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Improving medication titration in heart failure by embedding a structured medication titration plan

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ABSTRACT

Background: To improve up-titration of medications to target dose in heart failure patients by improving communication from hospital to primary care.
Methods: This quality improvement project was undertaken within three heart failure disease management (HFDM) services in Queensland, Australia. A structured medication plan was collaboratively designed and implemented in an iterative manner, using methods including awareness raising and education, audit and feedback, integration into existing work practice, and incentive payments. Evaluation was undertaken using sequential audits, and included process measures (use of the titration plan, assignment of responsibility) and outcome measures (proportion of patients achieving target dose) in HFDM service patients with reduced left ventricular ejection fraction.
Results: Comparison of the three patient cohorts (pre-intervention cohort A n = 96, intervention cohort B n = 95, intervention cohort C n = 89) showed increase use of the titration plan, a shift to greater primary care responsibility for titration, and an increase in the proportion of patients achieving target doses of angiotensin converting enzyme inhibitors/angiotensin receptor blockers (ACEI/ARB) (A 37% vs B 48% vs C 55%, p = 0.051) and beta-blockers (A 38% vs B 33% vs C 51%, p = 0.045). Combining all three cohorts, patients not on target doses when discharged from hospital were more likely to achieve target doses of ACEI/ARB (p < 0.0001) and beta blockers (p < 0.0001) within six months if they received a medication titration plan.
Conclusions: A medication titration plan was successfully implemented in three HFDM services and improved transitional communication and achievement of target doses of evidence-based therapies within six months of hospital discharge.

1. Introduction

Heart failure (HF) is a major public health problem associated with significant morbidity and mortality [1]. Large randomized controlled trials have demonstrated that angiotensin converting enzyme inhibitors or angiotensin receptor blockers (ACEI/ARB) and beta blockers decrease hospitalization and prolong survival in patients with HF with reduced left ventricular ejection fraction (HFrEF). However, these therapies can be difficult to manage in real-world clinical practice as HF patients frequently transition between acute hospital and primary healthcare sectors, and are often older and more complex than patients enrolled in the randomized controlled studies [2]. Nonetheless, suboptimal treatment is responsible for a substantial proportion of avoidable re-hospitalizations and deaths [3].

Whilst several studies have reported that only a small proportion of HFrEF patients are on target doses of ACEI/ARB and beta blockers at the time of hospital discharge [3,4], this may not be a true reflection of the final doses achieved, given that these drugs may require careful up-titration over several months [5]. However, a single-center audit of post-discharge titration of heart failure medications in our health service had previously identified that only 13% of patients achieved target doses at three months (unpublished data). This is similar to

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other reports of 17 to 43% of patients achieving target doses within three to six months of hospital discharge [6–9]. This "titration gap" is partly explained by higher rates of drug intolerance in unselected, older patients with multiple comorbidities who are under-represented in clinical trials [5], but may also represent an opportunity to improve adherence to evidence-based treatment in HF.

Barriers to guideline adherence include context-specific factors impacting upon provider knowledge, attitudes and behaviors, such as lack of awareness, lack of familiarity, lack of self-efficacy, inertia, patient expectations, and inadequate time or resources [10–12]. Interventions to improve prescribing behaviors have mostly focused on provider knowledge and attitudes. Although interventions such as education, point-of-care decision support and profiling with feedback have been associated with systematic improvements in some time series studies [9], other studies of this approach have been disappointing [13].

In the context of transition from hospital-based to primary care, communication of current therapy and expected treatment plans appears to be a major barrier and large registry studies confirm that discharge communication for HF patients is poor [9]. Heart failure disease management (HFDM) programs improve outcomes in patients recently discharged from hospital, helping to provide a "bridge" between hospital and primary care [14]. Specialized HF medical clinics or protocol-driven nurse and pharmacist led clinics can be effective in improving titration following hospitalization [15–18] although this finding has not been universal [6]. HFDM services may help to address barriers by providing access to specialized multidisciplinary staff familiar with current guidelines, who have the time and skills to support medication monitoring. However access to these services remains limited [19] and the general practitioner (GP) usually remains the key provider. Clear communication between the HFDM service, specialty services and GPs may help to improve GP familiarity and confidence with prescribing, as well as set consistent patient and provider expectations.

We undertook a quality improvement project to enhance discharge communication between the hospital and primary care in order to improve the titration of ACEI/ARB and beta blockers following discharge from hospital with a primary diagnosis of HFrEF. Our primary goal was to embed an individualized HF medication titration plan (using a standardized form) into clinical practice. The medication titration form included the discharge and recommended target dose of ACEI/ARB and beta blockers, the order of titration, and the primary clinician responsible for managing titration. We hypothesized that improved communication between healthcare providers would result in a higher proportion of HFrEF patients achieving target doses of medications by six months following hospital discharge. We report our findings using the SQUIRE guidelines for quality improvement research.

2. Methods

2.1. Setting

Metro North Hospital and Health Service (MNHHS) is the largest publicly funded health service in Australia servicing approximately 900,000 people in South East Queensland. We undertook the study in three hospitals that have established HFDM teams and together care for 80% of HF hospitalizations within MNHHS. Two of the hospitals are large teaching hospitals (one with an advanced HF transplant service) and the third is a district hospital servicing a rapidly growing population on the urban fringe of Brisbane. The HFDM services include expert HF nurses, clinical pharmacists and physiotherapists, and specialist medical supervision of the programs. The services provide active case finding throughout the hospital with an opt-out approach; patient and carer education continuing post hospitalization; discharge coordination between the inpatient treating team, the GP and primary care services; and multidisciplinary clinic and/or telephone-based follow-up. About 20% of patients attend a structured weekly group education and exercise program. None of the services offer home visits. Medical follow-up may include HF, general cardiology or medical outpatient clinics depending on local resources and patient preferences.

The study conforms to the ethical guidelines of the 1975 Declaration of Helsinki as reflected in a priori approval by the Human Research Ethics Committee (HREC) for all three hospitals which reviewed the study protocol and deemed it exempt from ethical review.

2.2. Planning the intervention

The project was supported by a steering committee and three clinical working groups. The steering committee consisted of two cardiologists, a general physician, two GPs, a pharmacist, a community HF nurse practitioner, and two community-based general nurses. The committee met quarterly to provide strategic advice and planning. The implementation group consisted of a senior project manager, clinical working groups of nurses, pharmacists and medical leads associated with HFDM services at each participating hospital, and representatives of information technology services in the hospital and primary care, who met as required to refine and implement intervention strategies.

Interventions were introduced and refined in a quality improvement Plan, Do, Study, Act (PDSA) cycle. The interventions centered on supporting the use of a HF medication titration plan and methods to embed the titration plan into standard clinical practice including performance feedback to HFDM services, ensuring timely communication of the titration plan to the GP following discharge from hospital, investigating electronic methods of transferring discharge information, considering the use of case-conferencing, and providing incentive payments.

2.3. Medication titration plan

Prior to the study, a workgroup including nursing, pharmacy, cardiology and general medical representatives had developed and piloted an individualized written HF medication titration plan using a standardized form. Modifications were made following input from renal and respiratory medical specialists (see HF Medication Titration Plan, Fig. 1). This document detailed ACEI/ARB and beta blocker therapy on discharge with clear instructions regarding the order and extent of titration of these medications. Instructions for weight-based diuretic titration were provided if appropriate. The document allowed clear delegation of the primary person responsible for titration (hospital specialist, HFDM nurse, or GP) and provided a troubleshooting guide. The primary person was negotiated by the heart failure disease management staff in discussion with the patient and in collaboration with the treating hospital team and general practitioner, influenced by practical and clinical considerations including clinical complexity, physical access to services, patient preference, and provider confidence. Patients had the option to choose to see their general practitioner to supervise medication titration. In these cases, the general practitioner was contacted by the heart failure nurse to confirm that they were happy to supervise titration. The medication titration plan addressed several potential barriers by providing individualized point-of-care decision support; setting clear expectations which could be developed in collaboration with the patient; providing access to a specialist service if time or skills were a barrier to titration; and providing single point accountability. Although the medication titration plan was available, it was inconsistently used prior to the project.

This improvement project aimed to embed the use of the HF medication titration plan into routine clinical practice with the goal of improving medication titration for patients with HF in the community. Specifically, it aimed to improve post-discharge communication of a titration plan, provide clearer accountability for titration, and thereby increase achievement of optimal dosing of ACEI/ARB and beta blockers by six months after hospital discharge.

2.3.1. Implementation of titration plan

Barriers and potential solutions were developed by interviewing GP's and practice managers of patients attending HF services in MNHHS as well as consulting with hospital-based implementation groups. These are summarized in Table 1 along with the actions agreed to by the project steering committee.

2.4. Planning the evaluation

2.4.1. Design and patient characteristics

To evaluate the effect of the intervention, we conducted three audits of consecutive, eligible patients with HFrEF discharged from the study hospitals between July to December 2009 (Cohort A, pre-intervention), 2010 (Cohort B) and 2011 (Cohort C). Recruitment of patients for all groups was at the same time of year to minimize the influence of seasonal variation. The baseline audit (Cohort A) was retrospective and the two intervention groups (Cohorts B and C) were prospective.

Eligibility criteria were patients newly referred to the hospital-based HFDM services following an admission to hospital with a primary diagnosis of HFrEF, with a left ventricular ejection fraction (LVEF) <50%, who were then followed up in the MNHHS and had no documented contraindication to medication titration or palliative intent to treatment. Given that the aim of this study was to evaluate titration of medical therapy over six-months, patients were excluded if they could not be contacted or died during the follow-up period.

2.4.2. Measures and outcomes

Patient characteristics, prescription and doses of HF medications at hospital discharge and six months, and quality of medication titration information communicated was collected from hospital charts, HFDM service notes, electronic discharge summaries, and electronic databases, supplemented if necessary by telephone interviews of patients, their GPs or GP practice managers. Data were collected by an experienced project manager not involved in delivery of services.

The primary endpoint was the proportion of patients who were on target doses of either ACEI/ARB or beta blockers at six months following discharge from hospital. Target