Automatic drug use audit in primary care

A pilot evaluation of warfarin use for patients with atrial fibrillation

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AIM
To develop and test an automatic way to extract patient data for audit purposes in general practice.

METHOD
A retrospective observational drug use evaluation of warfarin prescribing in patients with atrial fibrillation using automated searches of electronic medical records.

RESULTS
The system worked well. It identified 81 patients with atrial fibrillation in three practices: 17 (26%) not prescribed warfarin had moderate to high risk of stroke. We do not know what the sensitivity of the method was.

DISCUSSION
This may be a useful, rapid method of collecting data in primary care for audit purposes. It assumes accurate data input. The use of warfarin for atrial fibrillation was appropriately associated with other risk factors for stroke.

We decided to undertake a pilot study of a data extraction tool for audit purposes in primary care. This is more difficult than in hospitals because of the limited support data networks available, difficulties in collecting data, and general practitioner time constraints. To overcome this, we developed a semi-automatic data extraction tool for electronic medical records.

We chose to audit stroke prevention as stroke accounts for 9.4% of all deaths (second only behind cardiovascular disease) in Australia, and about 48 000 Australians suffer a stroke annually.1 Risk factors for increased likelihood of a stroke include hypertension, cardiovascular disease, diabetes, smoking, raised cholesterol and atrial fibrillation.1 Atrial fibrillation increases the risk of stroke by about 5%, exacerbating other risks such as aging (>65 years).2 Anticoagulation with warfarin reduces this risk by 68%, an absolute risk reduction of 4%.3,4 Accordingly, evidence based guidelines have been developed to target those patients with atrial fibrillation that would benefit from warfarin therapy.5 Despite the evidence, many people with atrial fibrillation do not receive warfarin.6,7 Reasons include concern for haemorrhage from warfarin use by both physicians and patients.8 Nevertheless, on balance, the benefits of warfarin use outweigh the risks of haemorrhage (gastrointestinal and intracranial), for which the incidence is not significantly higher among people anticoagulated with warfarin.9

Methods
This was a retrospective review of general practitioners’ records of patients with atrial fibrillation. Support was obtained from the Inner South Brisbane and Bayside Divisions of General Practice who identified three general practices that were willing to participate. The practices consisted of: a single GP; one with three GPs with electronic records for 50% of their patients; and one in which two out of 6 GPs participated. About 12 000 patients were available to be searched by the template. The division, a pharmacist, and the GPs helped us develop the electronic template method of collecting de-identified patient information which could extract the following data from the electronic record system, Medical Director: patients with atrial fibrillation, patients with atrial fibrillation and not taking warfarin, and patients with atrial fibrillation and taking warfarin (Figure 1). Identified patients’
data, including age, gender, medical history, medication use, allergies, and social history, but excluding names or addresses, were automatically collected when one of us visited the practice.

Analysis consisted of estimating warfarin use against existing guidelines after classifying patients into high, moderate or low risk of stroke, using the Fishers Exact test (Table 1).

Ethics approval was obtained from a medical research ethics committee of the University of Queensland.

**Results**

We identified 81 patients with atrial fibrillation: median age 73 years (IQR 65–85), 26 (32%) were women, warfarin was prescribed for 42 (52%), and there were contraindications to warfarin identified in 15 (39%) of the 39 (48%) patients not taking warfarin (from increased risk of falls [5]; previous cardiovascular accident [3]; previous fall [2]; cancer [3]; gastrointestinal haemorrhage [1]; renal impairment [1]; total knee replacement [1]; epilepsy [1]; dementia [1]; excessive alcohol intake [1]; and allergy to warfarin [1]). Of the remaining 24 (36%) patients with atrial fibrillation but not on warfarin, nine (14%) were at high risk, eight (12%) moderate risk, and seven (10%) low risk of stroke (Table 2).

Patients with a high risk for a stroke were significantly more likely to receive warfarin ($p<0.05$). Results were fed back to the GPs individually, and to the division by newsletter.

Thirteen of the patients (16%) had incomplete medical records (eg. medications were commonly listed with no corresponding medical condition). Two participating GPs said their reasons for not prescribing warfarin were: patient concerns of warfarin side effects, fear of haemorrhagic complications, and poorly compliant patients associated with language barriers and cultural diversity.

**Discussion**

The system seems to be time efficient and effective. Only 81 (0.7%) of the general practice sample of patients were identified by the template as having atrial fibrillation. This is likely to be an underestimate as the incidence of atrial fibrillation in the general population is 2% (potentially 240 patients from this sample) but may be as high as 5% in those over 65 years of age (potentially 600 patients from this sample). Nor did we test the...
specificity or accuracy of the template in identifying patients with atrial fibrillation. This would need to be addressed in future applications of the template. We also acknowledge the small sample of GPs and patients, which means we cannot generalise this widely. Also the template is reliant on accurate and complete data entry of medical history, something we could not verify.

The method may be transferable to review other areas of medication use in primary practice, with flexibility in the terms that can be entered. The software is flexible in that the search terms can easily be altered and expanded to include specific coding for different drugs. We were unable to ascertain where (hospital or general practice) warfarin was first prescribed, something that might be valuable in designing remediation.

The pilot audit found that warfarin was prescribed for patients with atrial fibrillation at a high risk of stroke. It compares favourably with some other studies where only 20% of patients who had an indication for warfarin were receiving it. Nevertheless 17 (26%) patients at moderate or high risk were not prescribed warfarin. There may have been sound clinical reasons for this, something our template could not measure.

Future research should test whether such automatic data collecting are sensitive and specific enough to be valid, and whether they lead to changes in behaviour when fed back to clinicians.

Conflict of interest: none declared.

Acknowledgments
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References
6. Sudlow M, Thomson RG, Thwaites B, Rogers H, Kenny RA. Prevalence of atrial fibrillation and eligi-