MEDICATION KNOWLEDGE AND SELF-MANAGEMENT BY PEOPLE WITH TYPE 2 DIABETES

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Key words: type 2 diabetes, medication, knowledge, self-care

ABSTRACT

Objective:

To explore medication knowledge and self-management practices of people with type 2 diabetes.

Design:

A one-shot cross sectional study using in-depth interviews and participant observation.

Setting:

Diabetes outpatient education centre of a university teaching hospital.

Subjects:

People with type 2 diabetes, n=30, 17 males and 13 females, age range 33-84, from a range of ethnic groups.

Outcome measures:

Ability to state name, main actions and when to take medicines. Performance of specific medication-related tasks; opening bottles and packs, breaking tablets in half, administering insulin, and testing blood glucose.

Results:

Average medication use ≥10years. Respondents were taking 86 different medicines, mean 7±2.97 SD. Dose frequency included two, three and four times per day. All respondents had ≥2 diabetic complications ± other comorbidities. The majority (93%) were informed about how and when to take their medicines, but only 37% were given information about side effects and 17% were given all possible seven items of information. Younger respondents received more information than older respondents. Older respondents had difficulty opening bottles and breaking tablets in half. Twenty percent regularly forgot to take their medicines. Increasing medication costs was one reason for stopping medicines or reducing the dose or dose interval. The majority tested their blood glucose but did not control test their meters and 33% placed used sharps directly into the rubbish.

Conclusion:

Polypharmacy was common. Medication knowledge and self-management were inadequate and could lead to adverse events.

INTRODUCTION

Diabetes is a chronic disease that affects 7.5% of Australians over 25 and 16.8% over 65 years (Dunstan et al 2000). Long term self-care and education are needed to control blood glucose levels and reduce the risk of complications and adverse medication-related events.

These necessary skills include blood glucose monitoring and medication administration. Over time, the complexity of the medication regime increases for people with type 2 diabetes because of the associated complications, comorbidities and pancreatic beta cell exhaustion (Olefsky et al 1999). This means the complexity of the self-care regime increases often at the same time as the person is growing older and eyesight, hearing, fine motor skills and memory and information processing are changing. These changes make it difficult for the individual to comply with recommended self-care practices such as blood glucose testing and medication management including insulin administration.

Anecdotal evidence suggests that many people with diabetes do not have adequate knowledge about the medications they take, stop medications and alter doses inappropriately without consulting their doctors and do not understand the actions, side effects or potential interactions of the medications they take, even those they have been taking for years.

In particular, older people are more likely to have physical problems that make safe medication usage difficult and they make significantly more insulin dose errors using syringes (DeBrew et al 1998) despite the advent of premixed insulin formulations such as Mixtard and modern insulin delivery devices (Coscelli et al 1992). Inappropriate medication usage is likely to have an effect on blood glucose control and therefore on health outcomes and diabetes-related health costs. In addition, inadequate medication self-care increases the likelihood of admission to a nursing home (Stradberg 1984).

A number of researchers have examined medication issues such as adherence by monitoring: pill counts, the frequency of completing the full course of a medication, script refill rates, and ability to open medication packages (Matsuyama et al 1993; Paes et al 1997; Kriev et al 1999). These studies indicate omitting doses, stopping medications without consulting a doctor, and, inappropriately changing doses, are common behaviours. However, supplying medications to patients does not guarantee the medications are actually taken. In fact, a systematic review of randomised control trials showed that about half the medicines prescribed for chronic diseases are not taken (Haynes et al 1996). In addition, self-reported behaviour is subjective and problematic. For example, people who say they do not follow treatment, may report accurately, while people who deny not following recommendations may report inaccurately (Spector 1986).

The majority of these studies relied on self-report. Actual practices were not directly observed and no researcher reported asking about self-prescribed medicines and complementary therapy use. There is a high rate of complementary therapy use among people with diabetes (Egede et al 2002) and there are a growing number of reports of undesirable drug/herb interactions and adverse events relating to the use of some complementary therapies by people with diabetes (Dunning 2003).

The impact of education on adherence is well documented (Kriev et al 1999), but adherence is a complex phenomenon and is difficult to predict. Adherence is influenced by many factors and is dependent on an individual's problem-solving skills, beliefs and attitudes, social situation and support and is complex and demanding (Jones 2003). The term is often used in a derogatory way that does not take account of the fact that it has physical, psychological, attitudinal and social components. The majority of medication adherence studies focus on adherence to the medication recommendations, knowledge and behaviour. Only rarely have physical limitations and financial factors been explored with people with diabetes. When they are, it is usually with respect to oral hypoglycaemic agents (OHA) and insulin administration (Coscelli et al 1992; Tay et al 2001; Evans et al 2002).

People with diabetes frequently have complications and concomitant diseases that make it difficult for them to perform some diabetes self-care tasks including managing their medications. For example, arthritis limits manual dexterity and makes it difficult to test blood glucose, break tablets, administer insulin, and open medication packages. Diabetes complications include reduced vision and retinopathy, yet consumer medication information and medicine labels are often presented in small fonts that are difficult to read, even with glasses. An important and rarely considered factor is the impact of health professional attitudes and beliefs and health system issues on an individual's willingness and ability to follow treatment recommendations.

Regular diabetes complication screening is an Australian established nationally co-ordinated project known as ANDIAB. Home medication reviews were introduced more recently, but routine monitoring of medication self-care ability and behaviours rarely occurs in a structured way and is not a focus of either of these processes. Diabetes management guidelines based on the Diabetes Control and Complications Trial (DCCT) (1993) and The United Kingdom Prospective Diabetes Study (UKPDS) (1998) stress the need to achieve good blood glucose, lipid and blood pressure control and 'treating to target'. That is, achieving evidence-based metabolic, blood pressure and weight targets. The targets are getting lower as the evidence that tight metabolic control prevents morbidity and mortality accumulates.

As a consequence, more medications are added to the treatment regime, which become more complex. Polypharmacy is the norm and could be considered best practice in light of diabetes management guidelines that recommend aiming for normoglycaemia and normal lipid and blood pressure ranges. For example, people with diabetes can expect to take three to four antihypertensive agents as well as insulin or oral hypoglycaemic and lipid lowering agents for their diabetes, as well as a range of medications for other diabetes complications or concomitant diseases. The cost of uncontrolled diabetes is high and carries significant morbidity and mortality rates; therefore polypharmacy can be justified. However, it leads to complicated medication regimes that are more likely to lead to mistakes and/or non-adherence.

The Quality Use of Medicines (QUM) initiative has been a key component of the National Health Policy in Australia since 1992 and is slowly being integrated into patient medication self-management education programs. The basic tenets of QUM are the primacy of the patient, collaborative, multidisciplinary practice, a systems based approach, the judicious selection and use of medicines if medicines are indicated and regular outcome monitoring. Research indicates medicines use is less than optimal nationally, and nurses have a shared professional responsibility for QUM (Griffiths et al 2001). This responsibility includes monitoring patient medication self-management, especially in chronic disease such as diabetes, where medicines are often required for life. A number of health professionals, including diabetes educators, are responsible for instructing patients about appropriate medication usage.

Despite the knowledge that good blood glucose control reduces the long term complications of diabetes (DCCT 1993; UKPDS 1998) and the availability of the technology to achieve it, good control is not achieved in many cases (Dunning 1994). Factors such as attitudes, beliefs and self-care practices, including appropriate use of medicines are some of the intervening variables between having the knowledge, applying it, and achieving good metabolic control.

Non-adherence, for whatever reason, threatens the provision of effective diabetes care. Lustman, (1995) stated that seven out of 10 leading causes of death are linked to behaviour. If that is so, more consideration of the behavioural factors associated with diabetes medication self-management appears to be warranted.

AIM OF THE STUDY

The study aimed to explore the medication knowledge and self-management practices of people with type 2 diabetes referred to the diabetes outpatient services by their general practitioners.

For the purpose of the study medication knowledge consisted of seven specific items of information: being able to name all medicines being used, what the medicine was prescribed for, the dose to take, when the medicine should be taken, potential side effects, how to store the medicine, and how to dispose of unused or outdated medicines. Self-management practices included being able to open medicine packages, break tablets in half, administer insulin and monitor blood glucose levels.

METHODS

A cross-sectional survey using structured interviews and observations of respondents performing relevant medication self-management practices was used to collect the data. The interview questionnaire was developed specifically for the study.

Face and content validity was established by consulting with relevant experts and pilot testing the draft questionnaire on a representative group from the sampling population who were subsequently excluded from the study. Ethics approval was obtained from the relevant human research ethics committee.

The sampling population and study sample

The sampling population consisted of all people attending the diabetes education centre of an inner city university teaching hospital who were taking medications and able to give informed consent including those referred by their general practitioners (GP). Between 30 and 45 outpatients are seen each week, primarily by the diabetes educators. Close links have been established with the referring GPs through a diabetes shared care scheme where GPs undertake diabetes management in consultation with the diabetes educators and endocrinologists. A large proportion of patients attending the centre are from multicultural backgrounds, predominantly Vietnam, Greece, Turkey, Italy and South East Asia.

Patients were invited to participate when they presented to the diabetes educator and were given written information about the study. Informed written consent was obtained if they agreed to participate and an appointment was made for them to return to the diabetes education centre where the data were collected.

Participants were asked to bring all of the medications they were taking, including any complementary and over-the-counter medicines, vitamin and mineral supplements and their usual blood glucose testing equipment to the appointment. These requirements were written on an appointment card together with directions to the centre.

The questionnaire

The questionnaire addressed four domains: a) standard demographic data to ascertain if there was any correlation between patient demographic characteristics and medication management practices; b) medication type, dose frequency, obtaining prescriptions and having them filled; c) education and knowledge, and, d) complementary and over-the-counter medicines.

Participant observations

Participants were observed undertaking specific medication-related activities such as breaking tablets in half, opening medication packages, preparing and administering an insulin dose and testing their blood glucose and the results recorded on a data base.

Data analysis

Interval and categorical data were analysed using ANOVA and Chi Square respectively to ascertain any significant relationship between the variables. Descriptive statistics including means, standard deviation and frequency counts were used for the demographic data. The Pearson correlation coefficient was used to test the degree of association between interval level data. Content analysis was used for the open questions where each question was read line-by-line to note any emerging themes (Morse 1994). Words, phrases and sentences were classified into categories, in which the number of occurrences of a particular category gave an indicator of the relative importance of the behaviour or activity described.

RESULTS

Thirty people were interviewed. Each interview took approximately two hours.

1. Demographic data

Seventeen males and 13 females took part; age range 33-84 years, mean 68.7±13.35 SD. A range of ethnic backgrounds was represented including Turkish, Italian Greek, Chinese and Vietnamese. Twelve participants did not speak English and an interpreter assisted with the interviews. HbA1c, which provides an accurate measure of long term glucose control ranged from 5.7%–10.9% (normal 4.5–6%, using High Pressure Liquid Chromatography [HPLC]). Twenty-seven respondents had at least one diabetic complication and the majority had three or more. The most commonly occurring complications were retinopathy, macrovascular disease and neuropathy and erectile dysfunction. Four were taking antidepressant medicines. The most common concomitant diseases were arthritis and thyroid disease.

2. Medication usage

Overall, 86 different prescribed conventional medicines and nine self-initiated or complementary medicines and supplements were used. Individuals were taking an average of 7.4 medicines; range 1–12±2.97 SD. Thirty three percent used insulin, 46% were on OHAs and 20% were taking a combination of OHA and insulin.

Overall, respondents were on 10 different antihypertensive agents, six types of lipid lowering agents, three different aspirin formulations and a range of other medicines including anticoagulants and diuretics. The majority, 66%, were on twice a day OHA/insulin regimes. Twenty-three percent were on daily and 10% on three times a day regimes. Forty-six percent took their medicines before meals, 36% after meals and 16% with meals. Most had been on medications for ≥10 years, range 1–≥10.

Complementary therapies

Participants described complementary therapies as ‘using old medicines for current problems’, ‘things that improve wellbeing and quality of life’, and ‘something other than regular medicines’. In three cases the GP had referred patients to a complementary therapist for massage, chiropractic or relaxation. Table 1 outlines the reasons people gave for using complementary therapies. Twenty-three percent used complementary and self-initiated medications, which included vitamin and mineral supplements, aperients, analgesics, iron tablets, cold remedies, amino acid supplements, garlic, aloe vera and tea tree essential oil on a foot ulcer.

Obtaining medications

Seventy-three percent always obtained their medicines from the same pharmacy and collected them themselves. Thirty percent required assistance to obtain their medicines due to poor vision or difficulty getting to a pharmacy. In these cases seven relatives (spouses, daughters) collected medicines from the pharmacy and also helped with dosing. One pharmacist and one GP delivered medicines to the homes of two participants.

In the majority of cases (90%), prescriptions were written by the GP, which is consistent with centre policy. Fifty-two percent of GPs wrote repeat prescriptions without reviewing the patient and left the script with the receptionist to be collected or sent the script directly to the pharmacist.

Reported costs of medications per year ranged from less than $100 to more than $600 (mode $100). Thirty-six percent paid more for medications than they had in the previous year, mostly because they needed more medications and the cost of some medicines had increased.

People used a range of strategies to pay for their medications including doing occasional work because the pension was inadequate, employing budget strategies and making sacrifices in other areas. One person ‘kept my diabetes medicines but threw the others away because of the cost’ and one ‘got tired of taking them, so I stopped. They were not doing any good anyway’. Another respondent stopped all his medications because of the cost. None of these respondents consulted their doctors before they stopped their medicines. One person shared their diabetes medicines and blood pressure tablets with a relative who helped with the costs. Fifteen were enrolled in the National Diabetes Services Scheme, one in the Veteran Affairs Scheme, which are schemes set up by the Australian Government to subsidise the cost of some non-medicinal products. Three had private health insurance.

Table 1: Reasons participants gave for using complementary therapies and the main therapies they used.

Reason	Therapies used
Arthritis	Massage Glucosamine sulphate tablets Reiki
Reduce stress and improve wellbeing	Mediation Aromatherapy
Improve immunity	Vitamins and minerals Aromatherapy massage with thyme, basil and clove oils
Reduce blood glucose	Herbs and bitter melon, prickly pear
Treat wounds, fungal infections on feet	Tea tree essential oil Aloe vera gel
Treat colds	Echinacea Lemon and honey drinks
Because they are holistic	
They work with medicines to help feel better and control blood glucose	

Disposal of unused medicines and/or sharps

Eighty-three percent monitored their blood glucose at home and they all used meters. The majority, 80%, did not perform control tests on their meters to ensure they were reading accurately, but did calibrate the meter with each new batch of strips. Thirty-three percent discarded used needles and lancets (sharps) directly into the rubbish. Unused medicines were generally left in the cupboard, taken away by a relative or discarded into the rubbish.

Education about medicines

Eighty-three percent of respondents reported having specific education about their medicines when they were prescribed. Table 2 shows a breakdown of the specific medicine-related education items received. The majority were given information about how to take (93%) and when to take (93%) medicines and ≥50% accurately reported this information for most of their medicines. However, only 37% were given information about and could name possible side effects of their medicines. The risk of hypoglycaemia with insulin was the best known medicine side effect. In addition, only 17% received all seven possible items of information. The GP was the most frequently reported education provider. Table 3 shows the mean differences between patients who received education from their GPs alone and those who received education from GPs and other education providers. There were no significant differences (p=0.05).

There was a negative correlation between age and total pieces of education delivered, suggesting younger patients received more information about issues such as side effects and how to store than older patients but the relationship was not statistically significant (p=0.05).

Ability to administer medicines

The majority were able to open their medicine bottles or dosettes, but five people all over 65 and all women living alone, were not able to open a childproof cap. Seven individuals, who needed to break at least one tablet in half, were not able to do so accurately, even though three used a pill cutter (two used a knife). Sixteen percent of participants using insulin did not dial up the correct dose.

Twenty percent regularly forgot to take their medications and offered the following reasons:

'I am getting older and my memory is not what it used to be.'

'I forget to take my insulin to work.'

'I do not forget insulin but forget the metformin quite often.'

'I like to have a rest from pills when I am on holidays and eating out.'

'It is human nature to forget.'

'Too busy to remember-sometimes, often, actually.'

These participants adopted a number of strategies when they realised they had missed a dose. The majority did not worry and took the medicines when the next dose was due. Others took all or part of the dose whenever they remembered, and two individuals telephoned their doctors for advice.

Perceptions of blood glucose control

All respondents had HBA1c estimations performed at least once in the past 12 months. Ninety-nine percent indicated they had good blood glucose control but only one participant's HbA1c was in the target range (<7%).

Medication side effects

Fifty percent of the respondents reported hypoglycaemic episodes, 43% had no hypoglycaemia and 3% were not sure. Education was associated with greater likelihood of reporting hypoglycaemic episodes (r=0.22, p=0.24), which rose to (r=-0.30, p=0.11) after correcting for the effect of age. The correlation between age and hypoglycaemic episodes was negative at -0.13. That is, older age was associated with a lower chance of having hypoglycaemic episodes.

Table 2: The seven specific education items related to medicines use participants were asked about in the study and the percentage of positive and negative responses

Medicine related information items	Response category	% responses
How it works	No Yes	43.3 56.7
How to store	No Yes	50 50
How to take	No Yes	17 83
When to take	No Yes	7 93
Side effects	No Yes	63 37
Special precautions	No Yes	70 30
Appropriate disposal	No Yes	57 43

Table 3: Mean differences between patients who received information from their GP only and those who received information from their GP and/or other health professionals

	GP only Mean difference	GP and Other* Mean difference	p
What medicine is for	3.37	2.73	0.085
When to take medicine	3.53	3.64	0.370
What the effects are	2.79	1.64	0.004
How long effects last	1.89	1.45	0.138
Side effects	1.95	1.18	0.025
Correct dose	2.89	2.45	0.192
Total knowledge of medicines	16.42	13.09	0.05

*Pharmacist, diabetes educator, nurse

There was no significant difference in the proportions of women (54%) versus men (54%) reporting hypoglycaemic episodes (Chi square =1.46, p=0.48). There was no significant relationship between smoking and hypoglycaemic episodes (p=0.83); 67% for smokers and 50% for non-smokers indicating a trend toward significance that may have been evident in a larger sample. There was no significant relationship between alcohol and hypoglycaemia episodes, with an equal proportion of self-reported drinkers (50%) and non-drinkers (52%) reporting hypoglycaemic episodes.

Participants reported side effects to some drugs: venlafaxine SR (drowsiness), isosorbide mononitrate (nausea), prednisolone (thirst), metformin (diarrhoea and nausea), and bruising following insulin injections. All of the reported side effects were correctly attributed to the specific drug, however some, such as thirst and drowsiness could have been a consequence of hyperglycaemia.

DISCUSSION

The demographic characteristics of the sample were similar to other studies undertaken in the same sampling population (Dunning 1994, 2003). This finding suggests the sample was representative of people who attend the diabetes centre and enhances the ability to transfer the findings beyond the sample. However, the results may not be applicable to other settings.

A number of participants reported forgetting to take their medications or discontinuing them if they could not afford the cost. Other researchers have demonstrated older patients use fewer medicines because of the costs (Tokarski 2004). Patients in Tokarski's study said they continued to take their core diabetes medications but cut back on analgesics and medicines such as Viagra.

Participants in our study adopted a number of strategies when they realised they had forgotten to take their medicines. In some instances they 'did not worry' and took the next scheduled dose. With long acting medications this may be appropriate behaviour and may not greatly affect therapeutic blood levels. However, where drugs have a narrow therapeutic index or are needed in frequent doses, adequate blood levels of the drug may be compromised eg, warfarin and digoxin.

Conversely, stopping medicines may reduce the risk of adverse drug events. Given the high incidence of complications and comorbidities in individuals in the current study, medicines, other than the 'diabetes medicines' were necessary, and stopping them increases the risk of long term complications.

Other researchers have reported suboptimal compliance with OHA (Evans et al 2002). Evans et al (2002) based their conclusions on the number of medications actually dispensed to patients (filled prescriptions), and found one third of the individuals in the study did not obtain sufficient supplies of OHAs. Filled prescription rates were not used as a measure of appropriate medicines self-management in the current study. It does not indicate actual or self-reported medicine use and does not take into account the physical and social limitations involved in managing medicines.

Gilbert et al (2002) reported more than 80% of individuals missed medicine doses and suggested planning strategies with individuals when medicines were prescribed so they would know what to do when they missed doses.

In contrast, only 20% of participants in the current study regularly forgot to take their medicines and gave a range of reasons for forgetting, but none of the participants had been specifically told what to do if they missed a medication dose. Sless and Wiseman (1997) make a similar recommendation in *Writing about medicines for people: Usability guidelines consumer medicine information* (Sless and Wiseman 1997). These are a set of guidelines, primarily for pharmaceutical companies, which specify how to prepare information about medicines for consumers. The extent to which the relevant Consumer Medicine Information sheets (CMI) were utilised in the current study is unknown.

Participants were certainly on a high average number of drugs per day, which equates to polypharmacy. Polypharmacy is a complex issue and involves finding a balance between necessary drugs and the associated risk of multidrug use such as interactions in addition to increasing the complexity of the regime. It is not known whether the complexity of the regimen affected medicine use in the study participants but it is likely given the evidence for such effects in other populations. Given the currently agreed stringent blood glucose, lipid and blood pressure targets, polypharmacy may be best practice in diabetes management.

One significant side effect of OHAs and insulin is hypoglycaemia. The risk of hypoglycaemia due to drug interactions and age-related changes that affect drug pharmacodynamics and pharmacodynamics, increases with polypharmacy. The incidence of hypoglycaemia was high in the current study, (50%), but factors in addition, to or other than, drug interactions, may have led to hypoglycaemia, for example reduced food intake and increased activity. There were no reports of serious hypoglycaemia requiring hospitalisation and patients managed hypoglycaemia appropriately.

Twenty percent reported using complementary therapies and over-the-counter medications, which is consistent with other studies in the same population (Dunning 2003). There was no indication that patients substituted these therapies for conventional prescribed drugs, although some individuals were taking herbal therapies to control blood glucose. There is some evidence to support the blood glucose lowering effects of both the preparations being used, which may have increased the risk of hypoglycaemia if they were also taking OHAs or insulin. Using hypoglycaemic herbs in combination with OHAs may enable lower dose of these medicines to be used, which is consistent with QUM recommendations to use the lowest possible effective dose.

It was of concern that many patients were able to obtain repeat prescriptions from their GP without having to see the GP. GP visits represent ideal opportunities for medication practices and knowledge to be assessed, which are missed if the patient is not actually seen. GPs usually refer patients to a diabetes educator when insulin is required but diabetes educators rarely provide specific, detailed education about the other medicines people are prescribed. For instance, most participants received education about some aspects of how and when to take medicines, but only 37% were informed about potential side effects, especially if they were elderly. However, it is not clear if they had been given the information originally and forgot, or whether the information was given in a way that was not relevant to the individual. Certainly, they did not appear to have been given CMI, or to have read the package insert that comes with all prescription medicines in Australia. CMI does not usually accompany complementary medicines and over-the-counter-medicines.

Frequent reminders are important education strategies and improve adherence. Regular reviews of knowledge and self-care skills are necessary in any chronic disease where physical and mental changes can affect self-care. The focus in diabetes care has been on regular screening for complications but systematic medication review has not been a focus of these programs. Factual reminders (Germer et al 1986; Tay et al 2001) and mailed reminders (Haynes et al 1996) have been shown to improve adherence. Home medication reviews, linking medicines review to annual review, offering individual education, and involving patients by seeking concordance rather than focusing on compliance, are other ways of achieving effective medicines use (Royal Pharmaceutical Society of Great Britain 1997). Concordance in this sense refers to achieving agreed goals.

The lack of appropriate disposal of used sharps (insulin needles and lancets) reported by participants in our study was a major concern, although the extent to which it represents a health risk to other people is not known. Most Victorian municipal councils have sharps disposal schemes in place and sharps disposal is a standard part of blood glucose testing and insulin therapy teaching. This finding could not be explained but highlights the need to find other ways to ensure patients are aware of their responsibilities to dispose of used sharps appropriately.

Quality use of medicines (QUM) is central to Australia's National Medicines Policy (NPS). The NPS aims to meet medication-related service needs so that optimal health outcomes and cost-effective medication use is achieved. There are four main inter-related objectives of QUM: selecting management options wisely; choosing suitable medicines; if a medicine is necessary; and, using medicines safely and effectively. Although individuals were using a large number of medications, they appeared to be necessary. However, individuals were not always using them appropriately and, based on their responses, were not adequately informed about appropriate use. Likewise it is not possible for individuals to achieve QUM if they cannot afford medicines, and this was an issue for many individuals in our study.

LIMITATIONS OF THE STUDY

The results of this study may not be able to be generalised outside the study participants because of the small sample size and the possibility of selection bias. No information is available about patients who do not attend regularly for diabetes or medicine review or who are managed in other diabetes services. Nevertheless, the researchers identified major concerns about medication knowledge and self-management by people with type 2 diabetes who regularly attend the diabetes outpatient clinic.

CONCLUSIONS AND IMPLICATIONS FOR NURSING PRACTICE

Some inappropriate medication self-care practices and knowledge deficiencies were identified in the study. The majority of participants had received some medicines education, but only a minority had received all seven possible items of information.

The results support the need to ensure medicines knowledge and use is part of routine diabetes education practice especially at regular complication reviews and when medicines or doses are changed. CMI could be used as part of the medicines education process.

Asking about complementary and self-initiated medicine use should be standard nursing practice.

Further research to determine which CMIs are most useful to people with diabetes and how to incorporate QUM strategies into diabetes education and management is warranted.

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