

# Outcomes of a decision support prompt in community pharmacy-dispensing software to promote step-down of proton pump inhibitor therapy

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## WHAT IS ALREADY KNOWN ABOUT THIS SUBJECT

- Computerized clinical decision support has been increasingly utilized in hospital and general-practice settings where it may improve prescribing practice. Little investigation has been undertaken using computerized decision support in the community pharmacy setting. Proton pump inhibitors are expensive and often prescribed in dosages above recommended guidelines.

## WHAT THIS STUDY ADDS

- This study adds justification for the use of computerized decision support in community pharmacy. It highlights the promotion of improved prescribing of proton pump inhibitors through patient empowerment.

## AIM

To evaluate the effect of a computerized decision support prompt regarding high-dose proton pump inhibitor (PPI) therapy on prescribing and medication costs.

## METHODS

A prompt activated on dispensing high-dose esomeprazole or pantoprazole was implemented in 73 of 185 pharmacies. Anonymized prescription data and a patient survey were used to determine changes in prescribing and associated medication costs.

## RESULTS

The pharmacist-recorded PPI intervention rate per 100 high-dose PPI prescriptions was 1.67 for the PPI prompt group and 0.17 for the control group ( $P < 0.001$ ). During the first 28 days of the trial, 196 interventions resulted in 34 instances of PPI step-down, with 28 of these occurring in PPI prompt pharmacies. Cost savings attributable to the prompt were AUD 7.98 (£4.95) per month per PPI prompt pharmacy compared with AUD 1.05 (£0.65) per control pharmacy.

## CONCLUSION

The use of electronic decision support prompts in community pharmacy practice can promote the quality use of medicines.

## Introduction

Computerized clinical decision support systems (CDSS) have been advocated for improving the quality use of medicines via promoting evidence-based medicine usage [1, 2]. A number of studies have employed CDSS in medication management. Almost all of these have targeted electronic prescribing by doctors.

There is very little literature describing the use of CDSS within community pharmacy practice and providing information directly to patients [3]. One previous study incorporated a computerized clinical decision support prompt that promoted the use of low-dose aspirin in diabetic patients without contra-indications [4]. This decision support prompt significantly increased the frequency of pharmacists recommending that patients with diabetes discuss low-dose aspirin therapy with their doctor [4].

The high rate of use and expense of protonpump inhibitors (PPIs) has created pressure to rationalize their prescribing [5–9]. For the maintenance treatment of gastro-oesophageal reflux disease (GORD), esomeprazole or pantoprazole 20 mg daily is considered appropriate [10, 11]. Often patients are initiated on higher doses to provide initial control, yet the recommendation to step-down to lower maintenance doses is not routinely instigated by general practitioners (GPs) [5, 12].

This study evaluated the effect of incorporation of a computerized decision support prompt regarding high-dose PPI therapy into pharmacy-dispensing software on the frequency of PPI-related clinical interventions documented by pharmacists, patient response to the intervention, PPI prescribing and medication costs.

## Methods

This was a sub-study of the Pharmacy Recording of Medication Incidents and Services electronic documentation system (PROMISE) III trial, which modified and trialled an electronic documentation system for recording clinical interventions made by pharmacists in Australian community pharmacies [13]. The trial was conducted across three Australian states in 185 pharmacies, which were representative of pharmacies nationally. Participating pharmacists were asked to document electronically all of their clinical interventions for a 12-week period using a previously validated classification system [14]. A clinical intervention was defined as any professional activity directed towards improving the quality use of medicines that results in a recommendation for a change in the patient's medication therapy, means of administration or medication-taking behaviour.

Trial pharmacies were subsequently stratified according to prescription volume and the Pharmacy Access Remoteness Index of Australia (a measurement of physical remoteness of pharmacies across Australia) [15]. The prompt was

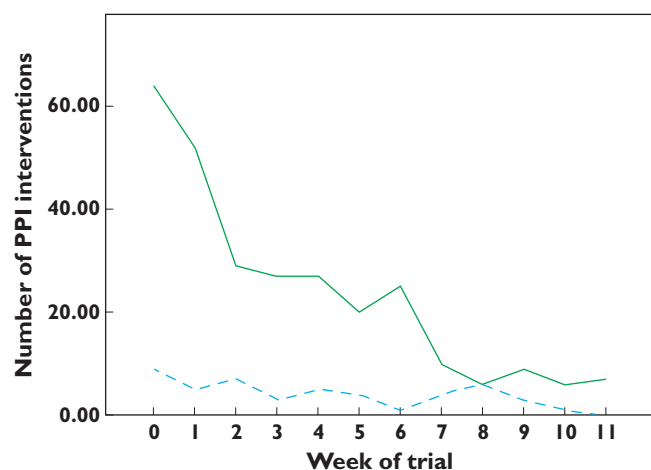
then randomly allocated within each stratification group to 73 of the 185 pharmacies (the 'PPI prompt' group), while the remaining 112 pharmacies acted as controls.

A specific clinical intervention was chosen for the CDSS prompt because the National Prescribing Service (a government-funded organization focused on the improved quality use of medicines and medical decision making) had recently highlighted a need for improved quality use of PPI medications [10]. The two PPI dosage forms chosen to activate the decision support prompt were pantoprazole 40 mg and esomeprazole 40 mg tablets, two high-cost and frequently prescribed PPIs. The National Prescribing Service recommendation was to use esomeprazole 20 mg daily or pantoprazole 40 mg daily to control GORD symptoms for up to 2 months, then step-down to the lowest dose and frequency for maintenance therapy [10, 16]. The prompt appeared to pharmacists every time one of the specified products was chosen during the dispensing process. It advised pharmacists to discuss with eligible patients the possibility of reducing their medication to a lower dosage, on consultation with their GP. The prompt contained links to printable leaflets targeted at GPs and patients. The leaflets discussed recommended use of PPIs for GORD, indicated that patients may no longer require therapy and PPI therapy carries some risk from long-term use. No such prompt appeared for the control pharmacies.

Intervention data and patient de-identified prescription data for each participating pharmacy were sent electronically to a secure repository for analysis. Intervention rates and targeted PPI intervention rates were compared across the two groups to determine the effectiveness of the prompt. Prescription data postintervention were used to determine changes in PPI dosage or other changes in GORD therapy resulting from the clinical interventions. Interventions performed within the first 28 days of the trial were used for this approach as this allowed a further 56 days to identify any medication changes. These figures were deemed appropriate, as the targeted medications were dispensed in packets containing 30 days' supply of medication.

A separate measure of patient action was undertaken via anonymous patient surveys. This was achieved by asking pharmacists from participating pharmacies to post reply-paid non-identifiable surveys to those patients who had been recipients of the PPI interventions. This survey asked consenting patients whether they had subsequently contacted their GP or intended to do so and, for those patients who had contacted their GP, whether their therapy had been changed.

Drug cost savings were calculated in Australian dollars (AUD) using the July 2009 costs available from the online Schedule of Pharmaceutical Benefits [17]. Cost saving was determined as the mean change per pharmacy of PPI medication cost from before to after the intervention. Interventions from the first 28 days of the trial (defined as a month) were used.



**Figure 1**

Number of proton pump inhibitor (PPI) therapy reduction interventions each week for each trial group. No prompt (—); PPI prompt (—)

A cost-saving accumulation calculation model was used to predict cost savings, which took into account the lower cost of dispensing in subsequent months. This was by applying the prescribing uptake effect of the prompt for 2 months, followed by 10 months with no additional prescribing uptake effect, to mimic the effect shown in Figure 1 where the first 2 months of the prompt produced a large pharmacist response. This estimate presumed patients did not revert to their original therapy. The estimate did not include ancillary costs, such as GP consultations. Cost savings from reduced incidence of adverse drug reactions would have been difficult to determine and were not included.

Statistical analysis was performed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA). Because of the non-parametric nature of the data, Mann–Whitney tests were used to compare the intervention rates between the two groups.

The study was funded by the Australian Government Department of Health and Ageing. Software vendors were contracted to develop the software for the prompt. Pharmacy owners were remunerated AUD 1200 (£745) for participation in the project. The study was approved by the Tasmanian Human Research Ethics Committee (University of Tasmania).

## Results

Overall, 330 PPI step-down interventions were identified during the 12-week trial, or 0.74 PPI interventions per 100 high-dose targeted PPI prescriptions. The majority of these were recorded by pharmacists in the PPI prompt group, at a rate of 1.67 (control group 0.17) PPI interventions per 100 high-dose PPI prescriptions (Tables 1,  $P < 0.001$ ).

Examination of prescription data for each step-down intervention that occurred within the first 28 days of the trial identified 34 patients with PPI therapy reduction, 28 of whom were in the PPI prompt group. Twenty-seven patients resulted in dose reduction of the targeted medications from 40 mg to 20 mg, and in one patient the reduction was from esomeprazole 40 mg twice daily to once daily. In six patients medications were changed to another PPI (all of which were less expensive). In one patient therapy was changed to a less expensive histamine  $H_2$ -receptor antagonist.

The average 1-month cost saving per PPI prompt pharmacy was found to be AUD 7.98 (£4.95). The average 1-month cost saving per control arm pharmacy was found to be AUD 1.05 (£0.65). The effect of the prompt was most prominent in the first 2 months of the trial (Figure 1) and is mimicked in the costing. A cost estimation applying the cost-saving effect of the prompt in each of months 1 and 2 of AUD 7.98 and allowing this to accumulate for 10 further months resulted in a 1-year saving of AUD 183.60 (£114) per pharmacy. When extrapolated to all 5006 Australian pharmacies [18], and subtracting the control group cost saving, the cost saving attributable to the prompt would be nearly AUD 800 000 (£497 000) in the first year, and would be expected to increase in subsequent years because of the accumulating cost-saving effect.

Seventy-six responses were received from 252 PPI intervention surveys sent to patients from PPI prompt pharmacies. Forty-eight patients (63%) had reviewed their medication therapy in consultation with their GP and a further 19 (25%) intended to do so. Of the patients who had consulted their GP, 31 of these consultations resulted in a change of therapy – 20 dose reductions, six cessations of therapy, three dose increases and one change from esomeprazole to pantoprazole (unknown strength). One response was unclear.

## Discussion

The overprescribing of high-dose PPIs is an issue that has been highlighted to Australian doctors and pharmacists [10, 11]. The PPI prompt provided the opportunity for pharmacists to perform short patient-focused interventions related to PPI therapy reduction.

The recording of PPI dose reduction interventions declined in the prompted group over the duration of the trial. Several factors may have contributed to this decline. First, patients with chronic conditions typically attend their local pharmacy monthly. Therefore, most patients suitable for therapy reduction were likely to have been identified within the first month of the trial. Second, the prompt was not highly specific, and was activated for patients who were not suitable for therapy reduction, or who had not had therapy reduced following a previous intervention.

**Table 1**

Intervention rates across the trial groups

	PPI prompt Esomeprazole 40 mg	Pantoprazole 40 mg	Control Esomeprazole 40 mg	Pantoprazole 40 mg
Number of PPI step-down interventions	158	124	32	16
Number of prescriptions	7967	8957	12 584	14 883
Intervention rate/100 prescriptions	1.98	1.38	0.25	0.11
Intervention rate/100 prescriptions	1.67		0.17	

PPI, proton pump inhibitor.

These factors may have caused fatigue, as has been identified in other decision support trials [19–22].

The extrapolation of cost savings for 1 year of therapy if this prompt was implemented for only 2 months in all Australian pharmacies was found to be nearly AUD 800 000 (£497 000). The economic benefits of the therapy reduction prompt are likely to be understated as follow-up prescription data were limited to prescriptions dispensed at the trial pharmacy only, and prescription supplies may have lasted beyond the follow-up period. Patients who are empowered by information provided by pharmacists may be more likely to bring this issue to the attention of their GP, which in turn may encourage GPs to enact a change of therapy [23]. This was demonstrated in the current trial where the provision of education and written material resulted in a large proportion of the surveyed patients contacting, or intending to contact, their prescriber to discuss the possibility of reducing their PPI therapy.

In conclusion, an electronic prompt into community pharmacy-dispensing software was successfully utilized to encourage quality use of PPIs. The rate of pharmacists performing the intervention increased 10-fold. Significant cost savings were demonstrated as a direct result of the interventions. Providing pharmacists with assistance using decision support software can have a positive influence on prescribing practice.

## Competing Interests

There are no conflicts of interest to declare.

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