



Original article

Transitional care interventions to reduce readmission in patients with chronic obstructive pulmonary disease: A meta-analysis of randomized controlled trials

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ABSTRACT

Objective: To objectively assess the effect of transitional care on readmission for patients with chronic obstructive pulmonary disease.

Methods: The PubMed, Science Direct, Web of Science, Cochrane Library, CNKI, and Wanfang databases were searched for relevant randomized controlled trials (RCTs) published from January 1990 through April 2016. The quality of eligible studies was assessed by two investigators. The primary outcome assessed was readmission for COPD and all-cause readmission. The pooled effect sizes were expressed as the relative risk and standard mean difference with 95% confidence intervals. Heterogeneity among studies was assessed using the Cochrane Handbook for Systematic Reviews of Interventions (Version 5.1.0) and determined with an I^2 statistic.

Results: A total of seven RCTs that included 1879 participants who met the inclusion criteria were analyzed. The results of subgroup analysis showed significant differences in readmission for COPD at the 6 month and 18 month time points and all-cause readmission at the 18 month follow-up. Transitional care could reduce readmission for COPD at the 6 month [RR = 0.51, 95% CI (0.38,0.68), $P < 0.00001$] and 18 month time points [RR = 0.56, 95% CI (0.45,0.69), $P < 0.00001$, and also reduce all-cause readmission after 18 months [RR = 0.72, 95% CI (0.62,0.84), $P < 0.0001$]. The reduction of all-cause readmission between the intervention and control groups in the 2nd year, however, was less than that in the 1st year.

Conclusions: Transitional care is beneficial to reducing readmission for patients with COPD. Duration of ≥ 6 and ≤ 18 months are more effective, and the effect weakens over intervention time, especially after the end of intervention. Both durations point to the importance of ongoing intervention and reinforcement after the end of intervention.

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1. Introduction

Chronic obstructive pulmonary disease (COPD) is a common disease worldwide that is characterized by chronic airflow limitation and a range of pathological changes in the lung, some heavy extra-pulmonary effects, and important comorbidities that may contribute to the severity of the disease in individual patients.¹ It has been estimated that COPD will be the third leading cause of death worldwide by 2030.²

Readmissions are a significant source of morbidity and a heavy healthcare burden. According to statistics, readmission among elderly patients with COPD costs approximately \$924 million annually.³ Unplanned readmission for COPD has exhibited an upward yearly trend, occurring in almost one in five discharges among older adults.⁴ The reasons for readmission of COPD patients are complex and include frequent acute exacerbations, coexisting comorbidities, and lack of transitional care.⁵

Nurses and other healthcare providers, as a part of a multidisciplinary team, can play a key role in COPD care by developing an individualized needs-based comprehensive discharge plan, connecting patients and outpatient providers, providing educational and behavioral interventions, managing symptoms and providing direct patient care, monitoring patients and caregivers regularly through home visits and/or telephone contact, providing

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counseling and self-care instruction, and reviewing and managing medications during transitions from one setting to another, especially from the hospital to home. For example, discharged patients with COPD may present with severe breathlessness, expectoration and chronic productive cough,⁶ and they may not be aware of their worsening status or the necessity of awareness of self-care, ongoing monitoring, and care coordination. As a result, they require professional education to identify risks, especially in the self-assessment of the acute exacerbated stage of COPD signs and symptoms as well as adherence to self-care maintenance recommendations. Transitional care executors play a critical role in narrowing these potential gaps when transitioning COPD patients from one care setting to another.

Regarding the effect of transitional care on readmission reduction, there have been many studies on the relationship between transitional-care models and the readmission reduction effect among patients with COPD, but the results of different trials have not been consistent.⁷ Therefore, the aim of this review is to study the effects of transitional-care models on readmission reduction for patients with COPD moving from the hospital to home and to provide guidance to transitional care providers in developing and implementing appropriate processes that may promote a reduction in readmissions.

2. Methods

2.1. Search strategies

A research librarian was consulted to search for and identify articles related to our study. The PubMed, Science Direct, Web of Science, Cochrane Library, China National Knowledge Infrastructure (CNKI), and Wan-fang databases were searched. The PubMed search was conducted using the following algorithm: [(Transitional care [MesH] OR Transition* care [tw] OR care transition [tw] OR transition after hospitalization [tw] OR transition for COPD patients [tw] OR transition interventions [tw]) OR ("Continuity of Patient Care" [MesH] OR (continuum of care [tw] OR care continuum [tw])) OR (Patient Care Planning [MesH])] AND (Pulmonary Disease, Chronic Obstructive [MesH] OR COPD[MesH]) AND (Patient Readmission [MesH] OR Patient Admission [MesH] OR readmission [tw]). Other databases were searched using a similar search strategy. In PubMed, we conducted searches in all fields and identified 101 articles. In other databases, we conducted searches in the title/abstract/keyword fields and identified 145 articles from Science Direct; 163 from Web of Science; 97 from the Cochrane Library; 56 from CNKI; and 41 from the Wanfang Database. Searches were limited to English language articles published from January 1990 through April 2016. Articles had to include patients with COPD exclusively and have at least 1 transition component from one setting to another. In addition, the reference lists and academic conference literature were manually searched, and experts in the clinical nursing field were consulted to locate additional studies.

The literature search consisted of four steps: (1) Searches of systematic literature studies relevant to COPD transition were conducted in the Cochrane and JBI libraries; (2) The titles, abstracts, keywords and subjects of original articles retrieved from PubMed, Science Direct and Web of Science were analyzed to further confirm retrieval of keywords and subjects; (3) relevant databases were searched by keywords and subjects, and full-text articles whose abstracts met the inclusion criteria were retrieved; and (4) references from the obtained articles were further retrieved.

2.2. Inclusion criteria and study selection

Studies were included if they met the following criteria: (1) Patients who reached the age of 18 were diagnosed with COPD,

patients in the intervention group who accepted post-discharge transitional care, and other patients in the control group who accepted usual care without post-discharge transitional care; patients with asthma as a primary diagnosis and with major comorbidities (e.g., serious heart failure, malignant or terminal disease) were excluded as were patients with dementia or uncontrolled psychiatric illness. (2) The interventions in the articles included in this review were: patient situation and homecare needs assessment before discharge; after discharge, a specific transition executor provided individual care to patients with COPD by telephone and/or home visit. Patients could also contact the executor for further information during the intervention period. (3) The outcomes in the studies were classified as readmissions for COPD and all-cause readmissions.

Fig. 1 shows the selection process for the final 7 articles for this review. An additional 136 additional full-text articles were excluded: 73 articles with incomplete readmission data, 29 articles with incomplete intervention group/control group (IG/CG) data, and 34 articles for other reasons. We originally retrieved these articles for meta-analysis between January 1990 and April 2016, and all of the articles investigated readmission as an outcome of transitional care for patients with COPD.

2.3. Data extraction and quality assessment

Data from the 7 studies were extracted by one of the two reviewers (Liu) with a standard data extraction form. All of the data extracted from these studies were checked by the other reviewer (Zhang). We adopted the Cochrane Handbook for Systematic Reviews of Interventions (Version 5.1.0)⁸ to assess the risk of bias, which includes six domains: selection bias, performance bias, detection bias, attrition bias, reporting bias and other bias. Two reviewers (Liu and Zhang) assessed each study independently and consulted in the case of disagreements, all of which were then resolved by consensus.

2.4. Statistical method

Software Review Manager version 5.3 was used to conduct statistical analysis. The heterogeneity between studies was evaluated by the I^2 test. If $I^2 < 50\%$, the possibility of heterogeneity between studies was low and the fixed effect model could be utilized. If $I^2 > 50\%$, there was heterogeneity between studies and the sources of heterogeneity should be analyzed. The criteria for significance were $P < 0.05$ and 95% CI not including 0.

3. Results

3.1. Systematic review

3.1.1. Characteristics of the selected studies

Seven articles identified as part of the systematic literature searches are summarized in Fig. 1. Based on a thorough review of this literature, 7 articles^{9–15} in the review included a total of 1879 participants. Table 1 presents the characteristics and pulmonary functions. The number of participants of each study ranged from 184¹¹ to 464.¹⁵ All participants had COPD. In these studies, the mean age was over 65 years old. In 2 studies,^{11,15} the participants were British, 2 other studies^{10,13} reported that the participants were Canadian, and 3 further studies reported^{9,12,14} adult participants from Slovenia, the Netherlands and the United States. The intervention duration ranged from 6 months^{9,12,14} to 24 months.¹⁰ One study¹⁰ had more than one follow-up interval that ranged from 12 to 24 months. Six studies^{9,11–15} investigated readmissions for COPD, and 4 studies^{9–11,15} investigated all-cause readmissions. One

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