Patient-directed reminders to improve preventive care in general practice for patients with type 2 diabetes

A proof of concept

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Background and objectives
Preventive care in general practice is fundamental to managing the Australian diabetes epidemic. Recommended preventive care is nonetheless underperformed. The aim of this pilot study was to demonstrate proof of concept that pre-consultation patient-directed reminders could improve preventive care in general practice.

Methods
Over two weeks, four general practices used a special software tool to generate reminder sheets listing recommended checks for a subset of patients with type 2 diabetes mellitus (T2DM). The sheets were given to patients before their consultations. The number of checks performed was compared for patients who did and did not receive reminders. General practitioners (GPs) were interviewed about the reminders and chronic disease management.

Results
Patients who received reminders had more recommended checks performed than those who did not receive reminders. GPs found the reminders useful but suggested that broader system changes are required.

Discussion
Pre-consultation patient-directed reminders could potentially be an effective tool to increase preventive care for patients with T2DM in general practice.

DIABETES IS EPIDEMIC in Australia – in 2016, an estimated 1.2 million Australians had diabetes.[1,2] Effective preventive care is integral to addressing this burden. General practitioners (GPs) are primarily responsible for managing preventive care, but recommended preventive activities are currently underperformed.[3,4] Possible reasons for this include time constraints, ineffective remuneration systems, gaps in knowledge and barriers to accessing other allied health professionals.[3,5] Multiple approaches have been used to address this problem.[6,7] Approaches aimed at engaging patients in their healthcare have a substantial evidence base.[8] The quality of care for a chronic illness, such as diabetes, has been shown to depend on the patient's degree of involvement.[9] Reminder systems are advantageous, as they are relatively simple to implement, compared with broader health system changes.[10]

Patient-directed reminders may, therefore, have a role in bolstering patients' involvement in their care process, and in improving preventive care for patients with diabetes. The pre-consultation preventive summary and reminder sheet (PPSRS) generated by the Doctors Control Panel (DCP), a clinical software tool that assists GPs in preventive care management,[11] is a patient-directed reminder that is also automated. A primary feature of the DCP is to provide a user-friendly record of the status of various measures to the GP or the practice nurse on their computer screen during consultations, to remind them of preventive care tasks that should be performed. The PPSRS module of the DCP software, conversely, is installed at the practice reception computer. It extracts similar information on the performance status of preventive care measures for all patients at presentation to a clinic and enables the clinic to generate a printable, patient-friendly version of this information, which can be given to a patient in the waiting room before the consultation. The idea is to provide some prompts for patients to initiate conversations about preventive care with their GPs. The PPSRS system had been previously tested in a pilot study and had demonstrated feasibility and acceptability by patients.[12]

The aims of this pilot study were to explore the utility of PPSRS and its potential ability to improve the performance of recommended preventive care in real-world general practice, and to explore the views of GPs on this intervention and on chronic disease preventive care in general. It was the first proof-of-concept study to investigate the use of patient-directed reminders for type 2 diabetes mellitus (T2DM) in Australia.

Methods

This study was part of a Doctor of Medicine (MD) research project (MDRP), completed during the fourth year of the MD course at the University of Melbourne. The study was approved by the Human Research Ethics Committee at the University of Melbourne (ethics ID number: 1647883).

A mixed-methods approach was used. The quantitative arm consisted of a pragmatic study of PPSRS at four Melbourne general practices. In view of

the tight timeline of the MDRP, it was decided that working with four practices was manageable and would generate adequate information for an exploratory study. The qualitative arm consisted of interviews with the GPs in the participating practices. General practices were recruited via email or phone by one of the researchers, using a convenience sampling approach. Signed informed consent was obtained from the principal GP or practice manager at each practice.

At the start of the study, introductory explanatory sessions were conducted by one researcher (SK) at the participating practices. The PPSRS module was then downloaded from the DCP website[11] and installed at a reception computer at each practice. Reception staff at each practice were asked to start the system daily for approximately two weeks (the intervention period).

When running, the PPSRS module automatically queried the medical records of patients with T2DM aged ≥18 years as they attended the clinic. The system checked the medical records and coded the performance status of 10 preventive care activities in line with those recommended in the 'annual cycle of care' from The Royal Australian College of General Practitioners and Diabetes Australia guidelines, *General practice management of type 2 diabetes*.[13,14] These 10 activities are:

1. systolic blood pressure
2. diastolic blood pressure
3. weight
4. waist circumference
5. foot examination
6. eye examination – performed by an optometrist or ophthalmologist
7. glycated haemoglobin (HbA1c) – a blood test measuring long-term blood glucose
8. glomerular filtration rate (GFR) – a blood test assessing kidney function
9. albumin:creatinine ratio (ACR) – a urine test assessing kidney health
10. lipid profile – a blood test, after patient has fasted, assessing the level of cholesterol.

The last recorded performance of each activity was compared against the recommendations. A check was coded as 'due' if the appointment date coincided exactly with the day that a check was due, 'overdue' if the time since the last recorded check exceeded the recommended interval for checking, or 'not done' if the check had never been recorded as performed. These codes were later collapsed into a single 'DUE' status. After the consultation, the DUE checks were coded 'done today' if the GP performed them on the day of the consultation, or 'up-to-date' if the last check was within the recommended interval for checking. These codes were later collapsed into a single 'PERFORMED' status.

Patients were either 'walk-ins' or had appointments. Allocation of patients into the group that 'received reminder sheets' and the group that 'did not receive the reminder sheets' was automatically performed by the DCP software according to the terminal digit of the patient's record number. Patients whose record number ended with an odd number received the reminder sheets, while patients whose record number ended with an even number did not. A reminder sheet with any checks that were DUE on the day of the appointment was automatically printed for patients allocated to the 'receive reminder sheets' group on their arrival at the clinic. Once a reminder sheet was printed, reception staff handed it to the patient as they checked into the practice in the waiting room before the consultation. The reminder sheets (Box 1) were designed to be self-explanatory.

After the intervention period, each clinic's medical records were queried to obtain data on the performance status of the recommended preventive activities for all eligible patients presented during the intervention period. The change from a DUE status before GP consultation to a PERFORMED status after GP consultation was the main outcome of interest. The number of preventive care activities performed for patients who received the reminder sheets and for those patients who did not receive sheets was compared. Descriptive statistics were generated using Microsoft Excel version 14.

GPs involved in the study were invited to participate in semi-structured interviews or to submit email responses to the five interview questions to one of the researchers (SK). These questions were:

1. Have you noticed a difference between patients who have the PPSRS and those who don't? Tell me more. [Prompts: Do PPSRS patients ask more questions? Or are more demanding of preventive services? Do you know whether patients even read the PPSRS?]
2. What are some of the preventive interventions you commonly prescribe for your patients with diabetes or at risk of diabetes? [Prompts: RACGP guidelines.]
3. How do you think the PPSRS impacted on the way you assess patients' diabetes risks and disease progression? Any examples?
4. How do you think the PPSRS impacted on your decisions about diabetes prevention for your patients? Any examples?
5. What are your views about chronic disease prevention in general practice in general? [Prompts: time factors, remuneration.]

The interviews focused on GPs' experiences and perspectives on the utility of the reminders as well as on chronic disease preventive care in general practice. Interviews were audio recorded then transcribed. Three researchers coded all interview transcripts and email responses separately, then met to discuss and reach consensus. Codes were then sorted and merged by SK to generate preliminary themes, which were further discussed collectively in the team until consensus was reached.

Results

Four general practices in Melbourne took part in this study between March and May 2017. Table 1 summarises the demographics, number of eligible patients and interview respondents at each practice.

Practice participation

At practices 1 and 3, the study was conducted as planned. At practice 2, the PPSRS software experienced technical difficulties. The PPSRS system was installed at a specific reception computer to allow access to a printer. This computer

was not routinely used, and the practice database was not always accessible to the DCP software. This resulted in few reminder sheets being printed at this practice. The system was stopped after one week and the intervention period was reinitiated; however, the technical difficulties persisted. Data extraction on the performance status of preventive activities was not possible due to continued technical errors. At practice 4, it appeared that no patients with T2DM attended the clinic over the two-week intervention period. Therefore, no data were extracted from this practice, and GPs were not pursued for interviews.

Performance of overdue checks

Data on overdue checks were combined for all patients with T2DM from practices 1 and 3. Table 2 shows the number of checks that were due and performed across the 10 different recommended actions over the intervention period. Figure 1, a graphical representation of the percentages of overdue checks that were performed during the intervention period, shows that patients with reminders were more likely to have preventive checks performed for nine of the 10 recommend checks. The greatest changes were in waist circumference measurement followed by weight measurement. Eye examination was the only check where patients without sheets had more overdue checks performed than patients with sheets.

Views of the GPs

Four GPs from practice 1 (GPs 1–4) and two GPs from practice 2 (GPs 5 and 6) participated in interviews. Respondents generally expressed approval for the concept of patient-directed reminders.

Thematic analysis yielded six major themes, which were grouped into two categories: patient-directed reminders and chronic disease management.

Patient-directed reminders

Theme 1: Prioritisation

GPs described how concerns raised by the patient are more likely to be addressed in a consultation. They suggested that patient-initiated concerns would often take precedence over automated GP-directed prompts.

> *A lot of the doctors will gloss over the prompts on the computer because they don't see them or they don't respond to prompts or um ... they're busy. So, a prompt from the patient is gonna be acted on more likely than what's on the software.* [GP2]

Conversely, by adding these extra issues to a consultation, participants commented that the reminders risk overwhelming GPs with too many tasks to handle. The pressure of time was a commonly reported challenge. Another was the perceived pressure of obligation.

> *I mean the issue then becomes how do you fit it all into the consult? Which is always a concern ...* [GP 3]

Some GPs did not see this as a significant problem, explaining that it would be amenable to prioritisation and effective communication with the patient. GPs felt that if they were overwhelmed, they could request patients to make a separate appointment to address the activities on the reminders.

Theme 2: Implementation

Real-world implementation of patient-directed reminders was affected by barriers and facilitators. GPs indicated that some patients, particularly patients with low health literacy or who are from culturally and linguistically diverse backgrounds, may not understand the purpose or content of the reminders.

Box 1. Patient-directed reminder sheet template

Summary of recommended health checks for (Patient name)

(Date printed)

Dear (Patient Title) (Patient name),

We want to help you stay well. The following check-ups are recommended by Diabetes Australia and the Royal Australian College of General Practitioners for people with Type 2 diabetes.

The information and advice below is based on data in our records. Please tell me if you think that any of the information is wrong or out of date.

Blood pressure: Your blood pressure – was last measured on (date) OR – has not been recorded. We should check it today.

Weight: Your weight – was last recorded on (date) OR – has not been recorded. We should measure it today.

Waist circumference: Your waist circumference – was last recorded on (date) OR – has not been recorded. We should measure it today.

Foot exam: Your feet – were last examined on (date) OR – have not been examined. We should examine them today.

Eye exam: Your eyes – were last examined on (date) OR – have not been examined. We should arrange today for this to be done.

Cholesterol tests: Your cholesterol – was last measured on (date) OR – has not been measured. We should arrange today for this to be done.

Long term blood sugar test (HbA1C): Your HbA1C – was last measured on (date) OR – has not been measured. We should arrange today for this to be done.

Kidney health tests

We last tested your urine for signs of kidney damage on (date) OR we have not tested your urine for signs of kidney damage. We should arrange today for this to be done.

We last tested your blood for kidney function on (date) OR we have not tested your blood for kidney function. We should test this today.

Please ask me about these important check-ups when we meet in a few minutes.

(Practitioner Name)

> *People have to have sufficient education. So it has to do with health literacy really.* [GP 4]

One interview respondent noted that patients may have to consent to reception staff handling potentially sensitive information present on the reminders. GPs also suggested that the reminders may be less applicable for very elderly patients for whom prevention becomes less of a priority compared to maximising quality of life.

GPs noted some features of the PPSRS system that would affect its use by practice staff. When talking about the documentation necessary for the software to detect specific information, GPs described concerns with the reminders' reliance on the data in medical records.

> *Sometimes it's as little an issue as where the information has been entered and whether it's been extracted correctly.* [GP 1]

While some GPs were tolerant of incorrect reminders at times, others chose to disregard the reminder entirely if parts of it were inaccurate. GPs also raised issues about the interruption to workflow.

> *For ours, the reception staff had to leave their desk and move two or three paces aside [to get the reminder from the printer], and that wasn't always practical.* [GP 6]

GPs moreover noted that patients may receive preventive care from multiple health services and their medical record at the clinic may not account for this.

Theme 3: The doctor–patient dynamic

GPs suggested that the reminders could create opportunities for preventive care and chronic disease to be discussed more readily between the GP and the patient. The reminders facilitated discussions by bringing these issues to the patient's attention. GPs indicated it would be easier to discuss chronic disease if patients were expecting to do so.

> *It's giving access to what's on the database or what isn't there ... when you're busy in general practice, it's not always easy to see.* [GP 6]

GPs discussed the concept of the reminders partially shifting the responsibility for addressing preventive care and chronic disease management from the GP to the patient. Some saw this as alleviating the GPs of some of the burden and encouraging patients to be more involved in their healthcare.

> *I think it's a collaborative thing and we've got to sell it to them that they've got to take a degree of responsibility. I mean, we all think that.* [GP 1]

Some, on the other hand, raised concerns with this shift. There were concerns about appropriateness and risk of patients not being capable of managing the information presented to them.

Chronic disease management

Theme 4: Time and money

GPs described the constraints in general practice to address chronic disease management. Many highlighted insufficient time and remuneration as major barriers.

> *... the patient comes in with two or three issues and the time required to go to preventive medicine or chronic disease is,*

Table 1. Demographics, number of eligible patients and interview respondents at each recruited practice

	Practice 1	Practice 2	Practice 3	Practice 4
Number of GPs (including general practice registrars)	17	9	10	6
Distance from Melbourne CBD (km)	15	37	6	1
Number of patients aged ≥18 years with T2DM who received printed reminders	62 (19%)	*	6 (12%)	0
Number of patients aged ≥18 years with T2DM who did **not** receive printed reminders	268 (81%)	*	46 (88%)	0
Number of GPs interviewed	4	2	0	0

**Values could not be determined because of technical difficulties*
CBD, central business district; GPs, general practitioners; T2DM, type 2 diabetes mellitus

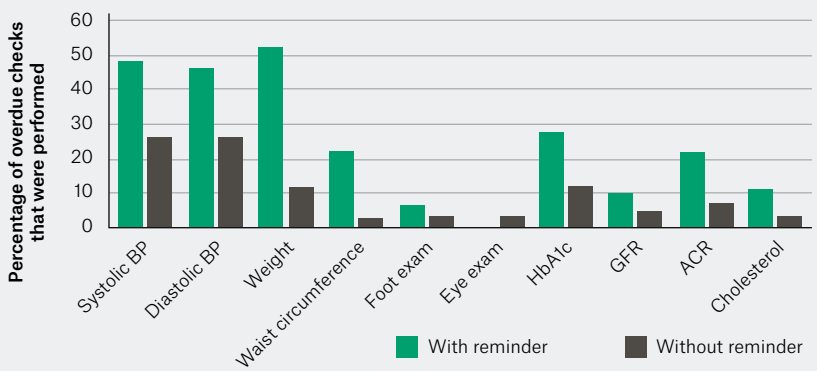

Figure 1. Percentages of checks that changed from 'overdue' to 'up-to-date' after a GP consultation in practices 1 and 3 over the intervention period
ACR, albumin:creatinine ratio; BP, blood pressure; GFR, glomerular filtration rate; HbA1c, glycated haemoglobin

> *it takes a lot of time. And, you know, we're not well remunerated for that.* [GP 2]

GPs indicated that these issues were due partly to the way that the primary care system was structured. They thought that healthcare policies were poorly tailored toward chronic disease management in general practice.

Theme 5: Working around the system

As a response to working within a system perceived as constraining, GPs suggested that some doctors may manipulate their documentation and practice, where possible, to meet the criteria for incentivised activities.

> *If you use money [to change GP behaviour], people will fudge things probably.* [GP 5]

GPs described their difficulty in attempting to provide best care for their patients while trying to stay profitable. All GPs noted that their ultimate concern was the quality of care provided to patients.

Theme 6: Complexity of chronic disease management

Despite the perceived problems with the current systems, GPs acknowledged that chronic disease management was complex and influenced by multiple medical factors, patient variability and broader societal factors.

> *You look at swiss-cheese theory errors made by people. The errors aren't the individuals, there's the system itself.* [GP 5]

Most respondents suggested that multifaceted solutions would be required to improve the overall situation of chronic disease management.

Discussion

The results suggest that patient-directed reminders have the potential to have a positive impact on conducting recommended preventive care activities for patients with diagnosed T2DM managed in general practice.

The reminders appeared to improve the performance of relatively short, simple checks such as measuring blood pressure, weight and waist circumference. These may be the kinds of checks that are usually forgotten but are simple to perform. Additionally, GPs may be reluctant to raise issues about weight or waist circumference with patients without a trigger.[15]

An important consideration is that the accuracy of the reminders relies on the data in a patient's medical record. This is an inherent problem when using medical record data to generate reminders.[16,17] GPs in this study noted that patient medical records usually do not reflect care received from multiple health services. Furthermore, specific information was only detectable if it was entered into the appropriate field in the GPs' clinical software.

Patient-directed reminders also have the potential to increase patients' roles in discussions with their GPs on preventive care and chronic disease management. Interview respondents described how these topics are often overlooked as patients may not initiate such discussions. The reminders could make these issues part of a patient's agenda.

The responsibility for preventive care was raised in interviews. Australian patient populations vary, as do their views on preventive care discussions with their GPs.[4] This suggests that patient-directed reminders may be best targeted at specific patients. Patient-directed reminder systems must be flexible to adapt to the needs of specific practices, clinicians and patients. A previous study of the PPSRS system introduced user controls at practices, and this may have enhanced the sustainability of the intervention.[12] Future research of similar systems should consider such a feature.

The impact of on-screen reminders is known to be beneficial but generally small.[10] This is partly due to the

Table 2. Number of due and performed checks for each recommended preventive activity in practices 1 and 3 over the intervention period

	SBP	DBP	Weight	Waist circ	Foot exam	Eye exam	HbA1c	GFR	ACR	Chol
For patients who received reminders										
Number of checks overdue (n)	23	26	25	37	65	55	22	30	37	28
Number of checks performed	11 (48%)	12 (46%)	13 (52%)	8 (22%)	4 (6%)	0 (0%)	6 (27%)	3 (10%)	8 (22%)	3 (11%)
For patients who did not receive reminders										
Number of checks overdue (n)	124	129	149	156	294	260	120	157	182	144
Number of checks performed	32 (26%)	33 (26%)	17 (11%)	3 (2%)	8 (3%)	8 (3%)	14 (12%)	7 (4%)	12 (7%)	4 (3%)

ACR, albumin:creatinine ratio; Chol, cholesterol; circ, circumference; DBP, diastolic blood pressure; GFR, glomerular filtration rate; HbA1c, glycated haemoglobin; SBP, systolic blood pressure

complexity of managing chronic disease in primary care. As suggested by interview respondents, patient-directed reminders could be one component of a multifaceted solution, and broader health system changes may be required for greater effects.

The limitations in this study were consistent with the challenges of real-world research and of conducting exploratory studies in general practice. Two of the practices (practices 3 and 4) involved in this study had fewer patients with diabetes than anticipated, and there were numerous technical challenges at practice 2. There was an unequal allocation of patients to the intervention and control groups, possibly related to three factors. First, randomisation was based on the terminal digit of a patient's record number, so equal allocation was not achieved because the short two-week intervention period did not allow enough time for equal numbers of patients with odd and even numbers to present at the practices. Second, it is possible that some patients presented multiple times, and a printed reminder might not have been printed at subsequent visits. Third, the PPSRS software may not have been operating as expected during the intervention period. However, practice staff at all clinics consistently confirmed that the system was being run as instructed. Finally, there were challenges in recruiting GPs for interviews due to their time constraints.

Conclusions

This pilot study suggests that the utility of PPSRS is influenced by its technical ease and implementation within practice workflow. It suggests the potential of patient-directed reminder sheets to improve the performance of T2DM preventive care, particularly simple checks that are usually forgotten. GPs perceived this intervention to be potentially useful in helping them prioritise patients' concerns and encourage patients to be more involved in their disease management. Patient-directed reminders may be best targeted at specific populations of patients in real-world general practice. GPs continued to view chronic disease management in general as complex and challenging, but they have adapted to the system to provide optimal care for their patients.

Findings from this study demonstrate proof of concept that patient-directed reminders could improve the performance of recommended preventive care in general practice. It is the first study to investigate GPs' views of this intervention.

Implications for general practice

Patient-directed reminders are one possible strategy to improve the quality of chronic disease care delivered in general practice and should be combined with broader systemic changes. Their potential use should be evaluated in a larger trial.

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