

Health Quality Ontario

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ONTARIO HEALTH TECHNOLOGY ASSESSMENT SERIES

Effect of Early Follow-Up After Hospital Discharge on Outcomes in Patients With Heart Failure or Chronic Obstructive Pulmonary Disease: A Systematic Review

KEY MESSAGES

Many patients are vulnerable to worsening health when they transition from hospital to home. In particular, people hospitalized for heart failure or chronic obstructive pulmonary disease (COPD) have a high risk of needing emergency department care or readmission to hospital within the first month of their previous hospitalization. Ensuring that patients see a health care professional soon after discharge is believed to improve their ability to manage their chronic health conditions and reduce the need to return to hospital.

The percentage of patients who receive early follow-up (specifically, a visit to a physician within 7 days of leaving hospital) is widely used in Ontario as one way to measure the quality of our health system. In this review, we evaluated published studies that assessed the effectiveness of early follow-up (within 7 days or within 30 days) for people hospitalized for heart failure or COPD. Our main goal was to examine whether early follow-up after hospital discharge reduces readmissions, emergency department visits, or deaths. The evidence available is limited. Within the available studies, we found low-quality evidence showing that patients with early follow-up had better health outcomes than those who did not receive that care. We judged the evidence to be low quality because of limitations in how the studies were conducted.

SYSTEMATIC REVIEW AT HEALTH QUALITY ONTARIO

This report was developed by a multidisciplinary team from Health Quality Ontario. The lead clinical epidemiologist was Jasmine Song and the lead medical librarian was Melissa Walter.

The medical editor was Amy Zierler. Others involved in the development and production of this report were Merissa Mohamed, Conrad Kabali, Kellee Kaulback, Margaret Millward, Ryan Monte, Claude Soulodre, David Wells, Mark Weir, Andrée Mitchell, Naushaba Degani, Danyal Martin, Anil Thota, Nancy Sikich, and Irfan Dhalla.

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ABSTRACT

Background

Transitions in care can increase patients' vulnerability to adverse events. In particular, patients admitted for heart failure or chronic obstructive pulmonary disorder (COPD) have high rates of readmission and return emergency department visits. Heart failure patients have the highest 30-day readmission rates in Canada, and COPD patients comprise the highest volume of readmissions. Combined, these two conditions account for the largest number of emergency department returns.

Prompt follow-up of discharged patients has been linked with reduced rates of readmission, emergency department use, and death. This systematic review evaluated the clinical effectiveness of early follow-up, within either 7 days or 30 days after hospital discharge, compared with usual care or a different time to follow-up, in reducing readmissions, emergency department visits, and mortality in patients with heart failure or COPD.

Methods

We performed a literature search to identify studies published in English up to May 25, 2016, on early follow-up after discharge from hospital in patients with heart failure or COPD. A single reviewer screened the titles and abstracts and obtained full-text articles for studies meeting the eligibility criteria. The risk of bias in the studies was evaluated according to ROBINS-I and EPOC criteria, and the quality of the body of evidence for each outcome was examined according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Working Group criteria.

Results

From a total of 3,228 unique citations, we identified 10 eligible studies: one randomized controlled trial, two nonrandomized controlled trials, and seven observational studies. Four studies were specifically on 7-day follow-up and 30-day health outcomes. The other six studies were on 30-day follow-up and more variable time to health outcomes. Follow-up was conducted by general and specialist physicians, nurses, and pharmacists in clinics, by telephone, and by home visit. Risk of bias was moderate for most of the studies. Having follow-up within either 7 days or 30 days after hospitalization for heart failure or COPD was associated with lower all-cause readmissions, emergency department visits, and mortality, even after accounting for confounders such as age, sex, socioeconomic status, and disease severity (GRADE: Very low to low). However, the evidence was inconsistent. We did not find a difference in effectiveness between studies using a 7-day versus a 30-day follow-up.

Conclusions

Based on low- and very low-quality evidence, follow-up within 7 days and within 30 days of discharge from hospitalization for heart failure or COPD—compared with usual care or no follow-up—were both associated with a reduced risk of all-cause readmission, emergency department visits, and mortality. Overall, there is a lack of large, methodologically robust studies specifically focusing on the effectiveness of 7-day follow-up after discharge in improving patient outcomes.

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BACKGROUND

Objective

The objective of this review was to evaluate the clinical effectiveness of early follow-up, defined as follow-up by any clinician within either 7 days or 30 days after discharge from hospital, on health outcomes in patients with heart failure or chronic obstructive pulmonary disease (COPD), compared with late follow-up (more than 30 days after discharge) or no follow-up.

Clinical Need and Target Population

Transitions in care can increase patients' vulnerability to adverse events.¹⁻³ In particular, hospital admissions for heart failure and COPD are associated with high rates of readmission and return emergency department visits. Patients with heart failure are usually older with a large number of comorbidities (co-existing health conditions); they typically require complex medical regimens and have multiple clinicians involved in their care.⁴ COPD is also one of the leading causes of serious illness; 25% to 40% of patients with COPD die within the year after they are hospitalized for an acute exacerbation of the disease.⁵

In Ontario, costs associated with unplanned 30-day readmissions (readmission within 30 days of a previous discharge) were estimated at \$705 million in 2008.⁶ In fiscal year 2010/2011, Canadian patients with heart failure had the highest 30-day readmission rates (21.0%) and COPD patients comprised the highest volume of readmissions (N = 10,517).⁶ These two conditions also accounted for the largest number of return emergency department visits (2,072 for heart failure, 2,536 for COPD).⁶ Similarly, US Medicare data from 2003 and 2004 show that 26.9% of heart failure patients and 22.6% of COPD patients are readmitted within 30 days of discharge.⁷

Clinical Practice and Performance Measurement

Although hospital readmissions may be common and costly, some are potentially avoidable.⁶ Substantial evidence suggests that avoidable readmissions tend to arise from failures during care transitions.^{8,9} Prompt follow-up of discharged patients has been linked with reduced rates of readmission, emergency department visits, and death.^{4,10} Prompt medication reconciliation, medication safety, disease management, patient education, and patient-provider communication are some key ways in which follow-up soon after discharge can improve the patient's care transition.¹¹ This intervention is also relatively inexpensive. In its 2011 report to Ontario's Ministry of Health and Long-Term Care, "Enhancing the Continuum of Care," the Avoidable Hospitalization Advisory Panel recommended early post-discharge follow-up to prevent avoidable hospitalization.¹²

Currently, follow-up with a physician within 7 days of hospital discharge for patients with heart failure or COPD is widely used in Ontario as a quality improvement indicator. Health Quality Ontario uses it as an indicator of system integration in the Common Quality Agenda and in the annual "Measuring Up" report.^{13,14} Interprofessional primary care organizations report data on physician follow-up rates within 7 days of discharge as a priority indicator in their annual quality improvement plans.¹⁵ Ontario's local health integration networks also report on this indicator. In the United States, the American College of Cardiology created the Hospital to Home quality improvement initiative for hospitals to improve patient transitions in care and to reduce readmission rates.¹⁶ One component of the program is to ensure that all cardiac patients be followed-up within 7 days of discharge.

However, despite the wide acceptance of this indicator, the quality of evidence on the clinical effectiveness of a 7-day physician follow-up in reducing adverse health outcomes for patients with heart failure or COPD has not been appraised. It is uncertain whether follow-up within 7 days is the optimal time period, and there are concerns that the current indicator is too narrow in scope, as it does not capture telephone calls to patients or visits with clinicians who do not bill to the Ontario Health Insurance Plan.¹⁵

Research Question

What is the clinical effectiveness of early follow-up, defined as follow-up by any clinician within either 7 days or 30 days after discharge from hospital, compared with late follow-up (more than 30 days) or no follow-up, in reducing the risk of the following health outcomes for patients with heart failure or COPD: non-elective readmissions, unplanned emergency department visits, and mortality?

METHODS

Clinical Literature Search

We performed a literature search on May 25, 2016, using the Ovid interface in the following databases: MEDLINE, Embase, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, Health Technology Assessment, National Health Service Economic Evaluation Database (NHSEED), Database of Abstracts of Reviews of Effects (DARE), and using the EBSCO interface in the Cumulative Index to Nursing & Allied Health Literature (CINAHL), for studies published up to May 25, 2016.

Search strategies were developed by medical librarians using controlled vocabulary (i.e., Medical Subject Headings) and relevant keywords. The final search strategy was peer-reviewed using the PRESS Checklist.¹⁷ Database auto-alerts were created in Ovid and CINAHL and monitored for the duration of the HTA review.

See Appendix 1 for Literature Search Strategies, including all search terms.

Literature Screening

A single reviewer reviewed the abstracts and, for those studies meeting the eligibility criteria, we obtained full-text articles. We also examined reference lists for any additional relevant studies not identified through the search.

Inclusion Criteria

- English-language full-text publications
- Studies published up to May 25, 2016
- Studies on early follow-up (within either 7 days or 30 days after hospital discharge), by any clinician, for patients discharged from the hospital for heart failure or COPD, compared with late follow-up (more than 30 days) or no follow-up
- Studies reporting non-elective hospital readmission rates, unplanned emergency department visits, or mortality

Exclusion Criteria

- Editorials, case reports, commentaries, qualitative studies, or reviews
- Studies that did not evaluate early clinician follow-up as the intervention
- Studies describing trends in follow-up after hospitalization (i.e., lacking adequate comparators)
- Studies that did not evaluate the effect of follow-up among patients who were initially hospitalized for heart failure or COPD

Outcomes of Interest

- Non-elective readmissions to a hospital
- Emergency department visits
- Mortality

Data Extraction

We extracted relevant data on study characteristics and risk of bias items using a standardized data form. The form collected information about:

- Source (i.e., citation information, contact details, study type)
- Methods (i.e., study design, study duration and years, participant allocation, allocation sequence concealment, blinding, reporting of missing data, reporting of outcomes, and whether or not the study compared two or more groups)
- Outcomes (i.e., outcomes measured, number of participants for each outcome, number of participants missing for each outcome, outcome definition and source of information, unit of measurement, upper and lower limits [for scales], and time points at which the outcome was assessed)

Quality of Evidence

We appraised the quality of controlled trials using the Effective Practice and Organisation of Care (EPOC) criteria¹⁸ and the quality of observational studies using the Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I).¹⁹ We used the DAGitty software to assess the appropriateness of covariate adjustment for nonrandomized controlled trials and observational studies.²⁰

The quality of the body of evidence for each outcome was examined according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) Working Group criteria.²¹ The overall quality was determined to be high, moderate, low, or very low using a step-wise, structural methodology. See Appendix 2 for details of quality of evidence.

RESULTS

Literature Search

The database search yielded 5,373 citations. After removing duplicates, we reviewed titles and abstracts to identify potentially relevant articles. We obtained the full texts of these articles for

further assessment. Ten studies (one randomized controlled trial [RCT], two nonrandomized controlled trials, and seven observational studies) met the inclusion criteria. We did not identify any additional studies from hand-searching the reference lists of the included studies.

Figure 1 presents the flow diagram for the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA).

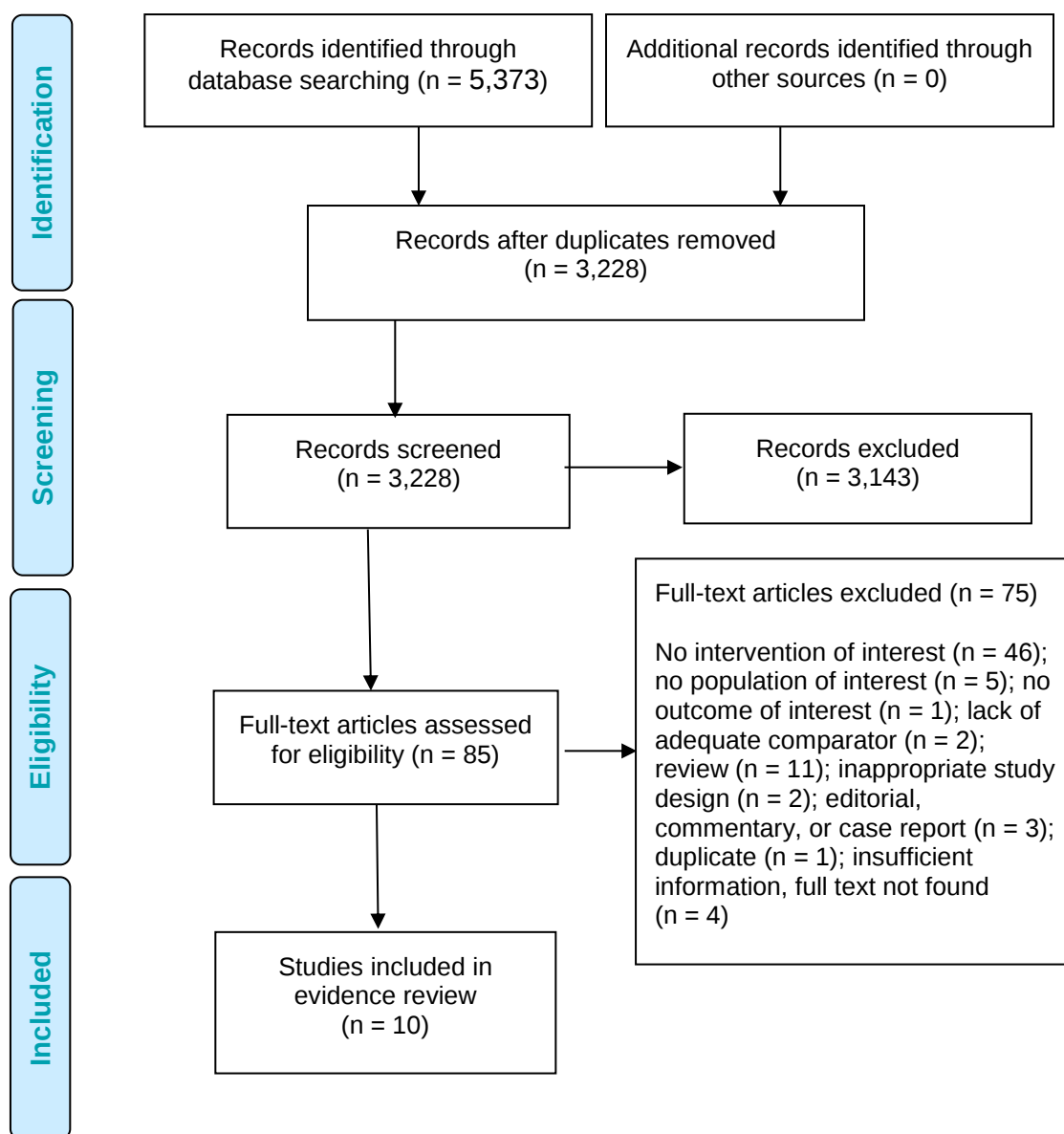


Figure 1: PRISMA Flow Diagram

Abbreviation: PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-analyses.

Source: Adapted from Moher et al.²²

Results for 7-Day Follow-Up

Four studies reported on the effect of a clinician follow-up within 7 days of hospital discharge on outcomes in patients with heart failure or COPD.^{4,23-25} All were nonrandomized studies. Two were nonrandomized controlled trials,^{24, 24} one was a case-control study,²³ and one was a retrospective cohort study.⁴ Three were conducted in the United States and used multi-centre data, and one was conducted in a single centre in Spain.²⁵ The time period of study ranged from 2003 to 2013. Tables 1, 2, and 3 summarize the characteristics and results of the four studies.

In the following subsections, we group and discuss the four studies on a 7-day follow-up according to how they conducted their data analysis. As assessed with the DAGitty software,²⁰ one study performed confounders adjustment in its regression models, in a way that is consistent with the interpretation of regression parameters.²⁴ Two studies either had improper or no adjustment of potential confounders.^{23,25} It was difficult to assess the appropriateness of confounders adjustment in the fourth study due to the aggregate nature of the data used for analysis.⁴

Study With Proper Confounding Adjustment

One prospective, quasi-experimental study examined the effect of a 7-day pharmacist follow-up, compared with usual care, on 30-day outcomes in patients with congestive heart failure, COPD, or pneumonia.²⁴ A total of 90 patients were recruited from two US hospitals and, based on self-selection, 60 of them received medication therapy management (intervention group). The usual care group had two options: either no intervention or, for high-risk patients, a hospital program called Care Transition Intervention, which consisted of a home visit and weekly telephone monitoring by a nurse.

Around 20% of patients in the usual care group were readmitted within 30 days of discharge, compared with 7% of patients in the intervention group. The numbers are similar for emergency department visits and for composite results. After adjusting for potential confounders such as insurance and comorbidities, the authors found that patients who had a 7-day follow-up by a pharmacist had reduced odds of 30-day readmission and emergency department visits, whether the two outcomes were considered individually or as a composite (Table 1).

The quality of evidence for all outcomes in this study is considered low (Appendix 2, Table A1).

Studies With Improper or no Confounding Adjustment

One case-control study²³ evaluated whether a 7-day follow-up impacts the risk of 30-day readmission in adults hospitalized for heart failure within a large, integrated health management system in the United States. A total of 1,587 patients who were readmitted to the hospital within 30-days of discharge were individually matched to 7,935 controls who had the same follow-up time. Follow-up included two options: 1) clinic visits with internal medicine, family medicine, or cardiology physicians who typically had had previous contact with the patient, or 2) telephone calls by nurses or pharmacists who may not have been familiar with the patient. After adjusting for several covariates, including disease severity and medical history, the authors found that a follow-up within 7 days was associated with lower odds of readmission (Table 2). Both in-person and by-telephone initial contact within 7 days of discharge showed similar strengths of association (adjusted odds ratio [OR] 0.81, 95% confidence interval [CI] 0.70–0.94 and adjusted OR 0.85, 95% CI 0.69–1.06, respectively). Outpatient contact within 8 to 30 days after discharge was not associated with the odds of readmission (adjusted OR 0.99, 95% CI 0.82–1.19).

One nonrandomized controlled trial investigated whether a home visit by a nurse within 2 to 3 days after hospital discharge reduces the rate of 30-day readmission due to COPD exacerbation.²⁵ Some ill patients, such as those with a severe comorbidity or on immunosuppression therapy, were excluded from the study. A total of 71 patients were recruited. Given the logistics of the nurses' commute, the authors assigned patients to the intervention group if they lived within 15 km of the hospital. Those in the control group were cared for by the primary care team following a protocol set by the hospital. The rate of rehospitalization was similar in both groups: 5 patients who had the home visit were readmitted compared to 7 patients in the control group (16% vs. 20%, $P < .5$) (Table 2).

The quality of evidence for 30-day all-cause readmission is graded as low. The quality of evidence for 30-day readmission due to COPD exacerbations is graded as very low (Appendix 2, Table A1).

Study Analyzing Aggregate Data

One large cohort study used US Medicare data to examine associations between 7-day follow-up with hospital-level and patient-level outcomes in elderly patients with heart failure.⁴ The hospital-level rates were grouped into quartiles.

The study included 30,156 patients from 225 hospitals. Compared with patients in the first quartile, patients in the higher quartiles (i.e., from hospitals with higher rates of follow-up) had lower rates of 30-day all-cause readmission (risk-adjusted hazard ratio [HR] 0.85, 95% CI 0.78–0.93 for the first quartile vs. HR 0.87, 95% CI 0.78–0.96, for the third quartile and HR 0.91, 95% CI 0.83–1.00, for the fourth quartile). Similar reductions in adjusted risk were observed for 30-day mortality and a composite outcome of 30-day readmission or mortality (Table 3).

Data aggregation makes it difficult to determine how interventions would have affected individual patients. For this reason we graded the quality of evidence for all outcomes reported in this study as low (Appendix 2, Table A1).

Table 1: Effect of a 7-Day Clinician Follow-Up Compared to Usual Care on 30-Day Patient Outcomes (Adjusted Analysis)

Author, Year, Study Design	Country, Setting	Sample Size (I/C)	Patient Population	Intervention Characteristics	Odds Ratio (95% CI)
Luder et al, 2015 ²⁴ NRCT	US, multi-centre	90 (60/30)	English-speaking patients ≥ 18 years old with CHF, COPD, or pneumonia	Outpatient visits with trained pharmacist ^a	30-day all-cause readmission: 0.072 (0.008–0.628) 30-day ED visit: 0.418 (0.092–1.905) Composite of 30-day all-cause readmission or ED visit^b: 0.292 (0.075–1.128)

Abbreviations: CHF, congestive heart failure; CI, confidence interval; COPD, chronic obstructive pulmonary disease; ED, emergency department; I/C, intervention/comparator; NRCT, nonrandomized controlled trial.

^aThere were two options for the comparator/usual care group in this study: no intervention or the hospitals' Care Transition Intervention program for high-risk patients. This group comprised patients who could not be reached by the pharmacist or did not show up for a scheduled appointment.

^bThe composite measure is the risk of having either outcome.

Table 2: Effect of a 7-Day Clinician Follow-Up Compared to no Follow-Up or Usual Care on 30-Day Patient Outcomes (Unadjusted or Improperly Adjusted Analysis)

Author, Year, Study Design	Country, Setting	Sample Size (I/C)	Patient Population	Intervention Characteristics	Effect Size
Lee et al, 2016 ²³ Case-control study	US, multi-centre	11,985 (1,587/7,935)	HF patients discharged home; excluded patients on chronic dialysis or discharged to home hospice	Either outpatient visits with internal medicine, family medicine, or cardiology physicians, or telephone calls from trained nurses and pharmacists	30-day all-cause readmission: OR = 0.81 (95% CI 0.70–0.94)
Jurado Gamez et al, 2013 ²⁵ NRCT	Spain, single centre	71 (36/35)	COPD patients < 70 years old; excluded some ill patients ^b	Home visits by nurses 48–72 hours after discharge ^a	30-day readmission due to COPD exacerbation (risk): 16% (intervention) vs. 20% (comparator), <i>P</i> = .5

Abbreviations: CI, confidence interval; COPD, chronic obstructive pulmonary disease; HF, heart failure; I/C, intervention/comparator; NRCT, nonrandomized controlled trial; OR, odds ratio.

^aThe comparator group was monitored by the primary care team following a protocol set by the hospital of interest in the study. This group comprised patients who lived more than 15 km from the hospital.

^bPatients with a severe comorbidity or admitted to intensive care, on immunosuppression or ventilator support, or with a specific cause of COPD exacerbation.

Table 3: Effect of a 7-Day Clinician Follow-Up Compared to no Follow-Up on 30-Day Patient Outcomes (Analysis of Aggregate Data)

Author, Year, Study Design	Country, Setting	Sample Size	Patient Population	Intervention Characteristics	Hazard Ratio (95% CI)
Hernandez et al, 2010 ⁴ Cohort study	US, multi-centre	N = 30,136 <i>Intervention^a:</i> Q2 = 8,662 Q3 = 7,812 Q4 = 6,581 <i>Comparator:</i> Q1 = 7,081	HF patients ≥ 65 years old discharged home	Outpatient visit to a cardiologist or general internist	30-day all-cause readmission: Q2: 0.85 (0.78–0.93) Q3: 0.87 (0.78–0.96) Q4: 0.91 (0.83–1.00) 30-day mortality: Q2: 0.95 (0.80–1.14) Q3: 0.88 (0.74–1.04) Q4: 0.84 (0.69–1.03) 30-day composite readmission or mortality^b: Q2: 0.86 (0.79–0.94) Q3: 0.88 (0.80–0.96) Q4: 0.90 (0.83–0.98)

Abbreviations: CI, confidence interval; HF, heart failure; Q, quartile.

^aThis study aggregated patient-level follow-up data at the hospital level and divided the hospitals into quartile rankings according to the rate of follow-up. Hospitals in Q1 (reference group) are those whose patients had the lowest rate of follow-up (< 32.4%), and in Q4, the highest (> 44.5%).

^bThe composite measure is the risk of having either outcome.

Results for Follow-Up Within 30-Days

Six studies reported on the effect of a clinician follow-up within 30 days of hospital discharge on outcomes in patients with heart failure or COPD.^{11,26–30} One was an RCT³⁰ and the rest were cohort studies. Most studies evaluated 30-day patient outcomes, but two evaluated longer-term outcomes: 3 months²⁸ and 6 months.^{29,30} Three used data from a single centre in Israel,²⁶ the United States,²⁷ or Hong Kong.³⁰ The other three, multi-centre studies, were conducted in the

United States^{11,28} and Canada.²⁹ The time period of study ranged from 1996 to 2011. The characteristics and results of the six studies are summarized in Tables 4 and 5.

In the following subsections, we group and discuss the six studies on 30-day follow-up according to how they conducted data analysis. Using the DAGitty software,²⁰ we determined that two studies properly adjusted the measured potential confounders^{26,27} whereas the other four had an improper or no adjustment of confounders.^{11,28-30}

Studies With Proper Adjustment of Known Confounders

One cohort study²⁶ assessed the effect of an outpatient visit to a pulmonologist within 30 days of discharge on a 3-month all-cause readmission among 195 COPD patients. The study excluded patients aged less than 30 years and those with organ failure. The authors found that attending a follow-up was associated with a 45% reduction in the risk of rehospitalization within 3 months (95% CI 17%–64%) (Table 4).

A single-centre cohort study²⁷ examined the effect of a post-discharge follow-up with a primary care physician or a pulmonologist within 30 days on 30-day outcomes in COPD patients. The study included 839 patients with 1,422 discharges. After adjusting for demographics, disease severity, and number of admission cycles, the authors reported that patients who were followed-up within 30 days did not differ significantly in risk of 30-day all-cause readmission or emergency department visits, compared with patients who were not followed-up (Table 4). However, the authors found a 62% reduction among the follow-up group in the adjusted risk of death within 30 days after discharge (95% CI 48%–85%). The authors cautioned that selection bias could not be ruled out because sicker patients are more likely to miss follow-up appointments.

The quality of evidence for all-cause readmission was very low. The quality of evidence for all-cause readmission, 30-day emergency department visits, 30-day mortality, and composite results was low (Appendix 2, Table A2).

Table 4: Effect of a 30-Day Clinician Follow-Up Compared to no Follow-Up on Patient Outcomes

Author, Year, Study Design	Country, Setting	Sample Size (I/C)	Patient Population	Intervention Characteristics	Effect Size (95% CI)
Gavish et al, 2015 ²⁶ Cohort study	Israel, single centre	195 (86/109)	COPD patients > 40 years old discharged home; excluded some ill patients ^a	Outpatient visit to a pulmonologist	3-month all-cause readmission: OR = 0.34 (0.12–0.94), HR = 0.55 (0.36–0.83)
Fidahussein et al, 2014 ²⁷ Cohort study	US, single centre	839 (973/449) with 1,422 discharges	COPD patients ≥ 18 years old discharged home or to a skilled nursing facility	Outpatient visit to the patient's PCP or pulmonologist	30-day all-cause readmission: HR = 1.02 (0.80–1.32) 30-day ED visit: HR = 0.97 (0.77–1.22) 30-day mortality: HR = 0.28 (0.15–0.52) Composite of 30-day all-cause readmission or ED visit^b: HR = 0.95 (0.76–1.18) Composite of 30-day all-cause readmission, ED visit, or mortality^b: HR = 0.85 (0.69–1.05)

Abbreviations: CI, confidence interval; COPD, chronic obstructive pulmonary disease; ED, emergency department; HR, hazard ratio; I/C, intervention/comparator; PCP, primary care physician.

^aPatients with mild severity lung function (based on forced expiratory volume test), other lung diseases, hepatic failure, renal failure, or immune deficiency.

^bThe composite measure is the risk of having either outcome.

Studies With Improper or No Confounding Adjustment

A cohort study using data from a large private insurer sought to identify predictors of 30-day all-cause readmission in 8,263 COPD patients aged 40 to 64 years old.²⁸ For patients who had follow-up with their primary care physician or pulmonologist within 30 days of discharge, the odds of readmission were 30% lower than for those without follow-up (95% CI 10%–40%) (Table 5).

Another cohort study using administrative data aimed to assess whether a 30-day follow-up with a primary care physician or a pulmonologist improves outcomes for COPD patients aged 66 years and above.¹¹ The study found that COPD patients with a 30-day follow-up had a reduced rate of 30-day readmission (adjusted HR 0.91, 95% CI 0.87–0.96) and a reduced rate of emergency department visits within 30 days of discharge (HR 0.86, CI 0.83–0.90) (Table 5).

One RCT evaluated the effect of a nurse-initiated telephone follow-up program in improving self-efficacy and decreasing health care use in 60 COPD patients.³⁰ The intervention consisted of two telephone calls within the first month after discharge to assist patients in symptom management (Table 6). The control group received normal routine care, the specifics of which were not provided. Compared with the control group, patients in the intervention group had significantly fewer emergency department visits, in the first 3 months after discharge (mean 0.4 ± 0.7 visits vs. mean 0.1 ± 0.3 visits, $P < .034$). Patients who received the nurse follow-up also had, on average, fewer readmissions due to respiratory problems, though this difference was not significant (Table 5).

A multi-centre cohort study using administrative data assessed the effect of 30-day physician follow-up on 6-month all-cause readmission and mortality in patients with heart failure.²⁹ The analysis was stratified by whether the physician was familiar or unfamiliar to the patient. Compared with patients who were not followed-up within the first month after discharge, patients who were followed-up had a lower rate of readmission or death 6 months after discharge (adjusted HR 0.87, 95% CI 0.83–0.91 for familiar physicians and 0.90, 95% CI 0.83–0.97 for unfamiliar physician) (Table 5).

The quality of evidence for 30-day all-cause readmission, 30-day emergency department visits, and composite 6-month all-cause readmission or mortality was graded low in all four of these studies. The quality of evidence for 3-month emergency department visits and readmission due to respiratory problems were both graded very low (Appendix 2, Table A2).

Table 5: Effect of a 30-Day Clinician Follow-Up Compared to no Follow-Up or Usual Care on Patient Outcomes

Author, Year, Study Design	Country, Setting	Sample Size (I/C)	Patient Population	Intervention Characteristics	Effect Size (95% CI)
Sharif et al, 2014 ²⁸ Cohort study	US, multi-centre	8,263 (4,732/3,531)	COPD patients 40–64 years old; excluded patients transferred to long-term care	Outpatient visit with the patient's PCP or pulmonologist	30-day all-cause readmission: OR = 0.7 (0.6–0.9)
McAlister et al, 2013 ²⁹ Cohort study	Canada, multi-centre	24,373 <i>Familiar physician:</i> (16,855/5,336) <i>Unfamiliar physician:</i> (2,182/5,336)	HF patients ≥ 20 years old	Outpatient visit to a familiar ^a or unfamiliar physician	Composite 6-month all-cause readmission or mortality: <i>Familiar physician:</i> HR = 0.87 (0.83–0.91) <i>Unfamiliar physician:</i> HR = 0.90 (0.83–0.97)
Sharma et al, 2010 ¹¹ Cohort study	US, multi-centre	62,746 (42,002/20,744)	COPD patients ≥ 66 years old	Outpatient visit to the patient's PCP ^b or pulmonologist	30-day all-cause readmission: HR = 0.91 (0.87–0.96) 30-day ED visit: HR = 0.86 (0.83–0.90)
Wong et al, 2005 ³⁰ RCT	Hong Kong, single centre	60 (30/30)	COPD patients; excluded patients discharged to a nursing home and some ill patients ^c	Two follow-up calls by nurse: within 3–7 days and within 14–20 days ^d	3-month ED visit^e: Mean (SD): 0.1 (0.3) vs. 0.4 (0.7) 3-month readmission due to respiratory problems^e: Mean (SD): 0.6 (1.0) vs. 1.1 (1.3)

Abbreviations: CI, confidence interval; COPD, chronic obstructive pulmonary disease; ED, emergency department; HF, heart failure; HR, hazard ratio; I/C, intervention/comparator; OR, odds ratio; PCP, primary care physician; RCT, randomized controlled trial; SD, standard deviation.

^aFamiliar physician defined as one who had seen the patient ≥ 2 times in the year before the index admission or once during the index admission.

^bPCP defined as the physician who had seen the patient ≥ 3 times in the year before hospitalization, and pulmonary physician defined as one who saw patient in the year before the hospitalization.

^cPatients with ischemic heart disease, psychiatric disease, musculoskeletal disorder, other disabling diseases, or serious substance abuse.

^dThe comparator group received normal routine care.

^eOutcome was the frequency of health care use.

Follow-Up Characteristics

Across the 10 included studies, the most common type of follow-up was by a physician at an outpatient clinic. Two studies found no difference in patient outcomes between follow-up by a clinician familiar to the patient versus an unfamiliar one.^{23,29} Nurses and pharmacists also conducted follow-ups through home visits and telephone calls. In the four studies that described follow-up in detail,^{23-25,30} common themes included symptom monitoring, patient education, and medication management. Table 6 summarizes the follow-up interventions in all 10 eligible studies.

Table 6: Description of Early Post-Discharge Follow-Up in Included Studies

Author, Year	Study Period	Components of Follow-Up	Type of Provider	Frequency	Duration
Follow-Up Within 7 Days					
Lee et al, 2016 ²³	January 2006–June 2013	Either outpatient clinic visits (84%) or by phone (16%) Outpatient visits: HF management Telephone calls: Followed HF treatment protocol to monitor patient symptoms, manage medication and lab testing, and schedule clinic appointments	Visits or phone calls: Internal medicine, family medicine, or cardiology providers (familiar to the patient before hospital discharge) Phone calls: Also included nurses, pharmacists (unfamiliar to patient)	NS	NS
Luder et al, 2015 ²⁴	NS	Initial outpatient pharmacy visit for medication reconciliation, comprehensive medication review, disease education, and self-management education (e.g., knowing which symptoms indicate disease deterioration). Visit summary note sent to patient's physician. Two weeks later, a follow-up phone call to review the health action plan	Pharmacist	2	30–60 minutes (outpatient visit)
Jurado Gamez et al, 2013 ²⁵	October 2010–November 2011	Home visit to supervise treatment compliance, measure SpO ₂ , and carry out spirometry. Real-time data sent to pulmonologist who can call in to consult if needed	Nurse	1	NS
Hernandez et al, 2010 ⁴	January 2003–December 2006	Outpatient clinic visit for evaluation and management	Cardiologist or general internist	NS	NS
Follow-Up Within 30 Days					
Gavish et al, 2015 ²⁶	January 2004–December 2010	Outpatient clinic visit	Pulmonologist	NS	NS
Fidahussein et al, 2014 ²⁷	January 2004–November 2011	Outpatient clinic visit	Patient's PCP or pulmonologist	NS	NS
Sharif et al, 2014 ²⁸	January 2009–November 2011	Outpatient clinic visit	Patient's PCP or pulmonologist	NS	NS
McAlister et al, 2013 ²⁹	January 1999–June 2009	Outpatient clinic visit	Physician	≥ 1	NS
Sharma et al, 2010 ¹¹	1996–2006	Outpatient clinic visit	Patient's PCP or pulmonologist	NS	NS
Wong et al, 2005 ³⁰	NS	Two follow-up phone calls (1st within 3–7 days after discharge, 2nd within 14–20 days) to improve patients' self-efficacy. Each call consisted of three parts: assessment, management options, and evaluation	Nurse	2	10–20 minutes

Abbreviations: HF, heart failure. NS, not specified. PCP, primary care physician.

DISCUSSION

This systematic review was intended to evaluate an intervention that is believed to improve health outcomes during care transitions. It summarizes the current published evidence on the clinical effectiveness of early follow-up, within 7 days or within 30 days after hospital discharge, in reducing adverse health outcomes in patients with heart failure or COPD. In Ontario, 7-day follow-up is widely adopted as one of the indicators of quality of care, although only a few studies have evaluated this intervention. Due to challenges with using the Ontario administrative databases to assess the effectiveness of early follow-up, we concluded that conducting a systematic review was the most viable way to perform this assessment. Unlike previous reviews on discharge planning, which included intervention bundles,^{9,10,31} this review focused solely on the effects of early follow-up.

The findings generally show that early follow-up after hospital discharge is associated with improved patient outcomes, though the evidence is inconsistent and of low quality. Compared with patients who do not receive early follow-up care, those who do receive it have a lower risk of readmission or emergency department use within 30 days of discharge, the two outcomes with the most supporting studies.

The available studies do not demonstrate a clear difference in the effects of follow-up within 7 versus 30 days, but this may be due to the small number and low quality of studies on a 7-day follow-up. Of the four studies on a 7-day follow-up that we included, one did not adjust for covariates,²⁵ one large study had improper adjustment,²³ one study used aggregate data which yielded results that are difficult to interpret,⁴ and one study was too small.²⁴

Limitations

We observed several limitations in the literature. First, in observational studies, it is often a challenge to infer a cause-effect relationship. In studies using administrative data, it was not always clear how they accounted for other factors that could explain why hospitalization rates differed across groups. Nine of the 10 included studies were not RCTs, and the only RCT included in this review was statistically underpowered.²⁹

Second, it was not clear how studies accounted for non-compliance (patients who missed follow-up appointments), a frequent problem in follow-up care. If the rate of non-compliance was high in some studies, this could explain why they failed to detect an impact of early follow-up. In the single-centre studies, some patients may have sought services outside the study centre. The use of administrative data contributes to this problem since they do not capture all clinical encounters, such as visits with a pharmacist.

Third, significant heterogeneity in study objectives, design, and methodology created challenges for synthesizing the evidence. Studies differed in their sample sizes, patient characteristics, comparators, and the confounders they adjusted for in statistical analyses. Half the studies were not primarily focused on the effects of the time factor in early follow-up: one focused on predictors of early readmission,²⁸ one evaluated the impact of physician continuity,²⁹ and the three controlled trials focused on components of their respective interventions.^{24,25,30} Furthermore, large variations in the outcomes reported meant that most GRADE outcome categories had only one supporting study. This limits the usefulness of the quality rating since some GRADE categories, such as inconsistency and publication bias, are not applicable.

Finally, only one of the 10 studies was conducted in Canada, using Alberta data.²⁹ This may limit the generalizability of our findings to Ontario. Other common methodological limitations in the included studies hinder the interpretation and application of the findings of this report. Complete results of our risk of bias analysis are presented in Appendix 2, Tables A3 and A4.

Patients' Perspectives

Apart from the potential medical benefits, follow-up care soon after patients leave hospital fits with the objectives of patient-centred care. Only two studies included in this review reported on patient satisfaction, and neither found a significant difference in patient satisfaction scores between patients who were followed-up and those who were not.^{24,30} However, higher patient satisfaction scores among patients with heart failure have been associated with reduced rates of 30-day readmission to hospital.³²

In connection with this evidence review, Health Quality Ontario conducted an online survey on patients' experiences with early follow-up after discharge in Ontario. Appendix 3 provides details of the survey time frame and questionnaire. Six patients responded: 3 had received a 7-day follow-up and 3 a 30-day follow-up after a recent hospitalization. Consistent with the literature, an outpatient visit with a physician was the most common form of follow-up. While 4 of the 6 respondents agreed that the follow-up visit improved their health outcome, there was unanimous agreement that follow-up increased their satisfaction with their care. Respondents said that follow-up provided them with "peace of mind, understanding ... [knowing] what to expect," "less anxiety," and "assurance" of improvement. However, given the small number of responses and the online survey method, the results are likely not generalizable to all heart failure and COPD patients in Ontario. Furthermore, the survey results do not inform us whether patients who had a 7-day follow-up would have preferred a 30-day follow-up, or vice versa.

Future Directions

This review does not provide clear evidence for Ontario to determine whether 7-day physician follow-up should remain a health system performance indicator, with its current specifications. The evidence does, however, highlight the fact that patients receive follow-up from clinicians other than physicians and in settings other than clinics. To address concerns that the current early follow-up indicator may be too narrow in scope, Health Quality Ontario is reviewing the specifications for this indicator and its inclusion as a priority indicator for primary care in the annual quality improvement plans required of all Ontario hospitals, interprofessional primary care teams, community care access centres, and long-term care homes. The team hopes to implement changes in future quality improvement plan cycles.

Our findings also highlight the need for local evidence to support the use of this indicator, given that the findings are based primarily on research done outside of Canada, in countries with widely different health systems.

Other recent research suggests that it may be important to explore the clinical effectiveness of early follow-up on outcomes in other patient populations. Studies on the general medical population do not seem to indicate that patients benefit from early follow-up, but high-risk patient groups might.³³⁻³⁵ Early follow-up may also play an important role in suicide prevention for recently discharged psychiatric patients. A 2015 UK report noted that around one-quarter of suicides occurred within 3 months of the person's discharge from inpatient care and the majority of them occurred within the first week.³⁶

CONCLUSIONS

From studies comparing a 7-day follow-up after hospital discharge with usual care or no follow-up in patients with heart failure or COPD:

- Low-quality evidence showed a significantly reduced risk of 30-day all-cause readmission and of a composite measure of the risk of readmission or death
- Low-quality evidence showed a non-significantly reduced risk of 30-day emergency department visits or death, and of composite risk of readmission or emergency department use
- Very low-quality evidence showed no significant difference in rates of 30-day readmission due to COPD exacerbation

From studies comparing a 30-day follow-up with usual care or no follow-up in patients with heart failure or COPD:

- Low-quality evidence showed a significantly reduced risk of 30-day all-cause readmission, emergency department visits, and death; of 3-month all-cause readmission; and of a composite measure of 6-month all-cause readmission or death
- Low-quality evidence showed a non-significantly reduced risk of composite 30-day all-cause readmission or emergency department visits and of composite 30-day all-cause readmission, emergency department visits, or death
- Very low-quality evidence showed a significant difference in rates of 3-month emergency department visits
- Very low-quality evidence showed no significant difference in rates of 3-month readmission due to respiratory problems

ABBREVIATIONS

CI	Confidence interval
COPD	Chronic obstructive pulmonary disease
EPOC	Effective Practice and Organisation of Care
GRADE	Grading of Recommendations Assessment, Development, and Evaluation
HR	Hazard ratio
OR	Odds ratio
RCT	Randomized controlled trial
ROBINS-I	Risk of Bias in Non-randomized Studies of Interventions

APPENDICES

Appendix 1: Literature Search Strategies

Search date: May 25, 2016

Databases searched: Ovid MEDLINE, Embase, PsycINFO, Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects, CRD Health Technology Assessment Database, and NHS Economic Evaluation Database; EBSCO CINAHL

Databases: EBM Reviews - Cochrane Central Register of Controlled Trials <April 2016>, EBM Reviews - Cochrane Database of Systematic Reviews <2005 to May 18, 2016>, EBM Reviews - Database of Abstracts of Reviews of Effects <1st Quarter 2016>, EBM Reviews - Health Technology Assessment <2nd Quarter 2016>, EBM Reviews - NHS Economic Evaluation Database <1st Quarter 2016>, Embase <1980 to 2016 Week 21>, All Ovid MEDLINE(R) <1946 to Present>

Search Strategy:

- 1 exp Heart Failure/ (463771)
- 2 (((cardia? or heart) adj (decompensation or failure* or incompetence or insufficiency)) or cardiac stand still or ((coronary or myocardial) adj (failure* or insufficiency))).tw. (363212)
- 3 1 or 2 (582364)
- 4 exp Pulmonary Disease, Chronic Obstructive/ (132307)
- 5 (copd or coad or chronic airflow obstruction* or chronic airway obstruction* or chronic airflow limitation* or chronic airway limitation* or (chronic adj2 bronchitis) or emphysema).tw. (156421)
- 6 (chronic* obstructive adj2 (lung* or pulmonary or airway* or airflow* or respiratory or bronchopulmonary) adj (disease* or disorder*)).tw. (95817)
- 7 or/4-6 (230430)
- 8 3 or 7 (797384)
- 9 Time factors/ (1437450)
- 10 (timing or timely or timeliness or time frame* or timeframe* or proactive* or pro active* or postdischarg* or (post adj2 discharg*) or posthospital or post hospital or ((after or following or recent*) adj4 (discharg* or hospital)) or 7 day or 7 days or seven day or seven days or one week or 1 week or first week or 1st week or a week or 14 day or 14 days or fourteen day or fourteen days or 2 weeks or two weeks or second week or 2nd week or 30 day or 30 days or thirty day or thirty days or one month or 1 month or first month or 1st month or a month).tw. (2073687)
- 11 9 or 10 (3372834)
- 12 "appointments and schedules"/ (54426)
- 13 aftercare/ (12971)
- 14 continuity of patient care/ (206684)
- 15 patient care planning/ (63928)
- 16 office visits/ (37691)
- 17 house calls/ (52127)
- 18 exp telephone/ (48288)
- 19 or/12-18 (455589)
- 20 11 and 19 (35040)
- 21 ((timing or timely or timeliness or time frame* or timeframe* or proactive* or pro active* or postdischarg* or (post adj2 discharg*) or posthospital or post hospital or ((after or following or recent*) adj4 (discharg* or hospital)) or 7 day or 7 days or seven day or seven days or one week or 1 week or first week or 1st week or a week or 14 day or 14 days or fourteen day or fourteen

- days or 2 weeks or two weeks or second week or 2nd week or 30 day or 30 days or thirty day or thirty days or one month or 1 month or first month or 1st month or a month) adj5 (follow up* or followup* or appointment* or visit or visits or visited or visiting)).tw. (56062)
- 22 ((early or rapid) adj2 (follow up* or followup* or appointment* or visit or visits or visited or visiting)).tw. (7407)
- 23 (follow up schedul* or followup schedul* or discharge follow up* or discharge followup* or outpatient followup* or outpatient follow up* or out patient followup* or out patient follow up* or house call or house calls or home call or home calls or house visit* or home visit*).tw. (23526)
- 24 ((follow up or followup or outpatient* or out patient*) adj2 (visit or visits or appointment*)).tw. (60929)
- 25 ((telephon* or phone*) adj5 (follow up* or followup* or appointment* or visit or visits or visited or visiting or postdischarg* or (post adj2 discharg*) or posthospital or post hospital or ((after or following or recent*) adj4 (discharg* or hospital))))).tw. (19095)
- 26 or/20-25 (182235)
- 27 8 and 26 (8729)
- 28 Case Reports/ or Comment.pt. or Editorial.pt. or Letter.pt. or Congresses.pt. (4586780)
- 29 27 not 28 (8619)
- 30 limit 29 to english language [Limit not valid in CDSR,DARE; records were retained] (8117)
- 31 30 use pmoz,cctr,coch,dare,clhta,cleed (2391)
- 32 exp heart failure/ (463771)
- 33 (((cardia? or heart) adj (decompensation or failure* or incompetence or insufficiency)) or cardiac stand still or ((coronary or myocardial) adj (failure* or insufficiency))).tw. (363212)
- 34 or/32-33 (582364)
- 35 chronic obstructive lung disease/ (116829)
- 36 exp emphysema/ (50720)
- 37 (copd or coad or chronic airflow obstruction* or chronic airway obstruction* or chronic airflow limitation* or chronic airway limitation* or (chronic adj2 bronchitis) or emphysema).tw. (156421)
- 38 (chronic* obstructive adj2 (lung* or pulmonary or airway* or airflow* or respiratory or bronchopulmonary) adj (disease* or disorder*)).tw. (95817)
- 39 or/35-38 (246050)
- 40 34 or 39 (812424)
- 41 time/ (410262)
- 42 (timing or timely or timeliness or time frame* or timeframe* or proactive* or pro active* or postdischarg* or (post adj2 discharg*) or posthospital or post hospital or ((after or following or recent*) adj4 (discharg* or hospital)) or 7 day or 7 days or seven day or seven days or one week or 1 week or first week or 1st week or a week or 14 day or 14 days or fourteen day or fourteen days or 2 weeks or two weeks or second week or 2nd week or 30 day or 30 days or thirty day or thirty days or one month or 1 month or first month or 1st month or a month).tw. (2073687)
- 43 or/41-42 (2452776)
- 44 patient scheduling/ (970)
- 45 *follow up/ (22909)
- 46 aftercare/ (12971)
- 47 *patient care/ (55422)
- 48 patient care planning/ (63928)
- 49 telephone/ (40802)
- 50 or/44-49 (193269)
- 51 43 and 50 (17363)
- 52 ((timing or timely or timeliness or time frame* or timeframe* or proactive* or pro active* or postdischarg* or (post adj2 discharg*) or posthospital or post hospital or ((after or following or recent*) adj4 (discharg* or hospital)) or 7 day or 7 days or seven day or seven days or one week

or 1 week or first week or 1st week or a week or 14 day or 14 days or fourteen day or fourteen days or 2 weeks or two weeks or second week or 2nd week or 30 day or 30 days or thirty day or thirty days or one month or 1 month or first month or 1st month or a month) adj5 (follow up* or followup* or appointment* or visit or visits or visited or visiting)).tw. (56062)

53 ((early or rapid) adj2 (follow up* or followup* or appointment* or visit or visits or visited or visiting)).tw. (7407)

54 (follow up schedul* or followup schedul* or discharge follow up* or discharge followup* or outpatient followup* or outpatient follow up* or out patient followup* or out patient follow up* or house call or house calls or home call or home calls or house visit* or home visit*).tw. (23526)

55 ((follow up or followup or outpatient* or out patient*) adj2 (visit or visits or appointment*)).tw. (60929)

56 ((telephon* or phone*) adj5 (follow up* or followup* or appointment* or visit or visits or visited or visiting or postdischarg* or (post adj2 discharg*) or posthospital or post hospital or ((after or following or recent*) adj4 (discharg* or hospital))))).tw. (19095)

57 or/51-56 (166427)

58 40 and 57 (8201)

59 Case Report/ or Comment/ or Editorial/ or Letter/ or conference abstract.pt. (8540822)

60 58 not 59 (5069)

61 limit 60 to english language [Limit not valid in CDSR,DARE; records were retained] (4644)

62 61 use emez (2356)

63 31 or 62 (4747)

64 63 use pmoz (1672)

65 63 use emez (2356)

66 63 use coch (131)

67 63 use cctr (420)

68 63 use clhta (8)

69 63 use cleed (126)

70 63 use dare (34)

71 remove duplicates from 63 (3133)

CINAHL

#	Query	Results
S1	(MH "Heart Failure+")	26,790
S2	((cardia* or heart) N1 (decompensation or failure* or incompetence or insufficiency)) or "cardiac stand still" or ((coronary or myocardial) N1 (failure* or insufficiency))	36,796
S3	S1 OR S2	36,827
S4	(MH "Pulmonary Disease, Chronic Obstructive+") or (MH "Emphysema+")	14,608
S5	(copd or coad or chronic airflow obstruction* or chronic airway obstruction* or chronic airflow limitation* or chronic airway limitation* or (chronic N2 bronchitis) or emphysema)	12,279
S6	chronic* obstructive N2 (lung* or pulmonary or airway* or airflow* or respiratory or bronchopulmonary) N1 (disease* or disorder*)	15,245

S7	S4 OR S5 OR S6	19,412
S8	S3 OR S7	55,155
S9	(MH "Time Factors")	114,830
S10	(timing or timely or timeliness or "time frame" or "time frames" or timeframe* or proactive* or "pro active" or "pro actively" or postdischarg* or (post N2 discharg*) or posthospital or "post hospital" or ((after or following or recent*) N4 (discharg* or hospital)) or "7 day" or "7 days" or "seven day" or "seven days" or "one week" or "1 week" or "first week" or "1st week" or "14 day" or "14 days" or "fourteen day" or "fourteen days" or "2 weeks" or "two weeks" or "second week" or "2nd week" or "30 day" or "30 days" or "thirty day" or "thirty days" or "one month" or "1 month" or "first month" or "1st month")	100,204
S11	S9 OR S10	205,278
S12	(MH "Appointments and Schedules") OR (MH "Office Visits")	8,470
S13	(MH "After Care")	8,025
S14	(MH "Continuity of Patient Care+")	13,300
S15	(MH "Home Visits")	4,514
S16	(MH "Telephone+")	19,620
S17	S12 OR S13 OR S14 OR S15 OR S16	51,494
S18	S11 AND S17	5,794
S19	((timing or timely or timeliness or "time frame" or "time frames" or timeframe* or proactive* or "pro active" or "pro actively" or postdischarg* or (post N2 discharg*) or posthospital or "post hospital" or ((after or following or recent*) N4 (discharg* or hospital)) or "7 day" or "7 days" or "seven day" or "seven days" or "one week" or "1 week" or "first week" or "1st week" or "14 day" or "14 days" or "fourteen day" or "fourteen days" or "2 weeks" or "two weeks" or "second week" or "2nd week" or "30 day" or "30 days" or "thirty day" or "thirty days" or "one month" or "1 month" or "first month" or "1st month") N5 ("follow up" or "follow ups" or followup* or appointment* or visit or visits or visited or visiting))	4,693
S20	((early or rapid) N2 ("follow up" or "follow ups" or followup* or appointment* or visit or visits or visited or visiting))	824
S21	("follow up schedule" or "follow up schedules" or "follow up scheduling" or "followup schedule" or "followup schedules" or "followup scheduling" or "discharge follow up" or "discharge follow ups" or "discharge followup" or "discharge followups" or "outpatient followup" or "outpatient followups" or "outpatient follow up" or "outpatient follow ups" or "out patient followup" or "out patient followups" or "out patient follow up" or "out patient follow ups" or "house call" or "house calls" or	6,905

	"house visit" or "house visits" or "home call" or "home calls" or "home visit" or "home visits")	
S22	((("follow up" or followup or outpatient* or out patient*) N2 (visit or visits or appointment*))	4,984
S23	((telephon* or phone*) N5 ("follow up" or "follow ups" or followup* or appointment* or visit or visits or visited or visiting or postdischarg* or (post N2 discharg*) or posthospital or "post hospital" or ((after or following or recent*) N4 (discharg* or hospital))))	2,850
S24	S18 OR S19 OR S20 OR S21 OR S22 OR S23	22,929
S25	S8 AND S24	722
S26	S25 NOT ((ZT "commentary") or (ZT "editorial") or (ZT "letter") or (ZT "case study") or (ZT "conference proceeding")) Limiters - Language: English	626

Appendix 2: Evidence Quality Assessment

Our first consideration was study design; we started with the assumption that randomized controlled trials are high quality, whereas observational studies are low quality. We then took into account five additional factors—risk of bias, inconsistency, indirectness, imprecision, and publication bias. Limitations in these areas resulted in downgrading the quality of evidence. Finally, we considered three main factors that may raise the quality of evidence: the large magnitude of effect, the dose-response gradient, and any residual confounding factors.²¹ For more detailed information, please refer to the latest series of GRADE articles.²¹

As stated by the GRADE Working Group, the final quality score can be interpreted using the following definitions:

High	We are very confident that the true prognosis (probability of future events) lies close to that of the estimate
Moderate	We are moderately confident that the true prognosis (probability of future events) is likely to be close to the estimate, but there is a possibility that it is substantially different
Low	Our confidence in the estimate is limited: the true prognosis (probability of future events) may be substantially different from the estimate
Very low	We have very little confidence in the estimate: the true prognosis (probability of future events) is likely to be substantially different from the estimate

Table A1: GRADE Evidence Profile for Comparison of Effect of a 7-Day Follow-Up and Usual Care on Clinical Outcomes

Number of Studies (Design)	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication Bias	Upgrade Considerations	Quality
30-day all-cause readmission							
1 (observational, multivariable analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
1 (observational, univariate analysis, or improper adjustment)	Serious limitations (–1)	No serious limitations	No serious limitations	No serious limitations	Undetected	None	⊕⊕ Low
1 (observational, aggregate data, multivariable analysis)	No serious limitations	No serious limitations	Serious limitations (–1)	No serious limitations	Undetected	None	⊕⊕ Low
30-day readmission due to COPD exacerbation							
1 (observational, univariate analysis)	Serious limitations (–1)	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕ Very low
30-day ED visit							
1 (observational, multivariable analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
30-day mortality							
1 (observational, aggregate data, multivariable analysis)	No serious limitations	No serious limitations	Serious limitations (–1)	No serious limitations	Undetected	None	⊕⊕ Low
Composite 30-day all-cause readmission or ED visit							
1 (observational, multivariable analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
Composite 30-day all-cause readmission or mortality							
1 (observational, aggregate data, multivariable analysis)	No serious limitations	No serious limitations	Serious limitations (–1)	No serious limitations	Undetected	None	⊕⊕ Low

Abbreviation: ED, emergency department; COPD, chronic obstructive pulmonary disease; GRADE, Grading of Recommendations Assessment, Development, and Evaluation.

^a Not adequate sample size for the outcome determined.

Table A2: GRADE Evidence Profile for Comparison of Effect of a 30-Day Follow-Up and Usual Care on Clinical Outcomes

Number of Studies (Design)	Risk of Bias	Inconsistency	Indirectness	Imprecision	Publication Bias	Upgrade Considerations	Quality
30-day all-cause readmission							
1 (observational, multivariable analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
2 (observational, univariate analysis or improper adjustment)	Serious limitations (–1)	No serious limitations	No serious limitations	No serious limitations	Undetected	None	⊕⊕ Low
30-day ED visit							
1 (observational, multivariable analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
1 (observational, univariate analysis or improper adjustment)	Serious limitations (–1)	No serious limitations	No serious limitations	No serious limitations	Undetected	None	⊕⊕ Low
30-day mortality							
1 (observational, multivariable analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
Composite 30-day all-cause readmission or ED visit							
1 (observational, multivariable analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
Composite 30-day all-cause readmission, ED visit or mortality							
1 (observational, multivariable analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
3-month all-cause readmission							
1 (observational, multivariate analysis)	No serious limitations	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕⊕ Low
3-month ED visit							
1 (observational, univariate analysis or improper adjustment)	Serious limitations (–1)	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕ Very low
3-month readmission due to respiratory problems							
1 (observational, univariate or improper adjustment)	Serious limitations (–1)	No serious limitations	No serious limitations	Serious limitations (–1) ^a	Undetected	None	⊕ Very low
Composite 6-month all-cause readmission or mortality							
1 (observational, univariate analysis or improper adjustment)	Serious limitations (–1)	No serious limitations	No serious limitations	No serious limitations	Undetected	None	⊕⊕ Low

Abbreviation: ED, emergency department; GRADE, Grading of Recommendations Assessment, Development, and Evaluation.

^aNot adequate sample size for the outcome determined.

Table A3: Risk of Bias for Controlled Trials (EPOC)

Author, Year Study Design	Allocation Sequence Adequately Generated?	Allocation Concealment?	Baseline Outcome Measurements Similar?	Baseline Characteristics Similar?	Incomplete Outcome Data Adequately Addressed?	Knowledge of Allocated Interventions Adequately Prevented?	Adequate Protection Against Contamination?	Selective Reporting?	Other Bias?
Wong et al, 2005 ³⁰ RCT	Low risk: Random sequence generation	Low risk	Unclear risk: Baseline measure of outcome not reported	Low risk	Low risk	Low risk	Low risk	Low risk	Unclear risk: Potential recall bias – some self-reported outcomes
Luder et al, 2015 ²⁴ NRCT	High risk: Not a randomized study; patient enrollment based on self- selection	High risk	Unclear risk: Baseline measure of outcome not reported	Low risk: Analyses adjusted for baseline differences	High risk: 16% and 33% losses to follow-up at 30 days after discharge in the intervention and control groups, respectively Data of patients lost to follow-up not included in analyses Unclear if this difference is nonrandom	Low risk	Low risk	Low risk	High risk: Recall bias – self-reported outcomes
Jurado Gamez et al, 2013 ²⁵ NRCT	High risk: Not a randomized study	High risk: Allocation based on how far a patient lived from the hospital	Unclear risk: Baseline measure of outcome not reported	Low risk	Low risk	High risk	Low risk	Low risk	

Abbreviations: EPOC, Effective Practice and Organisation of Care criteria; NRCT, nonrandomized controlled trial; RCT, randomized controlled trial.

Table A4: Risk of Bias for Observational Studies (ROBINS-I)

Author, Year Study Design	Bias due to Confounding	Bias in Selection of Participants Into the Study	Bias in Classification of Interventions	Bias due to Departures From Intended Interventions	Bias due to Missing Data	Bias in Measurement of Outcomes	Bias in Selection of the Reported Result	Overall Bias
Lee et al, 2016 ²³ Case-control study	Moderate risk: Improper covariate adjustment	Moderate risk	Low risk	Low risk	Low risk	Low risk	Low risk	Moderate risk
Gavish et al, 2015 ²⁶ Cohort study	Low risk	Moderate risk	Low risk	Low risk	Moderate risk: Missing data for 13% of sample No information on how many missing from intervention vs. control	Low risk	Low risk	Moderate risk
Fidahussein et al, 2014 ²⁷ Cohort study	Low risk	Serious risk: Multiple readmissions by the same patient were counted separately	Low risk	Low risk	Low risk	Low risk	Low risk	Serious risk
Sharif et al, 2014 ²⁸ Cohort study	Moderate risk: Improper covariate adjustment	Moderate risk	Low risk	Low risk	Low risk	Low risk	Low risk	Moderate risk
McAlister et al, 2013 ²⁹ Cohort study	Moderate risk: Improper covariate adjustment	Moderate risk	Low risk	Low risk	Low risk	Low risk	Low risk	Moderate risk
Hernandez et al, 2010 ⁴ Cohort study	Moderate risk: Study based on aggregate data	Moderate risk	Low risk	Low risk	Low risk	Low risk	Low risk	Moderate risk
Sharma et al, 2010 ¹¹ Cohort study	Moderate risk: Improper covariate adjustment	Low risk	Low risk	Low risk	Low risk	Low risk	Low risk	Moderate risk

Abbreviations: ROBINS-I, Risk of Bias in Non-randomized Studies of Interventions.

Appendix 3: Online Patient Engagement Survey

Patient groups contacted: Patients Canada; Ontario Lung Association; William Osler Health System; Ontario Telemedicine Network; Every Breath Counts; Canadian Cardiovascular Society; and Health Quality Ontario's Patient, Family, and Public Advisors Program

Timeline of survey: June 6 – July 7, 2016, via FluidSurveys, for Health Quality Ontario

Survey questions:

1. Were you discharged from the hospital within the past 12 months?
2. What was the health condition for which you were admitted?
3. Was a follow-up appointment made with a health care provider, such as your family doctor, pharmacist, nurse practitioner, or specialist?
4. How long was it between your discharge from hospital and your follow-up appointment?
5. How was the follow-up appointment scheduled?
6. Who was your follow-up appointment with?
7. How were you followed-up?
8. Did you feel that the follow-up appointment was useful?
9. Do you think that your follow-up appointment improved your health outcome? Please describe.
10. Did the follow-up appointment increase your satisfaction with your care? Please describe.
11. Were you readmitted to hospital within 30 days of your discharge?
12. Have you had any unplanned emergency room visits within 30 days of your discharge?
13. Is there anything else you'd like to tell us about your discharge from hospital and the arrangement of your follow-up care?

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About Health Quality Ontario

Health Quality Ontario is the provincial advisor on the quality of health care. We are motivated by a single-minded purpose: **Better health for all Ontarians.**

Who We Are.

We are a scientifically rigorous group with diverse areas of expertise. We strive for complete objectivity, and look at things from a vantage point that allows us to see the forest and the trees. We work in partnership with health care providers and organizations across the system, and engage with patients themselves, to help initiate substantial and sustainable change to the province's complex health system.

What We Do.

We define the meaning of quality as it pertains to health care, and provide strategic advice so all the parts of the system can improve. We also analyze virtually all aspects of Ontario's health care. This includes looking at the overall health of Ontarians, how well different areas of the system are working together, and most importantly, patient experience. We then produce comprehensive, objective reports based on data, facts and the voice of patients, caregivers and those who work each day in the health system. As well, we make recommendations on how to improve care using the best evidence. Finally, we support large scale quality improvements by working with our partners to facilitate ways for health care providers to learn from each other and share innovative approaches.

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We recognize that, as a system, we have much to be proud of, but also that it often falls short of being the best it can be. Plus certain vulnerable segments of the population are not receiving acceptable levels of attention. Our intent at Health Quality Ontario is to continuously improve the quality of health care in this province regardless of who you are or where you live. We are driven by the desire to make the system better, and by the inarguable fact that better has no limit.

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