Achieving the dose: an audit of discharge medication for the secondary prevention of myocardial infarction

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To establish whether the medication received by patients post-myocardial infarction was prescribed at therapeutic doses, we performed a retrospective audit of discharge summaries. Over three quarters (75.1%) of all patients in the study group were discharged on sub-therapeutic doses of angiotensin-converting enzyme (ACE) inhibitors and beta blockers. In contrast, nearly all (94–97%) patients received a statin at a therapeutic dose. Aspirin and clopidogrel, where prescribed, were also within the therapeutic range in 100% of patients. These findings illustrate the difficulty in optimising the doses of drugs that have a wide range of possible doses during short hospital admissions.

Introduction

This retrospective audit was performed to assess whether patients discharged from the cardiology ward at the Queen Elizabeth Hospital, Birmingham, following ST-segment elevation myocardial infarction (STEMI) or non-ST-segment elevation myocardial infarction (NSTEMI) were prescribed the recommended medication at appropriate doses. The evidence for the prognostic benefit of drugs such as angiotensin-converting enzyme (ACE) inhibitors, beta blockers and statins after a myocardial infarction (MI) is derived from studies in which these drugs were used at high doses, such as Acute Infarction Ramipril Efficacy (AIRE),[1] Carvedilol Post-Infarct Survival Control in Left-Ventricular Dysfunction (CAPRICORN),[2] and Pravastatin or Atorvastatin Evaluation and Infection Therapy (PROVE IT).[3] Lower doses may not confer the same benefit.

Recent studies on prescribing post-MI show that between 60% and 90% of patients are receiving each discharge medication as recommended by the National Institute for Health and Clinical Excellence (NICE),[4-7] although this does appear to be increasing.[5] This study aims to go further by assessing how many patients are being prescribed these drugs at doses likely to be effective.

Methods

Computerised discharge summaries, which included the discharge medications, were analysed retrospectively for 400 patients discharged between May and September 2008.

For study purposes, the sub-therapeutic doses of NICE recommended drugs for use post-MI were defined as follows:

- ACE inhibitors: lisinopril <10 mg per day, perindopril <4 mg per day, ramipril <5 mg per day

- beta blockers: atenolol <50 mg per day, bisoprolol <5 mg per day, carvedilol <25 mg per day, metoprolol <50 mg per day
- statins: atorvastatin <80 mg per day, rosuvastatin <10 mg per day, simvastatin <40 mg per day
- antiplatelets: aspirin <75 mg per day, clopidogrel <75 mg per day.

Results

Of the 173 patients with the diagnosis of STEMI/NSTEMI (65 and 108, respectively) 126 were male. The age range was from 39 to 87 years with a mean age of 65.1 years. Forty were current smokers (23%), 69 were ex-smokers (40%), 35 had never smoked (20%) and smoking status was unknown in 29 (17%). There were 18 patients with diabetes in the group (10%).

Over three quarters (75.1%) of all patients in the study group (72.2% of STEMI patients and 77.2% of NSTEMI patients) were discharged on sub-therapeutic doses of ACE inhibitors and beta blockers.

In contrast, 97% of STEMI and 94% of NSTEMI patients received a statin at a therapeutic dose. Aspirin was prescribed within the therapeutic range in 100% of patients. Clopidogrel was also prescribed within the therapeutic range for all patients, except in a small number of patients in the NSTEMI group where it was not prescribed at all (3%).

In an attempt to improve prescribing practice, posters were displayed above the computers on the ward, in full view of the doctors writing the discharge summaries. These stated the therapeutic doses of ACE inhibitors and beta blockers and also suggested giving instructions to general practitioners (GPs) regarding up-titration.

During the six weeks with the intervention in place, there was no significant improvement in the doses of ACE inhibitors or beta blockers prescribed for patients post-MI. There was also no evidence that the intervention improved the instructions given to GPs for ongoing patient care.

Discussion

These findings illustrate the difficulty in optimising the doses of drugs that have a wide range of possible doses during short hospital admissions. It is also notable that discharge summaries are usually completed by junior doctors with limited experience of prescribing cardio-active drugs. While a few patients may have had absolute contraindications to some drugs (e.g. asthmatics and beta blockers) and a few may have had problems such as hypotension limiting drug dosing, these factors are unlikely to have prevented the prescription of higher doses of drugs in over 75% of cases.

These findings suggest that doctors were either unwilling to change their prescribing habits, or perhaps they disagreed with the information on the posters. This study suggests that posters are not an effective method of influencing prescribing habits.

While short admission times limit scope for up-titration, all discharge summaries should include information for GPs regarding up-titration of ACE inhibitors and beta blockers if this cannot be achieved during the patient's stay. Instructions to stop clopidogrel after one year should also be included. This could be accomplished by modifying the electronic prescribing systems, such as the one in use in our institution, to alert doctors to the therapeutic doses of the drugs they are prescribing, as well as providing information regarding up-titrations. This system could also be modified to include a space for manual input allowing doctors to explain why they were unable to follow guidelines, for example, in patients with contraindications. This would improve communication between the hospital and primary-care setting and allow more accurate results to be collected in future studies of discharge medication.

By achieving these targets the post-MI mortality rate could be significantly lowered

Conflict of interest

None declared.

Editors' note

Kyle Stewart and Pippa Woothipoom are joint first authors of this article.

Key messages

- Some patients are receiving sub-therapeutic doses of medication following hospital admission for myocardial infarction
- The reasons for prescribing sub-therapeutic doses should be made clear on the patient record
- GPs should be provided with information regarding titration of medication, as appropriate
- Achieving therapeutic doses of post-myocardial infarction medications could significantly lower the mortality rate

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