Data extraction and feedback

Does this lead to change in patient care?

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Background
Computers enable general practitioners to collate clinical data within their practices. The improvements that this can make to clinical care remain the subject of enquiry.

Objective
Does the analysis of clinical data for the purpose of instigating quality improvement strategies in general practice, with support from a local division of general practice, lead to positive changes in measures of care after 12 months?

Discussion
This study demonstrated that, in this setting, the collection and analysis of clinical data, with support from a division of general practice, led to modest increases in the recording of information rather than improvements in clinical outcomes.

Keywords: general practice; medical informatics; quality of healthcare

General practices have been encouraged in recent years to examine their own computer held data to improve the quality of their clinical care.[1–5] The Australian government has contributed to this by sponsoring the Australian Primary Care Collaboratives (APCC) program and commercial software has become available to make data extraction simpler.[6–9] General practitioners in the United Kingdom have been given incentives to meet targets set out in their Quality and Outcomes Framework.[10] In Australia, divisions of general practice are also expected to provide feedback about clinical measures in their region,[11] but to date, direct GP feedback to government has been limited. This may change as 'pay-for-performance' in meeting clinical targets can change clinical behaviour, and this is of interest to funders of healthcare in Australia.[12]

Evidence from both the APCC and the Quality and Outcomes Framework in the UK suggests that with the right incentives it is possible to change clinical practice with feedback about 'performance'.[5,12] Further, the literature on the barriers and enablers to change in clinical practice suggests that change is possible if an intervention has a well tested, theoretical basis.[13]

This study investigated the effect of clinical data analysis for new quality improvement initiatives on process measures and intermediate clinical outcomes after 12 months in general practices with support from a division of general practice. These measures are in keeping with standard evaluation frameworks, with processes including the recording of clinical data such as allergy status, and intermediate outcomes including biochemical variables such as HbA1c or blood pressure (BP) levels.[14]

Methods

The setting

This study was conducted within a single division of general practice in the southeastern suburbs of metropolitan Melbourne, Victoria. In 2007, the division purchased data extraction tools to assist practices to analyse their clinical databases. Practices were offered ongoing support by the division's program officers in using the data extraction tools and in implementing changes in their practices based on small step, quality improvement cycles.[15]

Choosing the data extraction 'tool'

As the majority of the practices within this division used one brand of clinical software, a compatible data extraction program ('tool') was selected for the purpose of this study. The program, widely used by divisions of general practice, was purchased and supplied free to interested practices.

Practice recruitment

An initial offer was mailed to all practices in the division (59). Practices were followed up by telephone calls or opportunistically during practice visits, with a purposeful targeting of those practices known to have compatible clinical software. Interested practices were shown a demonstration of the software on a laptop computer and were offered both the extraction 'tool' and ongoing support from the division. The potential benefits to the practice and to patient care were explained. This took the form of an 'audit' of available clinical data at

baseline, with improvement strategies considered, and then the data 're-audited' at 12 months to see if measurable changes had occurred.

Practices were asked to nominate someone (GP, practice nurse or other staff member) to be the regular contact person for the division's program officers. Participating practices were asked to sign a consent form allowing the division to collect and collate de-identified clinical data.

This article focuses on the work undertaken by the initial group of 15 practices (representing 69 GPs) that were followed up for 12 months, between 2008 and 2009.

Using the data extraction tool

In consultation with division staff, each practice established the clinical areas they wanted to improve based on their perceived needs and the capabilities of the software. The practice representatives, GPs, practice nurses or other practice staff, were instructed how to extract their practice data using the data extraction 'tool'. Discussing which clinical areas might be focused on followed this. Most practices elected to start with diabetes, heart disease and meeting accreditation standards for the recording of allergies and smoking status. Queries were therefore based on standard reports that the extraction 'tool' could run without the need for customisation. Although the indicators were similar to those of the APCC, the nature of the support by the division was different. There was little mention of 'plan-do-study-act' cycles. Instead, there was a direct emphasis on examining data and seeing what actions the practice could take as a result.

The division produced written feedback reports that tabulated the practice data and suggested how these might be used to develop improvement strategies. Division staff visited each practice every 2–3 months to complete a data extraction and to discuss with a practice representative any actions that might be taken as a result of reflecting on the data. The program officers explained how aggregated data could be used to inform small scale quality improvement activities. Strategies included GPs reviewing the data at practice meetings or advising practice nurses to opportunistically assist with data collection and entry. For example, practice nurses at some practices used pathology lists to update diabetes patient registers.

Evaluation methods

The division's program officers routinely collected information through their contacts with practices. For each of the 15 practices, a 'before and after' study was designed for which baseline and 12 month data were collected on a range of clinical measures. Additional information was also collected on practice characteristics, computer systems, previous participation in the APCC program, the quality improvement strategies undertaken and their outcomes, and qualitative feedback from the practices. Only the information directly relevant to the study aim is referred to in this article.

Results

Baseline and 12 month data were collected from 15 practices. Over half (nine out of 15) of the practices had three or less GPs and the same number of practices employed at least one practice nurse. Eight practices had fully computerised medical records whereas seven used 'hybrid' systems.

Demographic data, the recording of allergies, smoking status and height, weight and BPs are shown in *Table 1*. There were improvements in the recording of allergies and smoking status by approximately 11% and 10% respectively. There were also modest improvements in body mass index (BMI) recording (4.5%) and BP in adults (9%).

There were no clinically significant changes in the recording of the levels of HbA1c, or in the ideal lipid or BP levels (*Table 2*).

There were negligible improvements in the recording of most items for the diabetes 'cycle of care', with the exception of smoking status which increased by almost 14% from baseline until the end of the 12 month period (*Table 3*). Paradoxically, the recording of eye checks within the clinical software diabetes tool decreased by almost 11% during this time.

The recording of patients who were on aspirin or a statin for coronary heart disease increased by 17% and 7% respectively. Blood pressures were not recorded for approximately one-third of these patients (*Table 4*).

Discussion

There are few clinically important changes in short term outcomes in this 12 month study. Further, of those changes that did occur, most are in the recording of information rather than changes in the actual clinical status. There are several possible explanations why this study failed to detect important clinical changes. There is the possibility that change in some of the measures chosen cannot be achieved within a 12 month timeframe. The study might also have failed to detect change because of the small sample size, that is, there might have been a type 2 error. The self selected practices might already have had above average levels of data recording, especially given that nine out of the 15 practices had participated in the APCC program, making further improvements more difficult. The APCC program and the Quality and Outcomes Framework in the UK have shown that clinical improvement based on practice data can occur. However, the improvements are generally patchy and tend to plateau after an initial period of impressive change.[15,16] There were no direct financial incentives for practices participating in this division led quality improvement program. Further, the intervention by the division was less intensive than that which occurred with the APCC program. For example, there were no group workshops for GPs and practice staff, little emphasis was placed on formalised 'plan-do-study-act' cycles, and practices were free to choose what issues they wanted to work on.

It is not possible to identify from the data which aspect of the change process failed to deliver an improvement in results: the data extraction program; the practice contact; the other GPs and staff within the practices; the improvement strategies chosen; the implementation of these strategies; the timing of the intervention; or the whole program. Feedback from the program officers who were in regular contact with the nominated clinic representatives suggests that engagement with all the GPs in the practices was difficult, especially in the larger practices. Spreading the interest and involvement throughout a practice appears to be a major challenge.

Before GPs can make sense of their clinical data, the data must be accurate and complete in the first place. This means not only recording the data, but entering them in the correct field within the clinical software.[17,18] For example, unless BP is entered within its specific field rather than in free text within the progress notes, it cannot be detected by data extraction programs. Some numerical pathology results are

Table 1. Baseline and 12 month data collection from the 15 practices

Data items	Baseline		At 12 months		Change	
	Number	%	Number	%	Number	Change in % rate from baseline
Demographics						
Total patients*	195 358		146 497		–48 861	
Recent patients**	100 684		100 451		–233	
Date of birth recorded ('recent')	100 509	99.8	100 404	99.95	–105	+0.15
Gender recorded ('recent')	99 592	98.9	100 143	99.7	+551	+0.8
Allergies/smoking						
Allergy status recorded ('recent')	69 727	69.3	80 417	80.1	+10 690	+10.8
Smoking status recorded starting from age 10†	56 594	56.2	66 018	65.7	+9424	+9.5
Height, weight, BMI and BP						
BMIs completed ('recent')	20 474	20.3	24 932	24.8	+4458	+4.5
Patients aged 18+ ('recent')	78 733		78 651		–82	
Age 18+ years with BP recorded#	37 715	47.9	44 348	56.4	+6633	+8.5

* Total means all the patients on the active database (ie. excluding deleted and inactivated patients)
** Recent means patients who have attended (or had notes entered into their files) at least once in the previous 30 months
† The numerator is based on smoking in patients aged 10 years and over, but the denominator used to calculate the proportion is based on all ('total') patients. This is a design feature of the standard reports in the data extraction tool
# With the denominator based on 'recent' patients aged 18+ years

Table 2. Changes in patients with diabetes

Diabetes (all recorded on 'totals')	Baseline		At 12 months		Change	
	Number	%	Number	%	Number	Change in % rate from baseline
Total diabetes population	3879		4094		215	
Undefined diabetes*	837	21.6	771	18.8	–66	–2.7
Number of diabetes patients whose last recorded HbA1c in previous 12 months was:						
≤7.0%	1327	34.2	1429	34.9	+102	+0.7
>7.0% and ≤8.0%	476	12.3	598	14.6	+122	+2.3
>8.0% and <10.0%	255	6.6	286	7.0	+31	+0.4
≥10.0%	94	2.4	86	2.1	–8	–0.3
Not recorded	1727	44.5	1695	41.4	–32	–3.1
Diabetes patients whose last cholesterol in past 12 months was:						
<4 mmol/L	651	16.8	786	19.2	+135	+2.4
≥4 mmol/L	1414	36.5	1542	37.7	+128	+1.2
Not recorded	1814	46.8	1766	43.1	–48	–3.6
Diabetes patients whose last recorded BP in past 12 months was:						
≤130/80**	745	32.9	745	30.6	0	–2.3
>130/80**	772	34.1	992	40.8	220	+6.7
Not recorded**	746	33.0	694	28.5	–52	–4.5

* Undefined could mean a range of diabetes problems (eg. unstable diabetes) but has not been further specified
** Data based on 10 practices only, as changes occurred in the data extraction program for the 12 month follow up, which meant that comparable data was not available for all the practices

automatically entered into the patient record, however some of the diabetes 'cycle of care' items such as foot and eye examinations do not appear unless they are recorded within specific fields in the diabetes 'module' of the clinical software. The relatively low recording rates for these items in the study bear this out. Entry of these data means double handling of information by the GP or practice nurse who has to locate data in one part of the program, such as a letter from an eye specialist, and then record it in another.

Initial information collected by this division suggests that for practices to successfully manage their clinical data, it is important to have a 'champion' within the practice who has the skills and enthusiasm to develop small scale improvement strategies that encourage GPs and practice nurses to enter data appropriately and take interest in reviewing them.

Data extraction programs can be useful tools that provide insight into a practice's clinical data and identify clinical issues such as gaps in recording of data, cohorts of patients at risk or those whose results do not fall within guidelines. This study has shown that these programs can be used in general practice, and with the support of divisions of general practice, can lead to modest improvements in the recording of patient information, however it failed to detect important clinical changes.

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Table 3. Changes in the recording of 'cycle of care' items for patients with diabetes

Diabetes SIP items (all recorded on 'total')	Baseline		At 12 months		Change	
	Number	%	Number	%	Number	Change in % rate from baseline
Number of patients on diabetes register	3879		4094			
HbA1c recorded in previous 12 months	2153	55.5	2399	58.6	+246	+3.1
Eye check recorded in previous 24 months	1216	31.3	843	20.6	–373	–10.7
BMI recorded in previous 6 months	1059	27.3	1096	26.8	+37	–0.5
BP recorded in previous 6 months	2048	52.8	2348	57.4	+300	+4.6
Foot exam recorded in previous 6 months	540	13.9	424	10.4	–116	–3.5
Cholesterol recorded in previous 12 months	2063	53.2	2328	56.9	+265	+3.7
Triglycerides recorded in previous 12 months	2045	52.7	2307	56.4	+262	+3.7
HDL recorded in previous 12 months	1976	50.9	2241	54.7	+265	+3.8
Microalbuminuria recorded in previous 12 months	1233	31.8	1407	34.4	+174	+2.6
Smoking status recorded	2610	67.3	3312	80.9	+702	+13.6

Table 4. Changes in patients with coronary heart disease

CHD (all recorded on total)	Baseline		At 12 months		Change	
	Number	%	Number	%	Number	Change in % rate from baseline
Number of patients on CHD register	2339		2416		+77	
Number of CHD patients whose last recorded BP in past 12 months was:						
≤130/80	475	20.3	504	20.9	+29	+0.6
>130/80	992	42.4	1087	45.0	+95	+2.6
Not recorded	872	37.3	825	34.1	–47	–3.2
Patients with CHD on aspirin	1250	53.4	1689	69.9	+439	+16.5
Patients with CHD on a statin	1584	67.7	1811	75.0	+227	+7.3
Patients with CHD who had a myocardial infarct in past 12 months	22	0.9	62	2.6	+40	+1.7

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Conflict of interest: none declared.

Acknowledgment

We thank the staff at the Monash Division of General Practice that supported this study and the general practices that participated.

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