ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

INNOVARE ACADEMIC SCIENCES
Knowledge to Innovation

Special Issue (May)

Online - 2455-3891
Print - 0974-2441

Research Article

PROFILE ASSESSMENT FOR HOSPITAL READMISSION AMONG MALE PATIENTS OF ACUTE EXACERBATION CHRONIC OBSTRUCTIVE PULMONARY DISEASE AT SELECTED HOSPITAL IN MALAYSIA

NUR SYAFA ADDINA BINTI DZAKWAN[1], ENTI HARIADHA[2]*

[1]Clinical Pharmacy Unit, School of Pharmacy, Management and Science University, Malaysia, [2]Coordinator, Clinical Pharmacy Unit, School of Pharmacy, Management and Science University, Malaysia. Email: entihariadha83@gmail.com

Received: 6 November 2017, Revised and Accepted: 24 January 2017

ABSTRACT

Background: Acute exacerbation chronic obstructive pulmonary disease (AECOPD) is a common lung disease characterized by airflow limitation that is not fully reversible and is both chronic and progressive. AECOPD is a sudden worsening of COPD symptoms that typically lasts for several days. AECOPD readmission has been one of global concern and was the fifth leading cause of disease burden in Malaysia, both clinically and economically.

Objective: This study is aimed to screen the factors are contributed to readmission among AECOPD male patients in selected hospital of Malaysia and associated medication cost.

Methods: A cross-sectional study design was used in this study, whereby data collections were based on AECOPD Patient's Medical Record that was readmitted to the male medical ward from January 1 to December 31, 2015, and documented into the patient's data collection form. The collected data were analyzed using software name Statistical Package for Social Sciences version 17.0.

Results: Total sample population collected was 100 patients during the study period. Majority of patients aged from 50 to 79 years old (83%) and 74% of them were Malays. The 94% of them were associated with cigarette smoking and 93% were having concomitant disease of cardiovascular disorder and endocrine disorder. Out of 100 study population, 32% patients were readmitted back in more than 1 year since the previous hospitalization, while 40% was readmitted back within <30 days. The longest day of hospitalization spent 12 days, but majority (56%) spent <5 days of hospitalization. Combinations between Augmentin and Azithromycin were the common (45%) antibiotics prescribed among the study population. Significantly statistical difference ($p<0.05$) is shown between cigarette smoking habits on different groups of age and between time readmission after discharge with medication adherence, while no significantly statistical difference ($p>0.05$) between the length of stay with medication cost during admission.

Conclusion: The readmission factors were contributed among AECOPD in selected hospital were revealed highest among Malay aged between 50 and 79 years old, associated with cigarettes smoking and not adhere to medications. Medication cost during admission was not significantly increasing proportionally with the length of stay.

Keywords: Readmission, Chronic obstructive pulmonary disease, Acute exacerbation of chronic obstructive pulmonary disease, Medication cost.

 DOI: http://dx.doi.org/10.22159/ajpcr.2017.v10s2.19476

INTRODUCTION

In developing countries, chronic respiratory diseases represent a challenge to public health because of their frequency, severity, projected trends, and economic impact. Health-care planners are faced with a dramatic increase in tobacco use and must establish priorities for the allocation of limited resources [1].

Chronic obstructive pulmonary disease (COPD) is a common lung disease characterized by airflow limitation that is not fully reversible and is both chronic and progressive [2]. Acute exacerbation of COPD (AECOPD) is associated with a significant increase in mortality, hospitalization, and health care utilization [3].

Inpatient admissions for COPD represent a significant economic burden, accounting for over half of direct medical costs. In Malaysia, the prevalence of COPD is moderate to severe, with approximately 448, 000 cases in the country, and the number of cases is consistently increasing year by year [4].

The interest in 30 days of readmission rates is growing worldwide. However, compared to the extensive studies that have been carried in the relation of readmission of COPD patients into the hospital in the US, there is very little study has been conducted in Malaysia regarding the hospital readmission among COPD patient within 30 days after discharged.

The aim of this study is to screen the factors contributed to readmission among AECOPD male patients in selected hospital of Malaysia and associated cost.

METHODS

Ethical approval

This study was approved by Medical Research Ethics Committee, Ministry of Health Malaysia with reference number [5] KKM/NIHSEC/P16-314.

Study design and location

A cross-sectional and retrospective study design was performed in this study whereby data collection is based on the medical records of AECOPD patients readmitted into a male medical ward of hospital within 30 day from the hospital discharged. Collected data were from the patient's medical records that were admitted from the January 1, 2015, to December 31, 2015.

Exclusions and inclusions criteria

Study populations were registered cases of readmission with diagnosed AECOPD and readmitted into hospital within 30 days, more than 30 days or <30 days after the previous discharged. Moreover, included

patients were Malaysian citizen with age above 21 years old. Excluded patients were not Malaysian citizen and pediatric.

Research tool and data analysis

Self-developed data collection form was used to record the data. Demographic data were recorded, such as age gender, race, BMI, family history, social history, and allergy. Signs and symptoms, including laboratory parameter, were recorded as well. Costs during admission were recorded too.

The collected data were processed statistically using Statistical Package for Social Sciences version 17.0, and frequency distribution was analyzed.

RESULTS

1. Sociodemographic (n=100)
   Majority (83%) of the study population belongs to age range of 50-80 years with highest rate of readmission as well. However, among this age range (50 – 79 years) highest readmission is found among age group 60-69 years. Malay was the highest admissions into the hospital contributing to ¾ of the study population. Highest patients admitted due to COPD exacerbation are ex-chronic smokers (40%) followed by chronic smokers (35%). A total of 6% of study populations were substance abusers (Table 1). There was a significant difference number that age group of 50-59 years old recorded as the highest chronic smokers while age group 60-69 years old and 70-79 years old recorded as highest ex-chronic smokers (Table 2). Concomitant diseases presented, showed that 1/2 of the study population were having Cardiovascular disorders followed by Metabolic or Endocrine disorders (2/5). Respiratory disorders and renal disorders are 1/10 of the study population. A total of 12% subjects are having other diseases such as Benign Prostate Hyperplasia (BPH) and Hepatitis C infection (Table 1).
2. Readmission status (n=88)
   Out of the total 100 subjects, 88 subjects were having recurrent admission, out of these 88 subjects; about 40% were having recurrent admissions within less than 30 days. Among those having recurrent admissions, it was found that more than 1/2 of them spent less than 5 days of hospitalization (Table 3).
   Half (1/2) of the study population was adhered to their medications. Out of those that adhere, more than 3/5 was found to have recurrent admission in more than 1 year since previous hospitalization. Only 4% was admitted for less than 30 days. There is a significant statistical difference numbers ($p \leq 0.05$) found between medication adherence and number of recurrent admission days (Table 6).
3. Clinical features (n=100)
   About 3/4 of study population came to Emergency Department with shortness of breath (SOB), 4/5 with symptoms of cough and 1/10 came with fever and chest pain. More than half of study population showed peripheral haziness on their chest x-ray results (Table 4). About 1/5 showed hyperinflated lungs, while 1/10 shows no pneumonic patches or changes. Only 4% of the study population showed emphysematous lungs.
4. Laboratory result on the first day of admission (n=100)
   Majority (≥ 50%) of study population experience increasing of systolic, diastolic, respiratory rate and WBC level on first day of admission (Table 5).
5. Culture and sensitivity result evaluation (n=100)
   Culture results of the study population showed that 97% came out as negative while only 3% were positive. Resistance to ampicillin/sulbactam and ceftazidime recorded only 2%, the highest frequency in patients that having the positive result of C and S. Sensitivity test came out for tigecycline, doripenem, ertapenem, meropenem, imipenem with 1% occurrence each in a patient that was infected with multiple resistant organisms.
6. Medication adherence (n=100)
   About 100% received the management of COPD according to the guideline. 21% of the study population did not prescribe with an antibiotic, where 3 of them were discharged with old medications. The highest frequency of antibiotic administered to a patient in ED

Table 1: Sociodemographic distribution among study population

Parameter	Frequency (%)
Age (years old)	
30-39	4
40-49	8
50-59	24
60-69	32
70-79	27
80-89	5
Race	
Malay	74
Chinese	13
Indian	13
Social history	
Ex-chronic smoker	40
Chronic smoker	35
Occasional smoker	19
Substance abuse	6
Concomitant disease distribution	
Cardiovascular disorder	57
Endocrine disorder	36
Respiratory disorder	17
Renal disorder	7
Others	12
Allergy	
No allergy	96
Aspiring	2
Bactrim	1
NSAID	1

Table 2: Social history evaluation in different group of age among study population

Age	Social history n (%)				p-value
	Chronic smoker	Occasional smoker	Exchronic smoker	Substance abuse	
30-39	1	0	0	2	0.00*
40-49	6	0	1	1	
50-59	14	0	5	2	
60-69	6	0	16	1	
70-79	8	1	14	0	
80-89	0	0	4	0	

*Fisher exact test, p-value significant at ≤0.05

Table 3: Readmission status distribution among study population

Parameter	Frequency (%)
Days of recurrent admission	
<30 days	40
Within 30 days	5
31 days - 1 year	23
>1 year	32
Length of stay	
<5 days	56
5-10 days	38
>10 days	6

Table 4: Clinical features distribution among study population

Parameter	Frequency (%)
Chie complaint: SOB	78
Sign and symptoms: Cough	83
Chest X-ray: Peripheral haziness	66

SOB: Shortness of breath

Table 5: Distribution of laboratory result on the first day of admission among study population

Parameter (normal range)	n (%)			Mean±SD
	≤ Normal	Within normal range	≥ Normal	
Temperature (36.5-37.49°C)	-	78 (78)	22 (22)	37.25±0.53
Systolic BP (90-119 mmHg)	-	16 (16)	84 (84)	140.99±21.60
Diastolic BP (60-79 mmHg)	2 (2)	48 (48)	50 (55)	81.83±12.60
Heart rate (60-100 bpm)	-	53 (53)	47 (947)	102.73±19.17
Respiratory rate (12-20 pm)	-	33 (33)	67 (67)	28.29±12.55
SPO_2 under RA (95-100)	62 (62)	38 (38)	-	91.62±8.77
WBC (4.0-11.0×10^9/L)	-	35 (35)	65 (65)	13.58±5.33
RBC (4.2-5.4×10^9/L)	15 (15)	74 (74)	11 (11)	6.17±10.61
pH (7.38-7.42)	45 (45)	28 (28)	27 (27)	7.36±0.97
pCO_2 (35-45 mmHg)	22 (22)	19 (19)	39 (39)	51.07±32.82
pO_2 (38-42 mmHg)	2 (%)	5 (5)	93 (93)	124.89±59.89
HCO_3 (22-28 mmol/L)	19 (19)	65 (65)	16 (16)	26.17±14.66
ALT (<32 IU/L)	-	79 (79)	21 (21)	37.89±33.47
AST (10-40 IU/L)	-	87 (87)	13 (13)	12.03±6.99
Urea (1.7-8.3 mmol/L)		83 (83)	17 (17)	6.10±3.08
Creatinine (64-122 umol/L)	13 (13)	74 (74)	13 (13)	94.92±62.36
Na (135-145 mmol/L)	19 (19)	80 (80)	1 (1)	137.08±5.33
K (3.5-5.0 mmol/L)	24 (24)	70 (70)	6 (6)	3.95±0.67

SD: Standard deviation, RBC: Red blood cell, WBC: White blood cell

Table 6: Medication adherence evaluation among study population

Recurrent admission days	Medication adherence		p-value
	Yes	No	
	n (%)	n (%)	
<30 days	4	36	
Within 30 days	0	5	0.000*
>30 days - 1 year	17	6	
>1 year	31	1	

*Chi-square test, p-value significant at ≤0.05

Table 7: Medication cost distribution among study population

Parameter	Frequency (%)
Daily cost (RM)	
<100	38
100-199	28
200-299	23
300-399	5
400-499	3
500-599	3
Total cost (RM)	
<1000	73
1000-1999	16
2000-2999	6
3000-3999	3
4000-4999	2

Table 8: Medication cost distribution among study population

Length of stay	Cost (RM)	p-value
	Mean±SD	
<5 days	755.02±2524.45	
5-10 days	1280.06±920.54	0.742*
>10 days	2542.72±1833.17	

*Fisher exact test, p-value significant at ≤0.05, SD: Standard deviation

(79%) and in the ward (85%) was a combination of Augmentin and azithromycin.

7. Medication cost
   Daily medication cost for majority (9/10) of the study population was revealed to be less than RM300 while total cost during admission was less than RM 1,999 (Table 7). The estimated total medication cost evaluation on different length of hospital stay revealed that patient that spent more than 10 days of hospitalization spent a mean of RM2542.72±1833.17 on their total medication cost. Subjects that spent less than 5 days of hospitalization recorded lowest total medication cost with less than RM1000, with mean cost revealed to be around RM755.02±2524.45. There was no significant statistical difference mean between length of stay and total medication cost (Table 8).

DISCUSSION

Sociodemographic data

The age distribution of study population was revealed to be highest in older population starting from age 50 years old until 79 years old. Majority of patients was Malay (74%), and 94% was associated with cigarette smoking, either as an ex-smoker or an active smoker. There is a significant difference ($p<0.05$) between the age group and smoking habit. The most dominating risk factors in AECOPD were increasing age and smoking habit, and it was estimated that half of the elderly smokers fulfilled the criteria for COPD according to both the BTS and the GOLD criteria [5].

Clinical features

Majority (3/4) of the study population came into the ED with chief complaints of shortness of breath (SOB). On assessment, majority of patients were diagnosed with a cough and flu (83%) and SOB (55%). Sputum was also one of accompanied symptoms among the study population (67%) ranging from whitish and yellowish sputum to greenish color sputum. A cough is often the first symptom of COPD which may initially be intermittent but later present on a daily basis, often with chronic sputum production. Wheezing and chest tightness may also be present [6].

All study population showed abnormalities in their chest X-ray results. Results showed that patient came with four types of abnormalities, such as peripheral haziness, hyperinflated lungs, emphysematous lungs, and no pneumonic patched lungs. Approximately 66% of the study population showed peripheral haziness, while only 10 patients showed no pneumonic changes on their lungs. Haziness is caused by increased absorption of the X-rays. Increased absorption occurred when tissues were denser, thicker, or had a higher fluid content than surrounding tissues. A diffuse haziness would typically be caused by inflammation or thickening of tissues, and there's a variety of different causes and patterns. Emphysema was defined in terms of anatomic pathology. Emphysema historically was defined on histologic

examination at autopsy. Due to this histologic definition is of limited clinical value, emphysema also has been defined as an abnormal permanent enlargement of the airspaces distal to the terminal bronchioles, accompanied by destruction of their walls yet without obvious fibrosis [2].

Laboratory result on the first day of admission

More than 62% of the study population had a reduction in the SPO_2 level with a mean reading of 91.62±8.77%. The most significant parameter in full blood count for diagnosis of COPD is white blood cell (WBC) level. More than 65% of the study population was presented with elevated WBC count with a mean reading of 13.58×10^9/L±5.33.

Arterial blood gas analysis provides the best clues as to acuteness and severity of disease exacerbation [7]. In a patient experiencing a severe exacerbation, profound hypoxemia and hypercapnia can be accompanied by respiratory acidosis and respiratory failure [2].

Culture and sensitivity result evaluation

Since only three incidences of AECOPD were associated with positive C and S, and no specific pathogens were mentioned in patient's medical records, therefore it could not be concluded that readmission of AECOPD patients due to the bacterial infection. The highest incidence (2%) of antibiotic resistance was against ampicillin/sulbactam (Unasyn) and ceftazidime. Antibiotic resistance increased in all major pathogens. The patients' having antibiotic resistance against ceftazidime was not given this antibiotic in his empirical treatment, and so the occurrence of antibacterial resistance was avoided.

Medication profile evaluation

The majority of the study population (79%) received antibiotic treatment in ED. Antibiotic administration in ED was given as empirical treatment if a patient came with either two of these symptoms increased a cough and sputum volume, purulent sputum and/or increased dyspnea [6]. Result of this study showed that combination of Augmentin (amoxicillin/clavulanate acid) and azithromycin is the most frequently initial antibiotic administered in ED for AECOPD. Even though the administration of initial antibiotic in ED serves as empirical treatment, the efficacy of antibiotic therapy in AECOPD is still controversial and has been the focus of an extensive review [8].

Medication cost

Estimated daily medication cost shows that 38% of the study population spent less than RM100 per day, while only 3% spent between RM500 and RM599. According to Dalal *et al.*, the cost of medication increased with people having complex AECOPD or in people requiring invasive intubation [9]. However, no studies are conducted in Malaysia in relation to medication cost for readmitted AECOPD patients, therefore no generalization of medication cost could be made.

Patients spent more than 10 days of hospitalization were seen having the highest mean cost of RM2542.72 while those who spent <5 days of hospitalization recorded the lowest mean cost of RM755.02 total cost of medication. There is no significant statistical difference value between the length of stay and total cost of medication. However, one study in 2010 by Dalal *et al.*, showed that the costs of hospital-based care for COPD are substantial. Admissions involving intubation or intensive care are associated with the highest costs, length of stay and mortality [9].

CONCLUSION

The distribution of the population of COPD patients readmitted in selected hospital was higher among Malays and of those within the age group of 50-79 years old. Most patients included in this study have a social history as an ex-chronic smoker which is the leading cause of exacerbation of COPD. All patients of COPD received treatment in the hospital according to the management stated in the clinical practice guideline for COPD provided by MOH. Majority of patients received antibiotic treatment in ED as empirical treatment. The highest usage for antibiotic was revealed to be the combination of Augmentin and Azithromycin. There was a significant increment of time readmission after discharge due to nonadherence to medication. Even though there is no significant difference between total costs of medication with the length of stay in the hospital, there is an increased trend of longer hospitalization observed that will subsequently result with higher medication cost.

ACKNOWLEDGMENT

Authors are thankful to all the lecturers of School of Pharmacy, Management and Science University, Malaysia, for providing support and knowledge throughout this study and also to the hospital for allowing to carry out this study at their premises.

REFERENCES

1. Aït-Khaled N, Enarson D, Bousquet J. Chronic respiratory diseases in developing countries: The burden and strategies for prevention and management. Bull World Health Organ 2001;79(10):971-9.
2. Dipiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey LM. Pharmacotherapy: A Pathophysiologic Approach. New York: McGraw-Hill Companies; 2011. p. 495-6.
3. Rodriguez-Roisin R. Toward a consensus definition for COPD exacerbations. Chest J 2000;117 Suppl 5:398S-401.
4. Regional COPD Working Group. COPD prevalence in 12 Asia-Pacific countries and regions: Projections based on the COPD prevalence estimation model. Respirology 2003;8(2):192-8.
5. Lundback B, Lindberg A, Lindstrom M, Rönmark E, Jonsson AC, Jönsson E, *et al*. Not 15 but 50% of smokers develop COPD? Report from the obstructive lung Disease in Northern Sweden studies. Respir Med 2003;97 Suppl 2:115-22.
6. Ministry of Health Malaysia. Clinical practice guidelines. Management of Chronic Obstructive Pulmonary Disease. 2nd ed. Malaysia: Academy of Medicine of Malaysia, Malaysian Thoracic Society; 2009. p. 1-67.
7. Cosimo MB, Maria V. Acid-base disorders in patients with chronic obstructive pulmonary disease: A pathophysiological review. J Biomed Biotechnol 2012;2012:1-8.
8. Adams SG, Jairo M, Michael L, Antonio A. Antibiotics are associated with lower relapse rates in outpatients with acute exacerbations of COPD. Chest J 2000;117 Suppl 5:1345-52.
9. Dalal AA, Shah M, D'Souza AO, Rane P. Costs of COPD exacerbations in the emergency department and inpatient setting. Respir Med 2011;105 Suppl 3:454-60.