

Full Length Research Paper

Risk for unplanned early hospital re-admission for patients with respiratory tract diseases: A retrospective study

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The purpose of this study was to identify unplanned hospital re-admission risk factors in patients with respiratory tract diseases in Taiwan. This was a retrospective study. Study subjects were patients with primary diagnosis of respiratory tract diseases, which were defined by using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes. Eight hundred and seventy-six respiratory tract diseases patients were discharged from the hospital, and 14.78% (n = 64) of them were re-admitted within 14 days after discharge. Results found that unplanned hospital re-admission among respiratory tract diseases patients were statistical correlated with subjects' ways of discharge from hospital, clinical re-visit compliance, receiving services from discharge plan team workers, intubation number, and previous hospital length of stay. The significant predictor was early re-hospitalization after discharge. However, results provide important information for measure intervention outcomes to prevent unplanned hospital re-admission among respiratory tract diseases.

Key words: Unplanned hospital re-admission, respiratory tract diseases, risk factors.

INTRODUCTION

Unplanned hospital readmission is often used as one of the care quality indicator in hospitals (Asthon and Asthon 1996; Brand et al., 2005). After discharge from hospital, unplanned hospital re-admission reflects the efficiency of hospital care (Western et al., 2002). From a financial point of view, unplanned hospital re-admission increases healthcare expenditures. According to the Bureau of National Health Insurance (2008), in Taiwan, the percentage of hospital re-admissions within 14 days after discharge was 6.9 days. The healthcare cost for in-patients was 21.66% of overall healthcare expenditures in 2008 (Department of Health, 2009), which is 1.62% higher than in year 2000. The occurrence of unplanned re-admission might be related to patients' diagnosis (Fen et al., 2003).

According to Ashton (1996), unplanned hospital re-admission rate among patients with medical or surgical

health problems was 5 to 29%. Patients with cognitive heart failure (CHF) or chronic obstructive pulmonary diseases (COPD) showed higher risk to re-hospitalization than patients with other health problems (Weissman, 2001). Brand et al. (2005) also indicated that patients with primary diagnosis of COPD were at risk of hospital readmission after discharge for 29 to 180 days. However, risk factors of unplanned hospital re-admission among patients with respiratory tract diseases in Taiwan are complex and still unclear. An unplanned hospital re-admission is defined as non-expected patients' re-hospitalization within 14 days after discharge from the hospital.

In previous studies, risk factors related to unplanned hospital re-admissions were varied (Hasan, 2001; Westert et al., 2002; Saynajakangas et al., 2004). For example, Fen et al. (2003) have investigated 2900 patients to understand the factors related to unplanned hospital re-admissions. They found that length of stay showed statistical significant association with hospital re-admission. The longer stay in hospital is increased risk

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for hospital re-admission. For patients with respiratory tract diseases such as COPD, Westert et al. (2002) found that a short hospital stay was the highest risk factor association with hospital re-admission. Saynajakangas et al. (2004) also supported that a 1-week stay in hospital can result in the longest interval to readmission interval of 215 days among COPD patients.

In addition, unplanned hospital re-admissions were also related to place of stay and services received from discharge plan team workers after patient discharge from the hospitals. Camberg et al. (1997) used a secondary data to identify relationship between place of stay after discharge and unplanned hospital re-admissions. Study subjects were recruited from a national sample of patients discharged from Veterans Health Administration hospitals. Results found that patients with COPD and patients with dementia who were transferred to nursing homes were less likely to be re-admitted within 30 days after discharge than patients discharged to their homes. Shepperd et al. (2009) also reviewed twenty-one randomized control trial studies to determine the effectiveness of planning the discharge of patients from hospitals. Results found that unplanned hospital re-admissions were significantly reduced for patients receiving a structured discharge plan services. Therefore, the purpose of this study was to identify unplanned hospital re-admission risk factors in patients with respiratory tract diseases in Taiwan.

METHODS

This was a retrospective study. The study was conducted from January, 1 to December, 31 2007 at a Hospital, located in south-west of Taiwan. Using purposive sampling method, study subjects were recruited. They were patients with primary diagnosis of respiratory tract diseases. The respiratory tract diseases were defined by using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes, including 846.5.x (acute upper respiratory infections at multiple or unspecified sites), 482.x (other bacterial pneumonia), 486.x (pneumonia, organism unspecified), 490.x (bronchitis, not specified as acute or chronic), 491.x (chronic bronchitis), 493.x (asthma), 494.x (bronchiectasis), 496.x (chronic airway obstruction, not elsewhere classified [COPD]), 503.x (pneumoconiosis due to other inorganic dust), 517.x (lung involvement in conditions classified elsewhere), 518.x (other diseases of lung), and 519.x (other diseases of respiratory system). The exclusion criteria were subjects who were transferred to other departments due to combination of varied ailments during admission.

SPSS version 16.0 Software for Windows was used to analyze the data. An alpha of 0.05 was set as the level of significance. An independent t-test and chi-square were performed to examine the factors related to unplanned hospital re-admission among patients with respiratory tract diseases. Forward logistic regression was used to analyze the factors that might affect respiratory tract diseased patients unplanned hospital re-admission.

RESULTS

Eight hundred and seventy-six respiratory tract diseases

patients were discharged from the hospital during the study period and recruited. The demographic information is summarized in Table 1. Among these patients, 14.78% (n = 64) of them were re-admitted within 14 days after discharge from the hospital. For patients with unplanned hospital re-admission, the average age was 72.58 (SD = 15.26). The majority re-admitted patients were males (n = 43, 67.2%). The length of hospital stay was 16.31 days (SD = 21.79) and the number of health problems was 1.89 (SD = 1.04).

To understand the significant association between unplanned hospital re-admission and related factors, chi-square and independent t-test were performed. Results found that unplanned hospital readmission among respiratory tract diseases patients were related with subjects' ways of discharge from hospital (against-advise discharge, or maybe discharge), clinical re-visit compliance, receiving services from discharge plan team workers, intubation number, and previous hospital length of stay. The unplanned hospital re-admission in respiratory tract diseases patients were not statistically related to subjects' sex, age, and number of co-morbid diseases (Table 2).

To understand the predictors of unplanned hospital re-admission factors that were related with unplanned hospital re-admission, logistic regression was conducted. Results indicated that subjects' clinical re-visit compliance was a significant predictor for unplanned hospital readmission but the other variables were not. Moreover, the other significant predictor was early re-hospitalization after discharge. This means that patients or their family member perceived hospitalization was needed for the patients and requested for re-hospitalization (Table 3).

DISCUSSION

The early and unplanned hospital re-admission is associated with a high morbidity and costs of healthcare expenditures (Chang et al., 2003). If the risks of unplanned hospital re-admission are identified, healthcare team may be able to develop interventions to prevent it. Since patient with respiratory tract diseases are at high risk of unplanned hospital re-admission (Fen et al., 2003), risk factors are needed to be identified.

This study found that the compliance with clinical re-visit after discharge from hospital is a significant predictor for unplanned hospital re-admissions. The early re-hospitalized after discharge was also a significant predictor. The patient or his/her family members' perceived hospitalization was necessary and requested for re-admission of the patient. These results of the study were not consistent with previous study. For example, Chang et al. (2003) assessed 1185 patients to understand the risk factors for unplanned hospital readmission. They found that 67 patients (5.7%) were re-admitted within 14 days after discharge. Patients' previous diagnosis, especially patients with cancer or gastrointestinal, and visited

Table 1. Demographic information (n = 876).

Variable	N/mean	SD (%)
Hospital re-admitted		
Yes	812	92.7
No	64	7.3
Sex		
Female	332	37.9
Male	544	62.1
Age	73.50	15.46
Length of hospitalized	23.63 (days)	38.3
Number of diseases	1.86	1.01

Table 2. Factors related to unplanned hospital readmission.

Variable	χ^2 /d.f.	t	p
Sex	0.384/1		0.232
Ways of discharge from hospital	16.620/4		0.001**
Clinical re-visit compliance	63.044/5		0.000**
Receiving services from discharge plan team workers	7.122/2		0.028*
Intubation number		2.893	0.005**
Previous hospital length of stay		2.592	0.011*
Age		0.493	0.622
Number of comorbid diseases		0.245	0.812

* $p < 0.05$; ** $p < 0.01$; χ^2 , chi-square; d.f., degree of freedom, t, t-test.

Table 3. The significant predictor of unplanned hospital readmission.

Compliance with clinical re-visit after discharge from hospital	p	Odds ratio	95% CI
Clinical re-visit on time	0.138	4.571	0.612-34.128
Clinical re-visit not on time	0.082	6.735	0.783-57.917
Clinical re-visit not needed	0.670	1.584	0.191-13.142
Early re-hospitalized	0.001	32.083	3/990-258.006
Early clinical re-visit	0.057	8.800	0.935-82/804

by other professionals, especially home care nurses or hospice home care nurses, were two major predictors for unplanned hospitalization within 14 days of discharge. Almagro et al. (2006) investigated 129 patients with acute exacerbation of COPD to identify risk factors for hospital readmission. Results found that 75% of patients were re-hospitalized. The best predictor for hospital readmission was combination of hospitalization for COPD in previous year and the total score of the St. George's Respiratory Questionnaires ≥ 50 points. The St. George's Respiratory Questionnaire is a health-related quality of life questionnaire. It contains 50 items and scored from 0 (no health impairment) to 100 (maximum impairment). The

probability of hospital re-admission for patients without any of these variables was 7%.

In addition, this study found that the unplanned hospital re-admission among patients with respiratory tract diseases were related to patients' ways of discharge, the compliance with clinical re-visit, receiving services from discharge plan team workers, number of tubes exist, and previous hospital length of stay. These results were consistent with some other studies (Fen et al., 2003; Shipton, 2004). For example, Shipton (2004) reviewed 13 research articles to understand risk factors associated with multiple hospital re-admissions. Results found that dependence, age, stage of illness, length of hospital stay,

prior hospitalization, care after discharge, and mobility status were risk factors for hospital re-admissions. Westert et al. (2002) have analyzed six major causes of hospitalization across three European countries (Finland, Scotland, and Netherlands) and three states in the USA (New York, California, Washington State). Results found that the risk factor for hospital re-admission was (initial) longer hospital stay.

However, some studies have had different findings (Osman et al., 1997; Chang et al., 2003; Alamgro et al., 2006). For example, Garcia-Aymerich et al. (2003) conducted a prospective study to understand risk factors of readmission to hospital among 346 COPD patients. Results indicated that risk factors associated with hospital readmission among COPD patients were: ≥ 3 admissions for COPD in the year before recruitments, forced expiratory volume in 1 s (FEV1) percentage predicted, and taking anti-cholinergic drugs, higher levels of physical activity reduced the risk of readmission. Cao et al. (2007) also examined the factors associated with hospital re-admission among 186 COPD patients. Results suggested that a high prevalence of current or ex-heavy smokers, underweight patients, depression, but a lower prevalence of caregiver support, pulmonary rehabilitation and influenza and pneumococcal vaccination.

Conclusion

Risk factors associated with unplanned hospital re-admission among respiratory tract diseases patients were identified in previous studies. As many studies measured different patients characteristics, study design, study settings, study subjects, and reasons for admission, and therefore, several risk factors related unplanned hospital re-admission were presented. However, the data of this study was collected from a hospital located in southwest of Taiwan. It is difficult to generalize the study findings to patients in Taiwan. Hence, to prevent unplanned hospital re-admission, previous studies encouraged patients with respiratory tract diseases to perform physical activity regularly, receive high social support and influenza and pneumococcal vaccination. Using the study information to design an experimental, longitudinal study for preventing unplanned hospital re-admission is needed in the future. Results of this study also provide important information for measure intervention outcomes to prevent unplanned hospital readmission among respiratory tract diseases.

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