ORIGINAL ARTICLE

Audit of Diabetes Mellitus in General Practice

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Summary

An audit on diabetic management was done in seven Perak general practice (GP) clinics in December 2001. The results showed inadequacies in nine out of eleven criteria assessed. Remedial measures were implemented. A second audit in March 2003, at the completion of the audit cycle, showed improvements in all the criteria used. All clinics established a diabetic register compared to 28.6% in the first audit and 57.1% of the clinics set up a reminder mechanism compared to 0% in the first audit. In the process of care, recording of weight, height, blood pressure; feet examination, fundoscopy, blood sugar monitoring and urine for albumin improved at the end of the audit cycle. In the only outcome criteria, the blood sugar control improved from 21.8% to 31.3%.

Key Words: Diabetes mellitus, Audit, General practice

Introduction

There is a growing epidemic of type 2 diabetes mellitus in the Asia-Pacific region[1]. In Malaysia, the prevalence of diabetes mellitus increased from 6.3% in 1986 to 8.2% in 1996[2]. With the ageing population, increasing affluence, overnutrition, physical inactivity, and urbanization, this prevalence is expected to rise.

Diabetes mellitus is a serious public health problem and a major source of morbidity, mortality and economic cost to society. Patients with diabetes mellitus are at increased risk of numerous complications, including blindness, end-stage renal disease, foot and leg amputations, ischaemic heart disease and stroke. There is good evidence that many of these adverse outcomes can be prevented, or at least delayed, by an aggressive programme of more preventive care, prompt identification of problems, early intervention and treatment[3,4,5].

Quality improvement initiatives offer a promising strategy to make improvements in overall health outcomes. One of the initiatives is a medical audit in diabetic care, where the quality of care is assessed, deficiencies identified and remedial measures implemented to improve the care.

General practitioners care for a significant proportion of patients with diabetes mellitus. The second NHMS in 1996[3] revealed that 31.6% of known diabetic patients on current medication sought care from private facilities, which would include GPs. A literature search revealed that there had been no published data on the audit of care of diabetes mellitus in general practice in Malaysia. Chan SC et al did an audit in Perak Outpatient Departments[6] and Lim TO in the Outpatient Clinic in Hospital Mentakab[7]. Wong KC et al performed a quality assurance exercise for type 2 diabetic patients in a primary care setting in the Family Practice Clinic in University Hospital in 1996[8]. All the above studies were done in government subsidized outpatient clinics. The lack of data on the quality of diabetic care in General Practice is glaring.

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The objectives of this study were to assess the quality of diabetic care in private general practice in Perak, identify deficiencies and to implement remedial measures.

Materials and Methods

A medical audit workshop was organized on 21st October 2001 by the Perak College of Medicine to teach tutors in general practice how to do an audit, as they were required to supervise fifth year medical students in an audit project. This workshop was also opened to other interested GPs and nurses. An outcome was that seven participants volunteered to conduct an audit on diabetic care in general practice with the second author, (who conducted the workshop), as the coordinator. Six of the participants were honorary tutors in general practice of the Department of Primary Care and Public Health in Perak College of Medicine. The remaining participant was an interested GP from Sitiawan. Three of the participants had clinics in the city of Ipoh, whereas the others were from smaller towns in Perak - Kampar, Gopeng, Batu Gajah and Sitiawan.

A meeting was held to discuss the methodology. Inclusion and exclusion criteria were decided. A series of criteria of diabetes care were selected covering structure, process and outcome and the levels of performance and desired standards of care for each were decided upon after discussion. The criteria were chosen based on indicators that were easiest to retrieve from the medical records and were currently available. Except for the structure criteria, levels of performance were set at 70% to allow for comparison with the audit of diabetic care in Perak Outpatient Departments[6], which used 70% as the target standard. Also, as this was the first audit for all the participating GPs, 70% level of performance seemed realistic and achievable and would not be a disincentive for further efforts in quality assurance. The coordinator prepared a data collection format for the individual patient and for the overall clinic and this was subsequently circulated to all the participants. Clinics were identified by code numbers I to VII.

In the first audit, records of diabetic patients seen over a 3-month period between August and October 2001 were traced from the daily drug prescription book, which had to be kept by all the doctors as a statutory requirement. All type 2 diabetics on drug treatment and followed up for a minimum of 6 months in the respective clinics were included. Excluded were type I diabetics, newly diagnosed diabetics, pregnant diabetics and diabetes on follow up elsewhere. A standardised format was used to record individual patient's results following the criteria/standard set. Data collected included the clinic code, the initials of patient with his/her identification number, the criteria and the standard agreed upon with space to mark the number of visits and a column to mark whether the level of performance was adequate or not. A second standardised format was completed for the overall clinic performance. It included the clinic code, the number of patients audited, columns with the stated criteria, standard decided by the group, number of patients reaching the adequate standard, number of patients not reaching the adequate standard and the calculated percentage adequacy. The data were compiled and analysed by the coordinator.

After reviewing and discussing the results of the first audit in a meeting, the following remedial measures were suggested. These measures were to be implemented by the clinics.

1. A diabetic register and a reminder mechanism were to be established in each clinic.
2. Three checklists were adopted to remind the doctors and this should be put into the patients' records. The checklists reminded the doctor what was to be done on the first visit of the patient, for each visit and for yearly visits.
3. Other strategies to be implemented included placing of the weighing machines near to the doctor, delegating the task of weight and height measurement to the nurses, educating the patient on the importance of checking of urine for albumin and doing the HbA1c, to improve on the process of care.

(Both the formats and the checklists are available from the authors on request)

A second audit was repeated in March 2003 with records of diabetic patients seen in the 3-month period between October and December 2002 using the same methodology. The results of the two audits were then compiled and analysed. A chi-square test for proportions was used to compare the outcome indicator in the first and second audit cycle. A p-level of 0.05 was taken to be significant.

Results

The number of patients from each clinic were summarized in Table I. There were 230 patients in the first audit and 248 in the second. Although the majority of the patients in the first audit were also in the second audit, some patients did default despite request to come for follow up and were not included in the second audit. Some patients requested a transfer to government clinics for follow-up for financial reasons. There were some new patients falling into the inclusion criteria.

Structure of Care Indicators

The audit results on the structure of diabetic care were summarized in Table II. In the first audit, none of the clinics had a reminder system and only two out of seven (28.6%) had a diabetic register. The repeat audit showed improvement with all the clinics establishing a diabetic register and four out of seven (57.1%) had implemented a reminder mechanism.

Process of Care Indicators

The audit results on the process of diabetic care indicators were summarized in Table III. The participants exceeded the standard of 70% in two of the eight criteria in the first audit. In the second audit, four out of eight criteria reached the standard.

Blood pressure measurement was recorded in more than 70% of the visits over the previous 6 months with an overall achievement of 83.3% in the first audit compared to 97.8% in the second audit. Blood sugar measurement criteria gave almost similar figures with 83.5% in the first and 90.2% in the second audit. The other two criteria, which improved markedly to reach the standard set, were recording of height and urine albumin or serum creatinine or blood urea done once during the past two years. The figures improved from 35.8% to 74.6% in the first audit and from 56.7 to 70.3% in the second audit respectively.

The rest of the four criteria also improved but did not reach the target standard set. Examination of the feet improved from 1.9% to 40.5%, weight recording from 28.7% to 59.8%, fundoscopic examination from 19.1% to 51.7%, and HbA1c done once over the past one year from 21.3% to 35.7%.

Outcome of Care Indicator

The audit results on the outcome of diabetic care indicator were summarized in Table IV. In the only outcome criterion, the first audit showed only 21.8% of the patients were found to be adequately controlled with a fasting blood sugar of <7.0 mmol/L or a random blood sugar of <10 mmol/L. This improved to 31.3% in the second audit. (Chi-square test Z = 2.22, p = 0.026)

Table I: Number of patients in medical audit

	Number of patients Clinic							
	I	II	III	IV	V	VI	VII	Total
First audit	13	29	27	65	35	14	47	230
Second audit	13	30	25	78	45	19	38	248

Table II: Results of audit of diabetes mellitus in seven general practice clinics (structure indicators)

Criteria	Clinic							Overall Adequacy
	I	II	III	IV	V	VI	VII	%
Diabetic register								
First audit	Yes	Yes	No	No	No	No	No	28.6
Second audit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100.0
Reminder mechanism								
First audit	No	No	No	No	No	No	No	0.0
Second audit	Yes	Yes	No	Yes	No	Yes	No	57.1

Table III: Results of audit of diabetic management in seven general practice clinics (process indicators – assessment and monitoring)

Criteria	Target Standard	Achieved Standard % Clinic							Overall Adequacy
	%	I	II	III	IV	V	VI	VII	%
Height recorded once									
First audit	70	38.5	72.4	51.9	0.0	5.7	14.3	68.1	35.8
Second audit	70	92.3	73.3	96.0	98.2	6.6	63.0	97.0	74.6
Weight recorded in 70% of visits									
First audit	70	0.0	72.4	0.0	96.9	2.9	7.1	21.3	28.7
Second audit	70	61.5	90.0	60.0	97.4	4.4	5.2	100	59.8
Blood pressure recorded 70% of visits									
First Audit	70	76.9	86.2	100	98.5	94.3	78.6	48.9	83.3
Second audit	70	100	96.7	100	100	91.1	100	97.0	97.8
Feet examined in 70% of visits									
First audit	70	0.0	3.4	0.0	7.7	0.0	0.0	2.1	1.9
Second audit	70	7.7	6.7	48	92.2	13.3	15.8	100	40.5
Fundoscopy done at least once in past 2 years									
First audit	70	7.7	86.2	7.4	6.2	3.0	0.0	23.4	19.1
Second audit	70	38.5	76.7	44.0	85.9	20.0	0.0	97.0	51.7
Blood sugar recorded 70% of visits past 6 months									
First audit	70	100	72.4	85.2	98.5	88.6	71.4	68.1	83.5
Second audit	70	100	96.7	96.0	98.7	97.7	79.0	63.0	90.2
HbA_{1C} done at least once past 1 year									
First audit	70	76.9	10.5	7.4	37.0	3.0	14.3	0.0	21.3
Second audit	70	61.6	3.3	24.0	66.7	2.2	0.0	92.0	35.7
Urine albumin or Serum creatinine or Blood urea done once past 2 years									
First audit	70	100	16.0	63.0	64.6	48.6	64.3	40.4	56.7
Second audit	70	85.0	3.3	88.0	84.4	55.5	79.0	97.0	70.3

Table IV: Results of audit of diabetic management in seven general practice clinics (outcome indicator)

Criteria	Target Standard	Achieved Standard % Clinic							Overall Adequacy
	%	I	II	III	IV	V	VI	VII	%
70% of FBS<7mmol/L or RBS <10mmol/L in the past 6 months									
First audit	70	38.5	31.0	22.2	16.9	8.6	14.3	21.3	21.8
Second audit	70	38.5	40.0	36.0	23.2	21.6	21.0	39.0	31.3

Discussion

Of the eleven indicators of diabetic care selected, only two indicators (blood pressure and blood sugar recording) reached the standard after the first audit. Improvements were seen in all and five indicators reached the standard after the second audit.

Despite the improvements, there was no complete implementation of the suggested remedial measures by all the doctors, even though they were familiar with the diabetes mellitus guidelines and the remedial measures, which were distributed to them. This indicated that there was a gap between knowledge and performance and some resistance to change.

We wish to highlight several issues, which arose during the implementation of remedial measures that private GPs faced when trying to provide a quality service. Three clinics did not implement a reminder mechanism despite establishing a diabetic register. The three doctors felt that it was inappropriate to remind the patients as it might offend or embarrass them and might convey the impression that they were soliciting patients. One doctor felt it was the patients' responsibilities to come for follow up. This was in contrast with the other doctors who found the recall mechanism useful and felt that regular follow up of patients in general practice was indeed aided by a register of diabetic patients and an appropriate recall system. Some patients were surprised but glad that the doctor took the effort to ensure compliance.

The cost of doing blood and urine tests impeded the doctors in achieving the required standards, especially in doing HbA1c, blood urea and serum creatinine, as some patients were unwilling or unable to pay for the tests. Many patients were not keen for an ophthalmologic referral in view of the finance involved. Cost constraints deterred some patients to increase drug dosage where needed to improve control.

Time constraint in general practice was another issue that was highlighted. For example, in examination of the feet, some GPs noted that asking the patient to take off his socks and shoes was inconvenient and time consuming, especially when patients had other complaints that they needed to attend to. Dilatation of pupils for examination of the fundus needed time and some patients were not willing to wait.

Lack of confidence and skills were mentioned as reasons for not examining the fundus. However, this could be easily overcome with practice and training as one GP achieved a standard of 86.2% in the first audit after completing a diploma course in ophthalmology.

Some doctors gave poor documentation in health records as one reason for not achieving standard. This was especially apparent in feet examination, fundoscopy and the recording of the weight.

There was a pervading worry amongst the GPs that implementation of the remedial measures might offend the patients, cause them inconvenience, and lose them to other doctors because of increased costs of tests

The significant improvement in the only outcome criterion from 21.8% to 31.3% is a clear indication that medical audit could improve surrogate outcomes. In comparison, in a study done in 1996 in outpatient department (OPD) Hospital Ipoh[10], 10% of patients had good or adequate diabetic control. This improved to 26.7% in 1999 using the same criteria. In these two studies good control was defined as 70% or more of FBS <6 mmol/l and 70% or more of RBS <8 mmol/l; acceptable control was defined as 70% of more of FBS between 6 to <8 mmol/l and 70% or more of RBS between 8 mmol/l to < 10 mmol/l. For better comparison, it would be preferable that HbA_{1C} be used as a measure of long-term control in line with other studies, rather than using the fasting or random blood sugar.

We feel that diabetic care could be improved further with more effort from the doctors who need some motivation and better understanding of the current evidence. Also a better outcome requires a high level of patient education and patient self-care and we need to put more effort in this aspect, which was not audited upon. It is likely that general practitioners, working alone, would not be able to achieve the maximum comprehensive care without a supporting team of trained diabetic nurses and dieticians.

This study, done in seven separate GP clinics shows that in the Malaysian GP setting, a medical audit is feasible and can result in substantial improvements in care that are likely to translate into improved long term clinical outcomes.

However, it should be noted that the authors are a motivated group of general practitioners who except for one, are all GP tutors of a teaching programme and have good support and encouragement in doing the audit from the coordinator. It remains to be seen

whether other GPs can replicate similar results. The real challenge is of course whether the efforts are sustainable after the initial enthusiasm.

The results should also be read in the context to the environment the GPs worked in. All the participating general practitioners were in a fee-for-service environment and GP care was demand-led. Patients, generally seen on a monthly basis, were not given appointments for follow-up visits, as they come for review when they had completed or nearly completed their medication. The GPs usually worked alone. However, there was continuity of care as the patient saw the same GP and had a better doctor-patient relationship, which might be important in adherence to advice and medication.

Conclusion

This was one of the first audits of diabetes mellitus in private general practice in Malaysia. Structure, process and outcome indicators were used. The quality of diabetic care was not optimal. Implementation of remedial measures with repeat audit at the completion of audit cycle showed improvement in all the criteria assessed. There was a significant improvement in the outcome for the patients with diabetes mellitus in this setting in the form of better glycaemic control. However, there remained room for further improvement. Quality assurance programmes like medical audit should be encouraged in general practice as it improves both the quality of care and outcome in patients with chronic diseases like diabetes mellitus.

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