

A REVIEW ON EVALUATION OF OUTCOME AND IMPACT OF PATIENT EDUCATION ON MEDICATION ADHERENCE IN HOSPITALISED PNEUMONIA PATIENTS

Reeba Roy^{*1}, Dr. Nithin Manohar R.², Ms. Shinju Somaraj³, Alfiya Sudheer F.¹, Chandini Nair¹, Sandra S. S.¹,
Dr. Prasobh G. R.⁴

^{*1}Student, Second Year, Doctor of Pharmacy Post Baccalaureate, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India.

²Professor & HOD, Department of Pharmacy Practice, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India.

³Lecturer, Department of Pharmacy Practice, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India.

⁴Principal, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India.



***Corresponding Author: Reeba Roy**

Student, Second Year, Doctor of Pharmacy Post Baccalaureate, Sree Krishna College of Pharmacy and Research Centre, Parassala, Thiruvananthapuram, Kerala, India.

DOI: <https://doi.org/10.5281/zenodo.20136128>

How to cite this Article: Reeba Roy^{*1}, Dr. Nithin Manohar R.², Ms. Shinju Somaraj³, Alfiya Sudheer F.¹, Chandini Nair¹, Sandra S. S.¹, Dr. Prasobh G. R.⁴ (2026). A Review On Evaluation Of Outcome And Impact Of Patient Education On Medication Adherence In Hospitalised Pneumonia Patients. European Journal of Pharmaceutical and Medical Research, 13(5), 698–703.

This work is licensed under Creative Commons Attribution 4.0 International license.



Article Received on 15/04/2026

Article Revised on 05/05/2026

Article Published on 10/05/2026

ABSTRACT

Pneumonia is a leading cause of morbidity and mortality worldwide, particularly among hospitalized patients, elderly individuals, and those with comorbid conditions. Despite the availability of effective antimicrobial therapies, poor medication adherence remains a significant challenge in achieving optimal treatment outcomes. Non-adherence can lead to treatment failure, prolonged hospital stay, increased healthcare costs, and the emergence of antimicrobial resistance. Patient education has been identified as a key intervention to improve medication adherence by enhancing patient knowledge, motivation, and engagement in treatment. This review explores the outcome and impact of patient education on medication adherence in hospitalised pneumonia patients, focusing on factors influencing adherence, methods of assessment, and effective interventions.

KEY WORDS: Pneumonia, Patient Education, Medication Adherence.

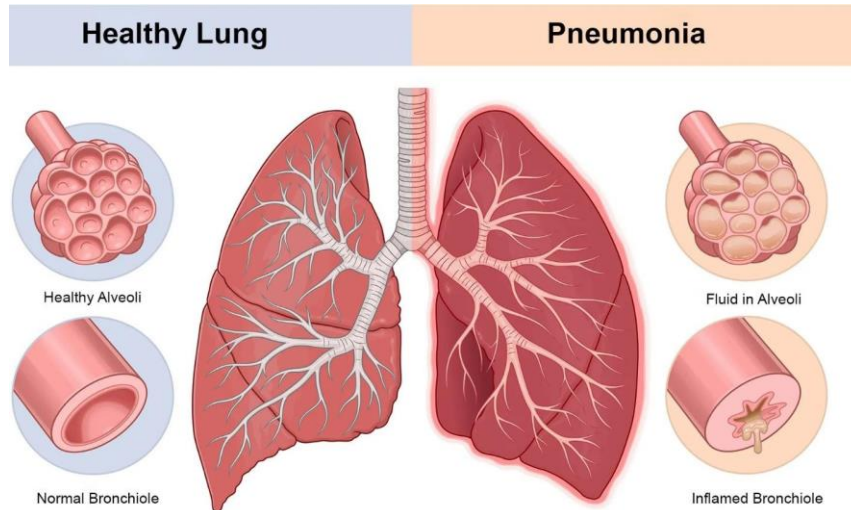
INTRODUCTION

Pneumonia remains one of the most common infectious diseases requiring hospitalization worldwide. It significantly contributes to morbidity, mortality, and healthcare burden, especially in developing countries like India. Despite advances in diagnostic tools and antimicrobial therapies, treatment outcomes are often compromised due to poor medication adherence.^[1]

Medication adherence refers to the extent to which a patient correctly follows medical advice, including timing, dosage, and duration of therapy. In pneumonia,

adherence to antibiotics and supportive medications is crucial for complete eradication of infection and prevention of complications.

Patient education plays a vital role in improving adherence by enhancing patient understanding, correcting misconceptions, and promoting active participation in treatment. This review aims to evaluate the impact of patient education on medication adherence and clinical outcomes in hospitalized pneumonia patients.^[2]



EPIDEMIOLOGY

Pneumonia affects millions of people globally each year. It is more prevalent in:

- Elderly populations
- Children
- Immunocompromised patients

In India, pneumonia remains a major cause of hospitalization and mortality, especially in rural and low-resource settings.^[4,5]

Pneumonia in Hospitalised Patients Risk Factors

- Advanced age
- Chronic diseases (diabetes, COPD, cardiovascular disease)^[6]
- Immunosuppression

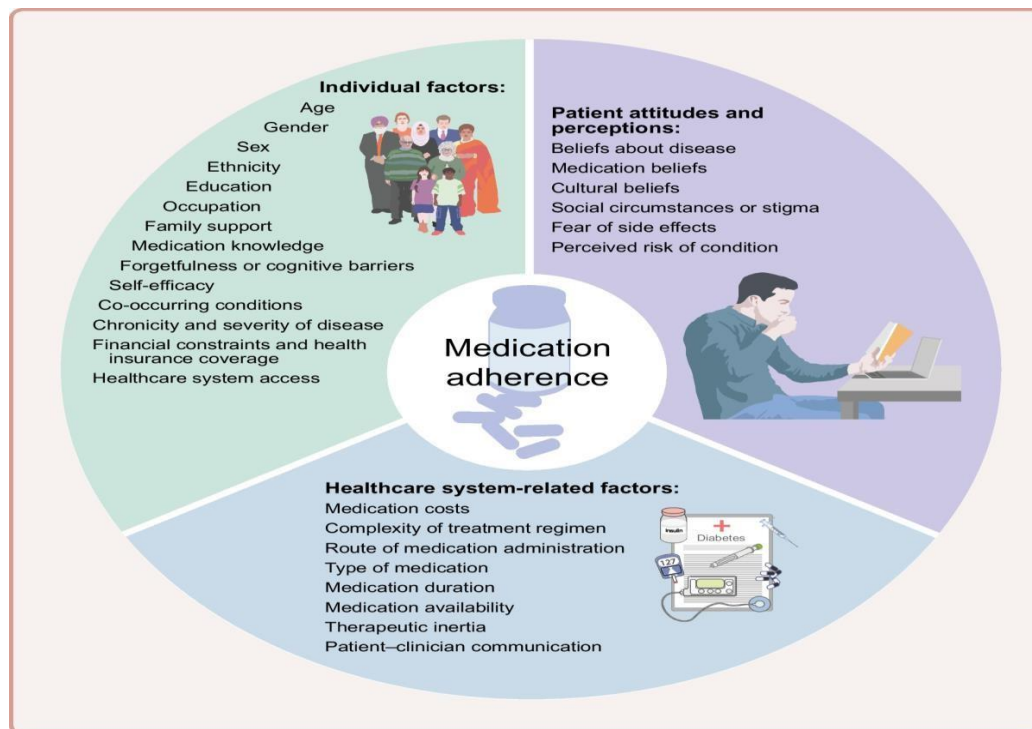
- Smoking
- Alcohol consumption

CLINICAL OUTCOMES AND COMPLICATIONS

- Hospitalised pneumonia patients may develop:
- Respiratory failure
- Sepsis
- Pleural effusion
- Acute respiratory distress syndrome (ARDS)
- Increased mortality^[7]

MEDICATION ADHERENCE

Medication adherence is defined as the degree to which a patient’s behavior corresponds with prescribed treatment.^[8]

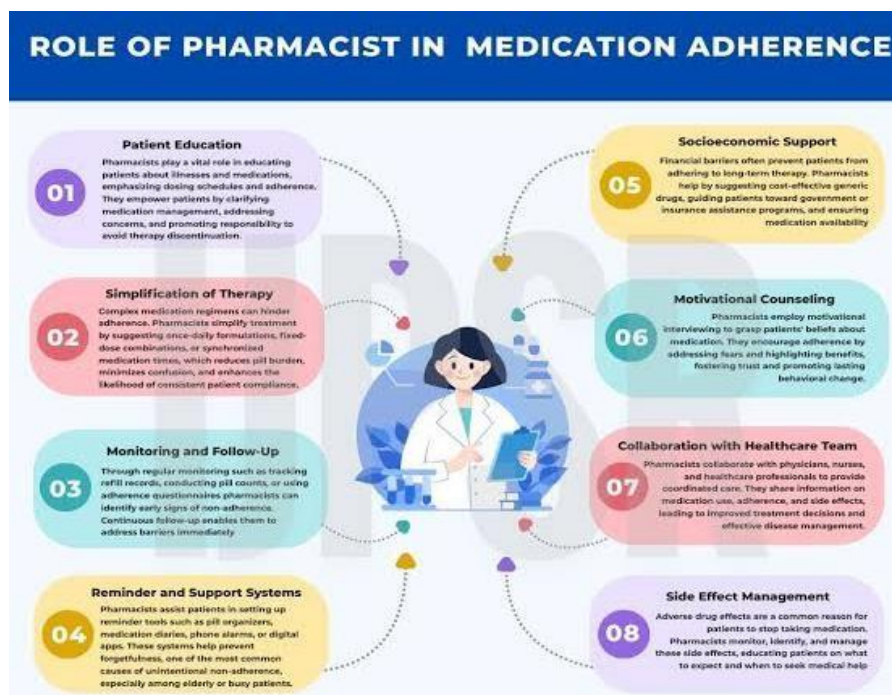


Importance in Pneumonia

- Ensures complete eradication of infection^[9]
- Prevents relapse and reinfection
- Reduces antibiotic resistance
- Improves clinical outcomes

Impact of Poor Adherence

- Treatment failure^[9]
- Prolonged hospital stay
- Increased healthcare costs

**ARMS TOOL**

The Adherence to Refills and Medications Scale (ARMS) is a concise and well-organized questionnaire designed for individuals with chronic diseases who need to take medications over an extended period.^[10,11]

Structure and Scoring

It consists of 12 questions that explore behaviors such as skipping doses, delaying medication intake, and difficulties in obtaining prescription refills.

Participants respond using a four-point scale, where 1 indicates “never” and 4 means “always.”

Scores can range from 12, which reflects perfect adherence, up to 48, indicating poor adherence.^[14]

BENEFITS OF ARMS TOOL IN PNEUMONIA PATIENTS**1. Identifies Non-Adherence Early**

- Helps detect patients who miss doses of antibiotics
- Early identification prevents treatment failure and complications.^[16]

2. Improves Treatment Outcomes

- Pneumonia requires strict adherence to antibiotics
- ARMS helps ensure completion of therapy → reduces relapse and resistance.^[18]

3. Reduces Hospital Stay

- Better adherence leads to faster recovery

- Helps avoid prolonged hospitalization and readmissions.^[18]

4. Prevents Antibiotic Resistance

- Incomplete antibiotic courses can lead to resistance
- ARMS identifies poor adherence → allows timely intervention

5. Guides Patient Education

- Helps healthcare professionals understand why patients are non-adherent
- Forgetfulness
- Side effects
- Lack of understanding
- Enables targeted counseling

6. Enhances Patient–Healthcare Communication

- Opens discussion between patient and pharmacist/doctor
- Builds trust and improves patient engagement

7. Useful in Clinical Research

- Widely used in studies evaluating:
- Impact of patient education
- Medication adherence outcomes

APPROCHES TO ENHANCE MEDICATION ADHERENCE

- Simplifying treatment plans by opting for medications that only need to be taken once daily whenever feasible.^[19]

- Providing counseling and guidance led by pharmacists during dialysis sessions to reinforce proper medication use.
- Using clear visual tools and straightforward language to help patients better understand their therapy.
- Employing medication organizers and technology-based reminders, such as phone alerts, to support consistent dosing.
- Encouraging involvement of family members or caregivers in managing and supervising medication intake.
- Screening for and addressing mental health issues like anxiety or depression to improve patients' ability to follow treatment plans.

PATIENT EDUCATION

Patient education is a process of providing information and guidance to patients about their disease and treatment.^[20]

Components

- Disease understanding
- Medication instructions
- Duration of therapy
- Side effects
- Importance of adherence

Methods of Patient Education

- Verbal counselling
- Written leaflets
- Visual aids
- Demonstrations
- Teach-back method

IMPACT OF PATIENT EDUCATION ON MEDICATION ADHERENCE

Patient education has a significant positive impact on medication adherence.^[21]

1. Improved Knowledge

- Patients better understand:
- Disease severity
- Importance of completing antibiotics

2. Behavioural Change

- Encourages responsibility
- Improves compliance

3. Clinical Outcomes

- Reduced hospital stay
- Lower readmission rates
- Faster recovery

4. Economic Outcomes

5. Reduced treatment cost

6. Lower burden on healthcare system

7. Factors Affecting Medication Adherence

7.1 Patient-related Factors

- Age
- Literacy
- Cognitive status
- Beliefs and attitudes

7.2 Disease-related Factors

- Severity of illness
- Symptom improvement

7.3 Therapy-related Factors

- Complex regimens
- Side effects
- Duration of therapy

7.4 Socioeconomic Factors

- Cost of medication
- Family support
- Access to healthcare

8. Methods of Assessing Medication Adherence

8.1 Subjective Methods

- Patient self-report
- Questionnaires

8.2 Objective Methods

- Pill count
- Pharmacy refill records
- Electronic monitoring

9. Interventions to Improve Medication Adherence^[22]

9.1 Patient Counselling

- Clear instructions
- Repeated reinforcement

9.2 Simplified Regimens

- Once-daily dosing
- Fixed-dose combinations

9.3 Reminder Systems

- Mobile alerts
- Pill organizers

ROLE OF CLINICAL PHARMACIST

- Clinical pharmacists play a key role in:
- Medication review
- Patient education
- Monitoring adherence
- Identifying drug interactions
- Improving outcomes

OUTCOME MEASURES

- Patient education
- Medication adherence rate
- Clinical recovery
- Reduction in complications
- Decreased readmissions
- Improved quality of life

CONCLUSION

Patient education is a critical component in improving medication adherence among hospitalised pneumonia patients. It enhances patient understanding, promotes rational use of antibiotics, and improves clinical outcomes. A multidisciplinary approach involving healthcare professionals is essential for effective implementation. The ARMS scale is especially useful because it is easy to understand and complete, even for patients with limited reading skills, and can be conveniently administered without interrupting treatment. This encourages stronger collaboration between patients and their healthcare providers and promotes more personalized approach to care. In summary, incorporating tools like ARMS into routine practice has strong potential to improve health outcomes and quality of life of patients. The Adherence to Refills and Medications Scale (ARMS) is a validated questionnaire that evaluates both medication-taking and refill behaviors, making it especially suitable for individuals with conditions like pneumonia.

REFERENCES

1. Fésüs A, Benkő R, Matuz M, et al. Impact of Guideline Adherence on Outcomes in Patients Hospitalized with Community-Acquired Pneumonia (CAP) in Hungary: A Retrospective Observational Study. *Antibiotics*, 2022; 11(4): 468.
2. Silveira CD, Ferreira CS, Corrêa Rde A. Adherence to guidelines and its impact on outcomes in patients hospitalized with community-acquired pneumonia at a university hospital. *J Bras Pneumol.*, 2012; 38(2): 148-207.
3. Levy G, Perez M, Rodríguez B, et al. Adherence with national guidelines in hospitalized patients with community-acquired pneumonia: results from the CAPO study in Venezuela. *Arch Bronconeumol.*, 2015; 51(4): 163-168.
4. Alshehri, A.F., Almangour, T.A., Alhifany, A.A., Alhossan, A., 2022. Assessment of Caspofungin use at a Tertiary Teaching Hospital and compliance with IDSA guidelines and FDA labelings. *Saudi Pharm. J.*, 30 (3): 212–216.
5. Balkhy, H.H., Cunningham, G., Chew, F.K., Francis, C., Al Nakhli, D.J., Almuneef, M.A., Memish, Z.A., 2006. Hospital-and community-acquired infections: a point prevalence and risk factors survey in a tertiary care center in Saudi Arabia. *Int. J. Infect. Dis.*, 10 (4): 326–333.
6. Bodi, M., Rodriguez, A., Solé-Violán, J., Gilavert, M., Garnacho, J., Blanquer, J., Almirall, J., 2005. Antibiotic prescription for community-acquired pneumonia in the intensive care unit: impact of adherence to Infectious Diseases Society of America guidelines on survival. *Clin. Infect. Dis.*, 41(12): 1709–1716.
7. Costantini, E., Allara, E., Patrucco, F., Faggiano, F., Hamid, F., Balbo, P.E., 2016. Adherence to guidelines for hospitalized community-acquired pneumonia over time and its impact on health outcomes and mortality. *Intern. Emerg. Med.*, 11(7): 929–940.
8. Egger, M.E., Myers, J.A., Arnold, F.W., Pass, L.A., Ramirez, J.A., Brock, G.N., 2016. Cost effectiveness of adherence to IDSA/ATS guidelines in elderly patients hospitalized for Community-Acquired Pneumonia. *BMC Med. Inf. Decis. Making*, 16: 34.
9. Edworthy SM, Devins GM. Improving medication adherence through patient education distinguishing between appropriate and inappropriate utilization. Patient Education Study Group. *J Rheumatol.*, 1999; 26(8): 1793-801.
10. Wilhelmsen NC, Eriksson T. Medication adherence interventions and outcomes: an overview of systematic reviews. *Eur J Hospital Pharmacy*, 2019; 26(4): 187-92.
11. Bosworth HB, Granger BB, Mendys P, Ralph B, Rebecca B, Susan MC et al. Medication adherence: A call for action. *Am Heart J.*, 2011; 162(3): 412-24.
12. Smaje A, Weston- Clark M, Raj R, Orlu M, Davis D, Rawle M. Factors associated with medication adherence in older patients: A systematic review. *Aging medicine*, 2018; 1(3): 254-66.
13. Sharma SK, Mishra HK. Clinical profile and outcomes of hospitalized pneumonia patients in India. *J Clin Diagn Res.*, 2022; 16: OC10–OC14.
14. Grenier C, Pépin J, Nault V. Impact of guideline-consistent therapy on outcome of patients with healthcare-associated and community-acquired pneumonia. *J Antimicrob Chemother*, 2011; 66(7): 1617-1624.
15. Triantafyllidis C, Kapordelis V, Papaetis GS, et al. Guidelines adherence for patients with community acquired pneumonia in a Greek hospital. *Eur Rev Med Pharmacol Sci.*, 2012; 16(1): 1-9.
16. Kolditz M, Ewig S. Community-Acquired Pneumonia in Adults. *Dtsch Arztebl Int.*, 2017; 114(49): 838-848.
17. Watkins RR, Lemonovich TL. Diagnosis and management of community-acquired pneumonia in adults. *Am Fam Physician.*, 2011; 83(11): 1299-1306.
18. Christensen D, Luna CM, Martínez J, et al. Cumplimiento con las guías nacionales en pacientes hospitalizados con neumonía adquirida en la comunidad. Resultados del estudio CAPO en Argentina [Adherence with national guidelines in hospitalized patients with community-acquired pneumonia. Results of CAPO study in Argentina]. *Medicina (B Aires).*, 2007; 67(6 Pt 2): 709-722.
19. Levy G, Perez M, Rodríguez B, et al. Adherence with national guidelines in hospitalized patients with community-acquired pneumonia: results from the CAPO study in Venezuela. *Arch Bronconeumol.*, 2015; 51(4): 163-168.
20. Corrêa Rde A, Lundgren FL, Pereira-Silva JL, et al. Comissão de Infecções Respiratórias e Micoses - Sociedade Brasileira de Pneumologia Tisiologia. Brazilian guidelines for community-acquired

- pneumonia in immunocompetent adults - 2009. *J Bras Pneumol.*, 2009; 35(6): 574-601.
21. Feldman C, Anderson R. Community-Acquired Pneumonia: Pathogenesis of Acute Cardiac Events and Potential Adjunctive Therapies. *Chest*, 2015; 148(2): 523-532.
 22. Ferreira HLDS, Costa KLP, Cariolano MS, et al. High incidence of rhinovirus infection in children with community-acquired pneumonia from a city in the Brazilian pre-Amazon region. *J Med Virol.*, 2019; 91(10): 1751-1758.
 23. Lanks CW, Musani AI, Hsia DW. Community-acquired Pneumonia and Hospital-acquired Pneumonia. *Med Clin North Am.*, 2019; 103(3): 487- 501.