An audit of INR control in the Australian indigenous setting

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BACKGROUND
Warfarin management can be difficult; many factors can impact on INR control with some factors being unique to the Australian indigenous setting.

METHODS
An audit at an urban Aboriginal community controlled health service calculated the time all patients on warfarin were in the target INR therapeutic range. Those patients with the best and the worst values for time in therapeutic range (TTR) were then compared.

RESULTS
The 26 identified patients on warfarin were in the target INR therapeutic range 44.9% of the time. Patients with better INR control were older than those with the worst control. There appeared to be no difference between the two groups when comparing other factors.

DISCUSSION
INR control was below the cited benchmark for TTR of 60%. However, this may be better than expected in this clinical setting. The small number of patients included in the audit means that any discussion of the causes of better and poorer control must be treated with caution.

Skills in anticoagulation management are an important part of general practice. At this urban Aboriginal community controlled health service in Darwin, in Australia's Northern Territory, general practitioners work with Aboriginal health workers to provide health care. General practitioners are responsible for dosage adjustments of warfarin.

A study of consultations at this health service (albeit in 1994) found that warfarin was prescribed during 1% (6/583) of consultations.[1] This was similar to the most recent BEACH study of Australian general practice in 2005–2006 where warfarin was one of the most frequently prescribed medications, being prescribed at 0.9% (95% CI: 0.8–1.0) of GP consultations.[2] There has been no change in warfarin prescribing in BEACH surveys since 2001.[2]

If an INR is too low there is the risk of ischaemic events including systemic or pulmonary emboli. A meta-analysis indicated a 5-fold risk of ischaemic events for a patient with atrial fibrillation and an INR of less than two compared with an INR of two or greater.[3] Conversely, if the INR is more than three, there is more than a 3-fold risk of bleeding.[3] In one study there was a 2.4–8.1% annual risk of major bleeding for patients on warfarin.[4] This is increased to a 15% per year risk of minor bleeding.[5]

Researchers have examined how well anticoagulation is achieved in various clinical settings: from hospital based INR clinics to general practice surgeries to home monitoring[6] of INR. Australian studies have concentrated on warfarin in the hospital setting,[7,8] but have also investigated point of care testing of INRs by pharmacists.[9,10] No studies were found involving Aboriginal or Torres Strait Islander patients in the general practice setting.

Several methods are available for measuring the quality of warfarin management.[11] Rosendaal's Linear Interpolation method is a commonly used method and calculates 'time in therapeutic range' (TTR).[12] Studies in a range of clinical settings and utilising various management techniques produced TTR results from 30–82%.[13,14] According to several studies, a benchmark TTR of 60% has been proposed.[15,16]

There have been many factors found to impact on warfarin management. These include interaction with other drugs, patients being in the first 3 months of warfarin initiation and, more controversially, advanced age.[17] Clinicians at this Aboriginal health service also suggested that the geographical mobility of many of their patients might make it more difficult to contact patients with abnormal INR results. This audit assessed: the patient's age, the total number of medications taken, the presence

of a permanent local address and a contact telephone number for the patient. Some authors have criticised clinicians and researchers for more often focusing on patient factors than health system factors as the potential cause of poor adherence (and so poor management of chronic conditions),[18] so we also recorded by which specific doctor INR management was provided. Most GPs at this health service work part time, which may threaten continuity of care and INR control.

Methods

INR samples for patients at this health service were collected by venesection and examined using a Sysmex CA500 machine at a local commercial pathology laboratory. Data was retrieved from computerised medical notes. Patients were included if their warfarin dosing had been managed by our health service between 1 January 2006 and 30 June 2006.

Rosendaal's Linear Interpolation method was used to estimate the TTR for each patient and the average TTR for all patients. An average TTR was also determined for two specific subgroups: all patients on warfarin for nonvalvular atrial fibrillation (NVAF) with a target INR of 2–3, and all other patients.

Patients with the eight highest and the eight lowest TTR were compared. Confidence intervals and the comparison of mean ages (using a t-test) and the number of INRs (using a Mann-Whitney test) for the two groups were performed using STATA version 8.0 (Stata Corporation, College Station, Texas, USA).

Results

There were 26 patients on warfarin attending the health service during the study period. Thirteen patients were on warfarin for NVAF (target INR 2–3) and had a total of 106 INR tests during the 6 month period (*Figure 1*). The other 13 included eight patients with valvular heart disease, two with NVAF but with a target range other than 2–3, one being treated for pulmonary embolus, and two for other heart disease. This group had a total of 139 INR tests.

The TTR for individuals ranged from 0–100% (*Figure 2*). The mean TTR for the total 26 patients was 44.9% (95% CI: 31.0–58.8). That is, on average, patients in our health service on warfarin were in the therapeutic INR range 44.9% of the time over the 6 month measurement period.

The mean TTR for the subgroup of 13 patients on warfarin for NVAF was 50.4% (95% CI: 28.5–72.2) and the median was 44%. The mean for the other subgroup of 13 patients was 39.4% (95% CI: 19.5–59.3) and the median was 35%.

Regarding the factors proposed to influence warfarin management, no difference was noted between those patients with the best INR control compared to those with the worst control except for age. There was a statistically significant difference ($p<0.05$) in the mean age of the two groups, with those with the best control being older. Those with the best control had more INR tests (median 7.5 INR tests) taken than those with the worst control (median 3.5). This difference was not statistically significant ($p=0.06$). However, one patient in the group with poorest control had over half (31/52) of the INR samples taken in that group and still had a TTR of only 14%. This patient was managed by a single doctor and had a telephone number for contact purposes.

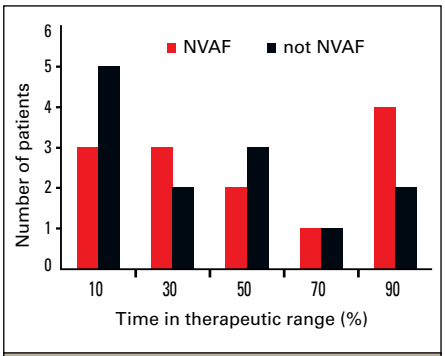

Figure 1. Patients on warfarin

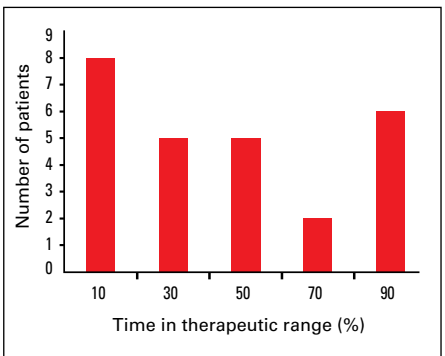

Figure 2. Time in therapeutic range

Discussion

The TTR of 44.9% achieved for all 26 patients on warfarin at this health service (50.4% for patients with NVAF and 39.4% for others) fell within the wide range of 30–82% reported in the literature.[3,13] It was however, lower than the benchmark TTR of 60%.[14,15] This may still be better than would be expected. Not only are there difficulties specific to the Aboriginal health context, but good INR control in clinics with few patients on warfarin is considered to be generally more difficult than in clinics with larger numbers of patients on warfarin.[19]

Unfortunately, the audit has not identified strategies to improve INR control in this setting. Not surprisingly, those with the best control had more frequent INR tests than those with the worst control. Otherwise, only age appeared to be associated with INR control. It is possible that older patients have more regular contact with health services due to the presence of more comorbidities, and therefore have better control.

It is difficult to make conclusions about the four factors that were anticipated to predict poor control (advanced age, polypharmacy, contact difficulties, and changing doctors), but did not appear to do so. Clinicians may take extra time and effort to succeed with patients with these perceived impediments to good warfarin control. It may simply be the study numbers are too small to detect a statistically significant difference. It would now be possible to explore these issues further in a study with much greater numbers if warfarin control were included in the audits of chronic disease management currently occurring in many Australian Aboriginal controlled health services.[20]

One patient in our audit was managed by a single doctor, had a telephone number for contact purposes and had INR samples taken regularly but still had poor INR control. This is a reminder that INR control can still be difficult to achieve even with apparently excellent adherence.

Conflict of interest: none declared.

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