (WHO) data, pneumonia remains the leading infectious cause of death worldwide, accounting for approximately 740,180 deaths in 2019. During the COVID-19 pandemic, this number increased significantly, with reported cases reaching 450 million in 2020 and 510 million in 2021. Although pneumonia affects all age groups, the highest mortality occurs in children under five and the elderly, especially in regions such as South Asia and sub-Saharan Africa (World Health Organization (WHO) 2022).

In Indonesia, pneumonia is a persistent public health issue, particularly in the elderly. Data from Riskesdas 2018 shows the highest prevalence in the age group of 65–74 years (3.0%) and those aged ≥75 years (2.9%), which increases to 5.8% and 5.7% respectively, when symptom-based diagnosis is included (Riskesdas Nasional 2018). In Gorontalo Province, pneumonia prevalence also increased from 1.2% (diagnosis) and 4.1% (symptoms) in 2013 to 1.81% and 6.12% in 2018. Among geriatric patients, prevalence reached 5.29% based on diagnosis and 13.2% when symptoms were included for those aged 65–74 years, and 1.63% and 5.58% respectively, for those aged ≥75 years. These figures highlight the vulnerability of the elderly population to pneumonia due to declining physiological and immune function with age (Riskesdas 2013; 2018).

Geriatric patients with CAP are at increased risk of complications, treatment failure, prolonged hospitalization, and mortality. Clinical guidelines such as the Infectious Diseases Society of America/American Thoracic Society (IDSA/ATS) and the Indonesian Pneumonia Management Guidelines (PDPI 2020) recommend not only timely antibiotic administration but also integrated non-pharmacological interventions such as oxygen therapy, respiratory physiotherapy, and supportive care to optimize clinical outcomes.

However, there is limited published evidence on how such comprehensive strategies are implemented in regional hospitals, particularly in geriatric populations. This knowledge gap underscores the need for descriptive clinical documentation.

Therefore, this study aims to describe pharmacological and non-pharmacological treatment patterns in hospitalized geriatric patients with community-acquired pneumonia at a provincial hospital in Gorontalo.

MATERIALS AND METHODS

Materials

Medical records which include the Medication Administration Sheet (LPO), Integrated Patient Development Record, radiology examination sheet, laboratory examination results, Initial Evaluation Form, initial nursing assessment, and integrated triage form.

Methods

This study is a descriptive qualitative case report based on retrospective medical records of a geriatric patient with community-acquired pneumonia treated at a provincial hospital in Gorontalo. Data included anamnesis, physical and diagnostic examinations, therapeutic interventions, and clinical outcomes. The case was selected purposively with inclusion criteria of patients aged ≥65 years, hospitalized with complete records. Patients with incomplete data or early discharge were excluded. Clinical progress was monitored from admission to discharge over a five-day period.

CASE REPORT

A male patient named Y.P., 71 years old, came to the emergency room in Gorontalo Province on October 30, 2024, at 21:30 local time with the main complaint of shortness of breath that has worsened since the past week. The complaints were accompanied by a productive cough with yellow sputum, resolved fever, and night sweats. Patients also complained of heartburn without nausea or vomiting, with the pattern of bowel movements and bowel movements still normal. The patient's history showed that the patient had undergone ATD (Anti-Tuberculosis Drugs) treatment five years ago and was declared cured.

During the physical examination in the emergency department, the patient complained of shortness of breath with stable vital signs: BP 130/80 mmHg, respiratory rate 30 times/minute, pulse 99 times/minute, temperature 37.2°C, and SpO_2 95% without supplemental oxygen. Minimal anemia, regular heart sounds without murmurs, and symmetrical vesicular breathing with rough rhonchi were found in both lungs. The abdomen and extremities are within normal limits. Supporting examinations include routine blood and blood glucose at any time.

Table 1. Clinical Laboratory Examination Results

Examination	Result	Standard	Information
Hemoglobin	11.6 g/dl	13.0 - 17.0g/dl	Abnormal
Leukosit	9.3 µl	3.2-10.0 µl	Normal
Eritrosit	4.08 µl	3.80-5.60 µl	Normal
Trombosit	231 µl	170-380 µl	Normal
Hematokrit	34.7 %	35.0-50.0 %	Abnormal
MCV	85.1 fL	80.0-100.0 fL	Normal
MCH	28.4 pg	28.0-34.0 pg	Normal
MCHC	33.4 g/dl	32.0-36.0 g/dl	Normal
Random Blood Sugar	82 mg/dl	70-199 mg/dl	Normal

Abbreviation : *MCV: Mean Corpuscular Volume*
MCH: Mean Corpuscular Hemoglobin
MCHC: Mean Corpuscular Hemoglobin Concentration

As initial management in the emergency room, the patient received Ringer Lactate 500 mL intravenously at a rate of 20 drops per minute, along with ceftriaxone 1 g IV administered as prophylactic antibiotic therapy. Additional pharmacological interventions included Neurosanbe® 5000 mg via drip infusion once daily for 3 consecutive days, omeprazole 40 mg IV twice daily for 4 days, Meprovent® 2.5 mL nebulization twice daily for 4 days, and paracetamol 500 mg orally three times daily for symptom control over a 3-day period. Following this initial treatment phase, the patient was transferred to the inpatient ward for continued observation and therapy optimization.

On October 31, 2024, at 08:00, a PA thorax examination showed left parahilar infiltrate, mild bronchopneumonia sinistra, pulmonary emphysema, and elongatio aortae. At 11:04 a.m., the patient was given oxygen via the nasal cannula (2–4 L/min), meprovent nebulization, and drug therapy in the form of paracetamol, acetylcysteine, azithromycin, and omeprazole. The evaluation at 14:00 showed that the patient was still short of breath, so follow-up management was carried out in the form of a semi-Fowler position and effective cough education.Until 19:30, complaints were still felt, but the patient's condition was stable.

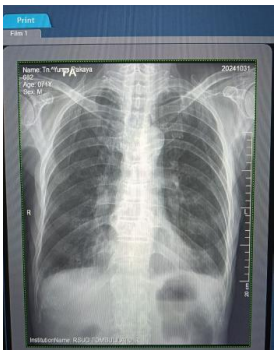

Figure 1. Thoracic radiodiagnostic results showed left parahilar infiltrate, mild bronchopneumonia, pulmonary emphysema, and aortic elongatio.

The results of thoracic radiology show a slightly asymmetrical body position with inspiration and quite good photo quality. An infiltrate appears in the left

parahilar, leading to active lung infection, normal heart size, and aortic elongation. The costophrenic sinuses are dull, the diaphragm is horizontal and low, and the bone structure is intact. These findings are consistent with the suspicion of pneumonia, accompanied by early signs of pulmonary emphysema and possible mild pleural effusion, in accordance with the patient's complaints of shortness of breath and coughing up phlegm.

On November 1, 2024, at 07:30, patients reported that shortness of breath began to decrease even though the cough was still present. Mucolytic therapy was continued, namely acetylcysteine 200 mg (3x1 oral), meprovent nebulization 2.5 mL (2x1 inhaler), and azithromycin 500 mg (1x1 oral after meals). A thorax examination at 14:00 showed a picture of bronchopneumonia that was beginning to improve. On November 2, 2024, at 07:30, the patient again reported that shortness of breath was decreasing. Airway interventions were still performed, including the administration of paracetamol 500 mg (3x1 oral), acetylcysteine, azithromycin, and meprovent nebulization at the same dose. Until 19:30, the patient still had a mild cough, but the general condition was stable.

On November 3, 2024, at 07:30, patients reported that shortness of breath and cough had decreased significantly. The final examination at 13:00 showed the patient was in good enough condition to be discharged. The patient was discharged with a diagnosis of pneumonia and instructed to continue mucolytic therapy in the form of acetylcysteine 200 mg (3x1 tablets, oral) and azithromycin 500 mg (1x1 tablet, oral, after meals) at home.

DISCUSSION

Pneumonia is one of the acute inflammatory diseases of the pulmonary parenchyma, usually originating from lower respiratory tract infections. It commonly presents with cough and shortness of breath due to infectious agents such as viruses, bacteria, mycoplasma, fungi, or aspiration of foreign materials. These infections can lead to exudation and consolidation within the lungs (Nurarif and Kusuma 2015).

Pneumonia is caused by a wide range of microorganisms, including bacteria, viruses, fungi, and protozoa. Globally, community-acquired pneumonia (CAP) is typically caused by gram-positive organisms. However, hospital-acquired pneumonia (HAP) tends to be associated with gram-negative pathogens. In Indonesia, several reports indicate that even CAP is frequently caused by gram-negative bacteria. Among the elderly, physiological changes such as reduced immunity, diminished cough reflex, and decreased lung elasticity increase susceptibility to pneumonia. Therefore, a combination of pharmacological and non-pharmacological treatments is necessary to support full clinical recovery during both inpatient and outpatient care.

Pharmacological Therapy

Oxygen Therapy

Oxygen therapy in pneumonia patients aims to prevent hypoxia by increasing arterial oxygen levels, thereby raising oxygen saturation (SpO_2) (Amiar and Setiyono 2020). In this case, oxygen was administered via nasal cannula at 2–4 L/min, targeting SpO_2 levels of 95–100%. Saturation was monitored daily or when respiratory parameters changed. This intervention aligns with guidelines that emphasize maintaining oxygenation to prevent complications (Metlay et al. 2019).

Bronchodilators

Bronchodilators serve as adjunctive therapy to ease breathing, improve ventilation, and facilitate secretion clearance. The combined use of ipratropium bromide and salbutamol (as found in Meprovent®) twice daily via nebulizer has shown better efficacy than monotherapy (Barjaktarevic and Milstone 2020). The study of Widodo, Adiyanto, and Aprianti (2019), also confirmed that this combination enhances bronchodilation and secretion excretion, particularly in pneumonia cases with comorbid COPD.

Mucolytics

Mucolytics like N-acetylcysteine (NAC) are prescribed to break down thick mucus obstructing the airway. NAC acts by cleaving disulfide bonds in mucoproteins, reducing mucus viscosity and facilitating expectoration. Additionally, its antioxidant properties can reduce lung inflammation. In this case, NAC was given orally at 200 mg three times daily. A study by Grandjean et al. (2020), reported NAC improved respiratory function in lower respiratory tract infections, including pneumonia.

Antibiotics

Antibiotics are the primary therapy in managing community-acquired pneumonia, which is generally caused by bacterial infections. In this case, the patient received a combination of ceftriaxone and azithromycin. Ceftriaxone, a third-generation cephalosporin, was administered intravenously at a dose of 1 gram upon hospital admission. It served as empirical therapy and prophylaxis against potential nosocomial infections by inhibiting bacterial cell wall synthesis. This antibiotic offers broad-spectrum coverage against pathogens such as *Streptococcus pneumoniae* and *Haemophilus influenzae* (Metlay et al. 2019). Once the diagnosis of pneumonia was confirmed, treatment was continued with azithromycin 500 mg orally during hospitalization. Azithromycin, a macrolide-class antibiotic, is effective against atypical pathogens and has additional anti-

inflammatory properties that help reduce infection-related inflammation and prevent relapse. The combination of these two antibiotics is consistent with IDSA/ATS guidelines for empiric therapy in community-acquired pneumonia.

Analgesics and Antipyretics

Analgesics and antipyretics are important components of supportive care in pneumonia, particularly to manage fever and inflammatory pain. In this case, the patient was administered paracetamol 500 mg orally three times daily to lower fever and relieve discomfort, especially in the chest or muscles. Paracetamol functions by inhibiting the cyclooxygenase (COX) enzyme in the central nervous system, reducing prostaglandin synthesis and regulating body temperature and pain perception. In the study by Azyenela and Syafitri (2025), paracetamol is considered effective and safe when used appropriately, although in geriatric patients, liver function should be monitored during repeated use.

Proton Pump Inhibitor

The patient was also prescribed omeprazole 40 mg intravenously twice daily. This therapy aimed to protect the gastrointestinal mucosa from potential irritation caused by polypharmacy, particularly antibiotics and stress-induced factors. In geriatric patients, omeprazole is often administered as a preventive measure. However, its use should ideally be based on the presence of risk factors such as a history of peptic ulcers, gastrointestinal bleeding, or concurrent use of NSAIDs or corticosteroids (Kinoshita et al. 2018). Unnecessary or prolonged use of PPIs in elderly populations may increase the risk of nutrient malabsorption, *Clostridium difficile* infection, and bone demineralization.

Intravenous Fluid Drip Ringer Laktat

Ringer Lactate infusion at 500 mL per day was provided intravenously at a rate of 20 drops per minute during hospitalization. Although not part of the main therapy, fluid administration is essential to prevent dehydration, especially in elderly patients experiencing high fever, increased respiratory rate, or reduced oral intake. Ringer Lactate contains a balance of sodium, potassium, calcium, and lactate, which function as electrolyte replenishment and a buffering agent for mild metabolic acidosis. This approach aligns with fluid therapy principles in infectious conditions to ensure adequate perfusion and prevent hypovolemic shock (Gelbenegger et al. 2025).

Vitamin B-complex

Vitamin B complex (Neurosanbe® 5000 mg) was administered intravenously once daily as supportive therapy. The formulation contains vitamins B1, B6, and B12, which are important for energy metabolism, hematologic function, and

neurological health (Calderon-Ospina et al. 2020). In this patient, its use was likely intended to support recovery and prevent neuropathic symptoms possibly exacerbated by prolonged illness, antibiotic therapy, or age-related vitamin deficiencies. While often prescribed routinely in hospitalized elderly patients, the administration of B complex should ideally be based on clinical indicators such as fatigue, nutritional risk, or paresthesia (Silviana, Tugasworo, and Belladonna 2021).

Non-pharmacological Therapy

Non-pharmacological therapy plays a vital role in the comprehensive management of pneumonia, especially in the elderly. In this case, oxygen was administered via nasal cannula to maintain adequate saturation. The patient was positioned in a semi-Fowler position to facilitate lung expansion and educated on effective coughing techniques to improve airway clearance. Fluid intake was increased to 2000 mL per day to thin sputum and support secretion mobilization.

The patient was also taught deep breathing relaxation techniques to reduce respiratory rate and improve ventilation comfort. This multi-modal approach resulted in gradual clinical improvement, reduction of shortness of breath, and stabilization of the patient's condition.

For patients with ineffective airway clearance, targeted interventions were applied with the goal of improving respiratory effectiveness within 3×24 hours. Monitoring included breathing patterns, additional lung sounds, and sputum characteristics. Additional actions involved semi-Fowler positioning, warm fluid administration, and chest physiotherapy when necessary. Education on independent airway clearance techniques was provided to help prevent secretion accumulation (Agustina et al. 2022).

Pharmacological management in this geriatric pneumonia case included antibiotics (ceftriaxone and azithromycin), bronchodilators, mucolytics, antipyretics, and supportive measures such as oxygen and fluid therapy. Non-pharmacological strategies like therapeutic positioning, cough techniques, and fluid optimization complemented the treatment. The use of omeprazole and vitamin B complex, although common, should be based on individual risk profiles. Given the polypharmacy involved, potential DRPs such as drug–drug interactions (e.g., azithromycin with omeprazole), duplicate therapies, and adverse effects like hepatotoxicity from paracetamol may occur. These risks highlight the importance of clinical pharmacy review to ensure safe and effective therapy. Overall, the integrative approach contributed to the patient’s recovery in line with clinical guidelines.

This study has limitations, as the analysis is based only on data recorded in medical records, so there may be important clinical information that is not fully documented.

CONCLUSIONS

Management of pneumonia treatment in geriatric patients through pharmacological and non-pharmacological therapy lines. In this case, treatment with pharmacological therapy is in accordance with guidelines for pneumonia, and non-pharmacological therapy is also important to support this pharmacological therapy until the patient is declared cured at the time of discharge from the hospital.

REFERENCES

Agustina, Diana, Aryudha Pramudianto, and Dwi Novitasari. 2022. "Implementasi Batuk Efektif pada Pasien Pneumonia dengan Masalah Gangguan Oksigenasi." *Jkm : Jurnal Keperawatan Merdeka* 2 (1): 1. https://doi.org/10.36086/jkm.v2i1.1153.

Amiar, Winda, and Erwan Setiyono. 2020. "Efektivitas Pemberian Teknik Pernafasan Pursed Lips Breathing dan Posisi Semi Fowler terhadap Peningkatan Saturasi Oksigen pada Pasien TB Paru." *Indonesian Journal of Nursing Science and Practice* 3 (1): 7–13. https://doi.org/10.24853/ijnsp.v3i1.7-13.

Azyenela, Lola, and Vella Syafitri. 2025. "Rasionalitas Penggunaan Antibiotik pada Pasien Pneumonia di Salah Satu Rumah Sakit di Sumatera Barat." *Jrikuf: Jurnal Riset Ilmu Kesehatan Umum* 3 (1): 44–54. https://doi.org/10.57213/jrikuf.v3i1.490.

Barjaktarevic, Igor Z, and Aaron P Milstone. 2020. "Nebulized Therapies in COPD: Past, Present, and The Future." *International Journal of Chronic Obstructive Pulmonary Disease* Volume 15 (July): 1665–77. https://doi.org/10.2147/copd.s252435.

Calderon-Ospina, Carlos-Alberto, Mauricio Orlando Nava-Mesa, and Carlos Emilio Arbeláez Ariza. 2020. "Effect of Combined Diclofenac and B Vitamins (Thiamine, Pyridoxine, and Cyanocobalamin) for Low Back Pain Management: Systematic Review and Meta-Analysis." *Pain Medicine* 21 (4): 766–81. https://doi.org/10.1093/pm/pnz216.

Gelbenegger, Georg, Nathan I. Shapiro, Markus Zeitlinger, Bernd Jilma, Ivor S. Douglas, and Anselm Jorda. 2025. "Lactated Ringer's or Normal Saline for Initial Fluid Resuscitation in Sepsis-Induced Hypotension." *Critical Care Medicine* 53 (February). https://doi.org/10.1097/ccm.0000000000006601.

Grandjean, Philippe, Clara Amalie Gade Timmermann, Marie Kruse, Et Al. 2020. "Severity of Covid-19 at Elevated Exposure to Perfluorinated Alkylates." *Plos One* 15 (12): E0244815. https://doi.org/10.1371/journal.pone.0244815.

Kinoshita, Yoshikazu, Norihisa Ishimura, and Shunji Ishihara. 2018. "Advantages and Disadvantages of Long-Term Proton Pump Inhibitor Use." *Journal of Neurogastroenterology and Motility* 24 (2): 182–96. https://doi.org/10.5056/jnm18001.

Metlay, Joshua P., Grant W. Waterer, Ann C. Long, et al. 2019. "Diagnosis and Treatment of Adults with Community-Acquired Pneumonia. An Official Clinical Practice Guideline of the American Thoracic Society and Infectious Diseases Society of America." *American Journal of Respiratory and Critical Care Medicine* 200 (7): E45–67. https://doi.org/10.1164/rccm.201908-1581ST.

Natasya, Febrina Aulia. 2022. "Management of Pneumonia." *Jurnal Medika Hutama* 03 (02): 2392–2399. https://jurnalmedikahutama.com/index.php/JMH/article/view/465

Nurarif, Amin Huda, and Hardhi Kusuma. 2015. "Aplikasi Asuhan Keperawatan Berdasarkan Diagnosa Medis dan Nanda Nic-Noc Jilid 2." *Yogyakarta : Mediaction Publishing* VII (January): 1–351.

Pdpi. 2020. *Pneumonia Covid-19 : Diagnosis dan Penatalaksanaan di Indonesia*. Persatuan Dokter Paru Indonesia.

Riskesdas. 2013. *Laporan Riskesdas 2013 Provinsi Gorontalo*. Cet.1. Gramedia Pustaka Utama.

Riskesdas. 2018. *Laporan Riskesdas 2018 Provinsi Gorontalo*. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan.

Riskesdas Nasional. 2018. "Laporan Nasional Riskesdas 2018." Jakarta: Kementerian Kesehatan RI

Silviana, Meyvita, Dodik Tugasworo, and Maria Belladonna. 2021. "Efficacy of Vitamin B1, B6, and B12 Forte Therapy in Peripheral Neuropathy Patients." *Diponegoro International Medical Journal* 2 (1): 14–19. https://doi.org/10.14710/dimj.v2i1.9549.

Widodo, Untung, Bowo Adiyanto, and Tutut Aprianti. 2019. "Tatalaksana Perawatan Intensif Pasien PPOK Eksaserbasi Akut dengan Gagal Napas Tipe II." *Jurnal Komplikasi Anestesi* 6 (2): 61–68. https://doi.org/10.22146/jka.v6i2.7354.

World Health Organization (WHO). 2020. "Pencegahan dan Pengendalian Pneumonia yang Cenderung Menjadi Epidemi dan Pandemi di Fasilitas Pelayanan Kesehatan." Jakarta: EGC.

World Health Organization (WHO). 2022. "Data Prevalensi Pneumonia di Dunia." World Health Organization. https://www.who.int/data/gho.