ORIGINAL ARTICLE

Tanaffos (2007) 6(2), 32-37

Management of Community Acquired Pneumonia in a Teaching Hospital: The Role of Established Guidelines

Fanak Fahimi [1,2], Mandana Moradi[3], Tahereh Safarnavadeh[3], Rocsanna Namdar[4]

[1] Pharmaceutical Care Unit, NRITLD, Shaheed Beheshti University of Medical Sciences, [2] Clinical Pharmacy Department, School of Pharmacy, Shaheed Beheshti University of Medical Sciences, [3] Clinical Pharmacy Department, School of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran, [4] College of Pharmacy, University of Colorado, Denver, USA.

ABSTRACT

Background: *In spite of established guidelines developed by the American Thoracic Society (ATS), Infectious Disease Society of America (IDSA) and Centers for Disease Control (CDC), there is no consensus among physicians regarding hospitalization and choice of antibiotics for management of community-acquired pneumonia (CAP).*

This study was conducted to determine the percentage of patients appropriately assessed for admittance and the antibiotic treatment selections that were in accordance with the established guideline criteria.

Materials and Methods: *This retrospective chart review study was conducted at the National Research Institute of Tuberculosis and Lung Disease (NRITLD), Masih Daneshvari Hospital during 2005-2006. Patients with a definite diagnosis of CAP were selected and entered the study. The previous IDSA, ATS and CDC guidelines and the more recent IDSA/ATS CAP guidelines were all used to evaluate the management of patients admitted with CAP. Patients were excluded if information was not sufficient.*

Results: *A total of 31 patients were reviewed. Of the 31 patients included in the study, 24 (77%) could have been treated with outpatient regimens. Six of 31 cases (19%) had been treated with regimens consistent with all three (IDSA, ATS, and CDC) guidelines. Twelve of 31 cases (39%) had corresponded to the previous treatment recommendations from ATS. The management of the remaining 13 patients (42%) had not corresponded to any of the mentioned guidelines. When compared to the recently published joint guidelines of ATS/IDSA, 12 of 31 cases (39%) had appropriately corresponded to the treatment recommendations.*

Conclusion: *According to this study only one fifth of the cases reviewed could have been treated on an inpatient basis. Considering the standard guidelines 42% of the patients did not follow the recommendations from evidence-based guidelines. The enforcement of guideline usage through education and surveillance in university hospital settings may be required. We suggest the use of evidence-based medicine in the treatment of CAP.* ***(Tanaffos 2007; 6(2): 32-37)***

Key words: *Antibiotic treatment, Community-acquired pneumonia (CAP), Guidelines, Pneumonia, Risk category*

Correspondence to: Fahimi F

Address: NRITLD, Shaheed Bahonar Ave, Darabad, TEHRAN 19569, P.O:19575/154, IRAN

Email address: fahimi@nritld.ac.ir

Received: 14 June 2007

Accepted: 30 July 2007

INTRODUCTION

Community-acquired pneumonia (CAP) is a common infection associated with significant morbidity and can be potentially life-threatening, especially in elderly patients and those with co-morbid conditions (1). Patients with CAP requiring intensive care unit (ICU) admission have been reported to have mortality rates of up to 50% (2-4).

Organizations such as the American Thoracic Society (ATS), Infectious Diseases Society of America (IDSA) and the Centers for Disease Control (CDC) have developed evidence-based guidelines for empiric treatment of CAP in adults to optimize patient care. Recently, the IDSA and ATS combined their efforts and published a joint statement. These statements have identified specific host and disease criteria to be taken into consideration for inpatient versus outpatient management of CAP and the initial treatment selection. In spite of guidelines and recommendations, the physicians' decision regarding CAP management has been known to be varied; and, it is under the influence of many factors such as cost, drug availability and physician preferences (5-11). In addition, the substantial variability in the decision of the admission of patients with CAP may be an indicator of uncertainty among the managing physicians in predicting the need for hospitalization of patients with pneumonia (9).

The usefulness and implication of the previously mentioned guidelines in teaching hospital settings has yet to be established. However, reports from the United States have demonstrated that regimens inconsistent with the guidelines have been associated with a prolongation of hospital stays, increased mortality rates, iatrogenic complications and significant costs (12,13).

The present study was performed to focus mainly on the site of care and the management scheme of CAP at our institution.

The aim of this study was to determine how well the empiric treatment and management of CAP corresponded to the recommendations of the previously published IDSA, ATS and CDC and most recent IDSA/ATS joint guidelines.

MATERIALS AND METHODS

The study design was a retrospective chart review of all patients admitted to the internal services of the National Research Institute for Tuberculosis and Lung Diseases (NRITLD), Masih Daneshvari Hospital, during 2005-2006. Progress notes, laboratory data and physician orders were reviewed. Patients who were admitted to the hospital and had definite radiographic and clinical CAP diagnosis as identified in their charts were selected and entered into the study. Patients were excluded if the information in their charts was not sufficient to determine the required mentioned data below.

The diagnosis and treatment plans were determined by the physicians in-charge. Patient information including demographic data, physical examination, presenting manifestations, coexisting conditions, diagnostic work-ups, laboratory data and initial antibiotic regimens were recorded. Collected data were used to determine mortality risk score according to Pneumonia Severity Index (PSI). Validated prediction rules were applied to assess the likelihood of mortality in CAP patients and categorized according to Fine Criteria Risk classes I-V (14-16). Risk factors for drug resistant streptococcus pneumonia were also assessed (17). Drug therapies were evaluated and compared to recommendations from the most often cited guidelines: IDSA (18), ATS (19), CDC (20) and the new joint IDSA/ATS guidelines (21).

Data regarding condition upon discharge and orders were collected to evaluate the outcome of selected therapies. The percentage of patients admitted and treated consistently and inconsistently with the established guideline was determined.

RESULTS

A total of 31 patients were reviewed. Table 1 summarizes the results extracted from chart reviews. Patients mean age was 48.98 ± 22.54 years old (mean ± SD).

Table 1. Risk assessment, dug therapy and outcomes of study subjects.

Case #	Age	Total score	Risk class Recommended site of treatment Mortality range	Risk factor For DRSP	Drug therapy
1	78	108	IV In patient 8.2-9.3	Age>65	Ceftriaxone + Azithromycin
2	75	155	V In patient 27-29.2	-Age>65 -Immunosupressed -Multiple medical co- morbidities	Ceftriaxone + Azithromycin+ Clindamycin (3 days) then Vancomycin + Meropenem
3	71	91	IV In patient 8.2-9.3	-Age >65 -Multiple medical co- morbidities	Co-Amoxiclav 625mg
4	82	102	IV In patient 8.2-9.3	Age>65	Ceftriaxone + Azithromycin
5	36	46	II Out patient o.6	-	Ceftriaxone
6	43	63	II Out patient o.6	-	
7	34	24	I Out patient o.6	-	Ceftriaxone + Clarithromycin
8	51	120	IV In patient 8.2-9.3	Immunosupressed	Ceftriaxone + TMP/SMX + Azithromycin
9	32	42	II Out patient o.6	-	Ceftriaxone + Azithromycin
10	22	22	I Out patient 0.1	ICU & prison history	Cefixime + Erythromycin
11	44	34	I Out patient 0.1	Beta lactam therapy within past 3 month	Ceftriaxone + Erythromycin
12	1.5	30	II Out patient 0.6	-Medical co- morbidities -Beta lactam therapy within past 3 month -Nursing home resident	Ceftriaxone + Erythromycin
13	71	101	IV In patient 8.2-9.3	-Age>65 -Nursing home resident	Ceftriaxone + Azithromycin
14	69	89	III Out patient 0.5- 2.8	-Age >65 -Structural lung disease	Ceftazidime Azithromycin Clindamycin Ciprofloxacin
15	20	20	I Out patient 0.1	-	Ceftriaxone + Erythromycin
16	70	70	II Out patient 0.6	Age>65	As above
17	79	79	III Out patient 0.5-2.8	Age>65	Ceftriaxone + Azithromycin
18	50	60	II Out patient 0.6	Heart failure	Ciprofloxacin
19	20	20	I Out patient 0.1	-	Ceftriaxone +Erythromycin
20	70	70	II Out patient 0.6	Age>65	As above
21	79	79	III Out patient 0.5-2.8	Age>65	Ceftriaxone + Azithromycin
22	50	60	II Out patient 0.6	Heart failure	Ciprofloxacin
23	65	65	II Out patient 0.6	-Age >65 -Beta lactam therapy within past 3 month	Ceftriaxone + Erythromycin
24	58	58	II Out patient 0.6	Antibiotic therapy within past 3 months	Ceftriaxone + Azithromycin
25	68	108	IV In patient 8.2-9.3	-Age >65 -Neoplastic Disorder -COPD	Ceftriaxone + Azithromycin
26	23	23	I Out patient 0.1	Beta lactam therapy within past 3 month	Ceftriaxone + Azithromycin
27	19	9	I Out patient 0.1	Beta lactam therapy within past 3 month	Ceftriaxone + Azithromycin
28	30	30	As above	-	As above
29	36	26	As above	-	As above
30	40	60	As above	Beta lactam therapy within past 3 month	As above
31	32	22	As above	Cardiopulmonary disease	Ceftazidime, Vancomycin, Ciprofloxacin

Of the 31 patients included in this study, 24 (77%) did not meet the criteria for admission according to risk classifications established by guidelines. These patients could have been treated with outpatient regimens.

Six of 31 cases (19%) were treated with regimens consistent with all three IDSA, ATS, and CDC guidelines. Twelve of 31 cases (39%) corresponded to the previous treatment recommendations from ATS. The management of the remaining 13 patients (42%) did not correspond to any of the aforementioned guidelines. When compared to the recently published joint guidelines of ATS/IDSA, 12 of 31 cases (39%) appropriately corresponded to the treatment recommendations.

Table 2 shows the antibiotic regimens given during hospitalization. Twenty-two of 31 (71%) regimens consisted of ceftriaxone and a macrolide. Ciprofloxacin was used in 2 cases. Other regimens included beta lactam/ beta lactamase inhibitor, ceftriaxone alone, ceftriaxone/ sulfamethoxazole/ trimethoprim/ macrolide, ceftazidime/ macrolide/ clindamycin/ ciprofloxcin, ceftazidime/ vancomycin/ ciprofloxcin, cefixime/macrolide, and one case used ceftriaxone/macrolide/clindamycin then changed to vancomycin and meropenem.

Table 2. Antibiotic regimen used for the treatment of CAP

Drug	Number	Percent
Beta Lactam/ Beta lactamase inhibitor	1	3.22
Ceftriaxone/Macrolide	22	71
Ceftriaxone	1	3.22
Ceftriaxone/TMP/SMX/Macrolide	1	3.22
Ceftazidime/Macrolide/Clindamycin/Ciprofloxcin	1	3.22
Ciprofloxacin	2	6.45
Ceftazidime/Vancomycin/Ciprofloxcin	1	3.22
Cefixime/Macrolide	1	3.22
Ceftriaxone/Macrolide/Clindamycin then Vancomycin and Meropenem	1	3.22
Total	31	100

DISCUSSION

The result of the present study shows that 24 of 31 patients did not meet the criteria for in-patient care and could have been managed on an outpatient basis. Treatment of 42% of cases reviewed did not match any of the abovementioned guidelines set for the initial treatment of CAP. It appears that physicians in this hospital still base their treatment decisions on clinical judgment rather than established objective criteria and evidence-based guidelines. Although treatment guideline recommendations are not identical, the recommendations are similar.

Despite the development of previous guidelines to guide clinicians in the management of community acquired pneumonia, physicians' therapeutic interventions in this review are different. Due to controversies between guidelines, the IDSA and ATS developed the joint document to unify treatment recommendations.

Only 7 patients were eligible for admission to the hospital based on the guidelines. Use of pneumonia severity index is an established measure that can be used to identify low risk patients for outpatient treatment of CAP. Physicians tend to overestimate the risk of death in patients with pneumonia and these overestimates are associated with the decision of hospitalizing low risk patients (22).

Together, these raise the need for education, implication and surveillance of the evidence based guidelines in the management of CAP. Using risk scores for admission could decrease costs of therapy, number of hospitalizations, complications, and antibiotic usage.

To our knowledge, there have been only a few investigations on the usage of treatment guidelines, which attempt to improve patient care.

Twenty-three patients had at least one risk factor for drug resistant streptococcus pneumonia (DRSP). Treatment with medications other than cephalosporins may have been better options in these

patients.

The favorable outcomes could be due to the lower risk of patients selected for admission. Also, duration of hospital stay was not obtained to determine the cost saving effects of adherence to guidelines.

The prediction rules are designed to guide treatment decisions since low-risk patients can usually be treated in the ambulatory setting. An overall pneumonia- severity score is sometimes difficult to use or deal with because of the complexity of other factors which may influence patient outcome. Low-risk patients can be identified quickly and treated as outpatients assuming social issues make this feasible. Patients treated at home are able to continue their normal activities sooner. They are also less likely to become infected with the more virulent and resistant pathogens found in the hospital, and they avoid further nosocomial infections since they can be treated as an outpatient with an oral antimicrobial agent.

CONCLUSIONS

In the present study, non-adherence to evidence-based guidelines for the treatment of community acquired pneumonia occurred frequently. Use of a standard guideline has been shown to provide patients with optimal and cost-effective care. Admissions of low-risk patients in our hospital may be avoided if the PSI is used to predict the risk. We suggest the use of evidence-based medicine in the treatment of community-acquired pneumonia and in all areas of medicine. Evidence-based medicine should be utilized through education and surveillance in the treatment of CAP.

Acknowledgement

The authors would like to thank Dr. Leila Ghazi Tabatabaie and Dr. Naghmeh Foroutan for their cooperation.

REFERENCES

1. File TM. Community-acquired pneumonia. ***Lancet*** 2003; 362 (9400): 1991- 2001.
2. Garibaldi RA. Epidemiology of community-acquired respiratory tract infections in adults. Incidence, etiology, and impact. ***Am J Med*** 1985; 78 (6B): 32- 7.
3. Campbell GD. Overview of community-acquired pneumonia. Prognosis and clinical features. ***Med Clin North Am*** 1994; 78 (5): 1035- 48.
4. Feldman C, Ross S, Mahomed AG, Omar J, Smith C. The aetiology of severe community-acquired pneumonia and its impact on initial, empiric, antimicrobial chemotherapy. ***Respir Med*** 1995; 89 (3): 187- 92.
5. Pachon J, Prados MD, Capote F, Cuello JA, Garnacho J, Verano A. Severe community-acquired pneumonia. Etiology, prognosis, and treatment. ***Am Rev Respir Dis*** 1990; 142 (2): 369- 73.
6. Torres A, Serra-Batlles J, Ferrer A, Jimenez P, Celis R, Cobo E, et al. Severe community-acquired pneumonia. Epidemiology and prognostic factors. ***Am Rev Respir Dis*** 1991; 144 (2): 312- 8.
7. Gleason PP, Kapoor WN, Stone RA, Lave JR, Obrosky DS, Schulz R, et al. Medical outcomes and antimicrobial costs with the use of the American Thoracic Society guidelines for outpatients with community-acquired pneumonia. ***JAMA*** 1997; 278 (1): 32- 9.
8. Magalit PN, Sorongon EMD, Tupasi TE. Antibiotic usage in community-acquired pneumonia in a tertiary care hospital. ***Phil J Microbiol Infect Dis*** 1997; 26 (3): 109- 12.
9. Astin GT, Honig E, Shipp C, Moore B, McClellan W. Initial antibiotic management of community acquired pneumonia. ***J Med Assoc Ga*** 1997; 86 (2): 105- 8.
10. Pomilla PV, Brown RB. Outpatient treatment of community-acquired pneumonia in adults. ***Arch Intern Med*** 1994; 154 (16): 1793- 802.
11. Kappstein I, Daschner FD. Antibiotic usage in community-acquired pneumonia: results of a survey in 288 departments of internal medicine in German hospitals. ***Infection*** 1991; 19 (5): 301- 4.

12. Gugliemo BJ, Dudas V, Tran S, et al. Treatment outcomes associated with community acquired pneumonia in US hospitals: a 3,000 patient survey. Proceedings of the 37th ICAAC, 1997; Toronto, Canada.
13. Kravitz J, Sanders D. Paediatric pneumonia in Zimbabwe: management and pharmaceutical costs of inpatient care. ***J Trop Pediatr*** 1994; 40 (1): 17- 23.
14. Black ER, Mushlin AI, Griner PF, Suchman AL, James RL Jr, Schoch DR. Predicting the need for hospitalization of ambulatory patients with pneumonia. ***J Gen Intern Med*** 1991; 6 (5): 394- 400.
15. Metlay JP, Fine MJ. Testing strategies in the initial management of patients with community-acquired pneumonia. ***Ann Intern Med*** 2003; 138 (2): 109- 18.
16. Fine MJ, Auble TE, Yealy DM, Hanusa BH, Weissfeld LA, Singer DE, et al. A prediction rule to identify low-risk patients with community-acquired pneumonia. ***N Engl J Med*** 1997; 336 (4): 243- 50.
17. Pallares R, Gudiol F, Linares J, Ariza J, Rufi G, Murgui L, et al. Risk factors and response to antibiotic therapy in adults with bacteremic pneumonia caused by penicillin-resistant pneumococci. ***N Engl J Med*** 1987; 317 (1): 18- 22.
18. Mandell LA, Bartlett JG, Dowell SF, File TM Jr, Musher DM, Whitney C. Infectious Diseases Society of America. Update of practice guidelines for the management of community-acquired pneumonia in immunocompetent adults. ***Clin Infect Dis*** 2003; 37 (11): 1405-33. Epub 2003 Nov 3.
19. Niederman MS, Mandell LA, Anzueto A, Bass JB, Broughton WA, Campbell GD, et al; American Thoracic Society. Guidelines for the management of adults with community-acquired pneumonia. Diagnosis, assessment of severity, antimicrobial therapy, and prevention. ***Am J Respir Crit Care Med*** 2001; 163 (7): 1730- 54.
20. Centers for Disease Control and Prevention. Trends in morbidity and mortality: pneumonia, influenza, and acute respiratory conditions. 2001. www. cdc. gov/ nchs/ about/ major/ nhis/ release 200306.htm
21. Mandell LA, Wunderink RG, Anzueto A, Bartlett JG, Campbell GD, Dean NC, et al; Infectious Diseases Society of America; American Thoracic Society. Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. ***Clin Infect Dis*** 2007; 44 Suppl 2: S27-72.
22. Fine MJ, Smith DN, Singer DE. Hospitalization decision in patients with community-acquired pneumonia: a prospective cohort study. ***Am J Med*** 1990; 89 (6): 713- 21.