Dosing frequencies in general practice

Whose decision and why?

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BACKGROUND
Little is known about patient preference for dosing frequency (daily, weekly or monthly). Patient preferences and attitudes among women over 60 years of age were studied. Condition, medication experience and perceived control were assessed against preference.

METHODS
One hundred and seven Australian general practitioners each recruited approximately 10 patients within three categories: those with preventable conditions (prevention of osteoporotic fracture), other chronic conditions, and acute or no conditions.

RESULTS
While most patients (67%) preferred starting medications daily, differences were observed between weekly and monthly preference. Chronic/acute groups and those experienced in daily/intermittent medication preferred starting and continuing monthly. Experience of weekly preventive medication resulted in a preference for weekly dosing. Those women with more perceived control of decision making had a preference for monthly dosing.

DISCUSSION
Patients prefer dosing schedules they have experienced. Condition type and perceived control in decision making also affect preferences. This study provides the first evidence about how patients determine preferences in dosing frequencies. It can assist GPs in their medication choice and patient education.

Patient preference for dosing frequency is a relatively new area of study. New options for oral medication dosing have increased the importance of dosing frequency in medication choice making.[1] Cost to the patient has been shown to be a significant barrier to the initiation and continuance of essential medication in chronically ill patients.[2] Similarly, studies of diseases such as HIV have shown that patients find the strict medication regimens to be highly demanding; they have to alter the times they sleep and eat, thus interrupting life's normal flow, and lose control of their lives.[3]

To date, no quantitative study has compared dosing preferences in general practice where a range of conditions and dosing frequencies exist. In qualitative studies of patients, three categories of patient responses emerge: to reject, passively accept, or to modify the treatment regimen. Various models have been described as drivers of patient beliefs and motivations for medication taking: the health belief model, the locus of control theory, and the self regulatory model.[4,5] This study sought to explore whether these models applied to patient preferences and decision making across a range of patients with different types of conditions and varying experiences of medication frequencies, and whether there were differences in characteristics between these groups. The study was designed to test the null hypothesis that there was no difference in patient preferences for different dosing schedules between patients with different medication experiences and morbidities.

We chose osteoporosis as an appropriate preventive condition, as osteoporosis treatment aims to prevent serious morbidity, and medication is available in a range of dosing frequencies.

Methods

GP and patient selection

One hundred and seven general practitioners were recruited from research network databases held at the University of Sydney, New South Wales. This database is reflective of the Australian GP population in terms of GP

and practice characteristics, with only a possible bias toward an interest in general practice research. Each GP conducted a practice audit to assess patient eligibility; patients who met the study criteria were invited to come to the GP's surgery to complete the study questionnaire.

Instead of surveying all women 60 years of age or over regarding their dosing preferences, three categories of the patient population were chosen to assess the influence of condition type on dosing preference. Sample stratification ensured suitable strata sample sizes to allow for statistical comparison. This breakdown gave the authors a greater insight into the influence that the type of condition and medication experience has on treatment decision making. Therefore each doctor was asked to recruit 10 patients within three categories: patients diagnosed with a preventable condition (in this case osteoporotic fracture, four taking bisphosphonates, one on other medication), patients with other chronic conditions (four), and one with an acute or no condition. The doctors were instructed that in the unlikely event of their recruitment not matching the target, the ratios in each group were to be maintained. In total, 1099 patients were surveyed.

The questionnaire

A nine item, three page questionnaire was administered covering the following areas: preference for daily, weekly or monthly medications based on adherence factors, lifestyle, strength of medications, other medications taken, duration of action and side effects; perceived advantages and disadvantages of monthly medications based on adherence factors, duration of action, number of tablets, side effects, lifestyle and synergy with other medications; preference for dosing schedule when starting, continuing or stopping medication; current and past medications; and perceived control in treatment decision making.

Statistical analysis

Given the novelty of the research and the lack of prior hypotheses about medication preferences across condition states, we studied three subsets of our study population. The first subset was based on whether the patients had preventable, chronic or acute conditions.

Table 1. Mean age and number of medications for type of condition, medication experience and perceived control subsets

	Number	Mean age (95% CI)	Mean number of medications (95% CI)
		Type of condition (n=1099)	
Preventive	557	74.7 (73.90–75.46)	4.1 (3.92–4.30)
Chronic	454	71.3 (70.50–72.20)	3.6 (3.36–3.74)
Acute/none	88	69.2 (67.40–71.01)	0.6 (0.25–0.95)
		Medication experience (n=1099)	
Weekly	421	74.7 (73.87–75.54)	4.1 (3.90–4.34)
Daily	590	72.1 (71.29–72.89)	3.7 (3.50 – 3.84)
Acute/none	88	69.2 (67.40–71.01)	0.6 (0.25–0.95)
		Perceived control (n=1096*)	
Patient	45	71.6 (69.39–73.83)	2.8 (2.18–3.33)
Shared	514	71.1 (70.29–71.83)	3.5 (3.26–3.65)
Doctor	537	74.7 (73.85–75.48)	3.8 (3.61–4.00)

* 1096 patients answered this question

Those patients in the preventive group were all diagnosed with osteoporosis, as the treatment for osteoporosis aims to prevent further fractures. Patients without osteoporosis on long term medication were classified as the chronic group, and those on short term or no medication were allocated to the acute group.

The second subset was based on whether the patients had experience taking weekly, daily or intermittent medication. The preventive group comprised of 421 patients on weekly medication and 136 patients on daily medication. The latter group were combined with the chronic group to form the daily medication group. The acute group was renamed the intermittent medication group.

Thirdly, to assess whether preference for medication frequency was influenced by the patient's relationship with their doctor and the patient's perceived degree of control in decision making about treatment, the participants were divided into three groups according to questionnaire response: 'patient control', where patients perceived that they were essentially in control of their treatment decisions; 'shared decision making', where patients perceive that they share decision making with their doctor; and 'doctor control', where patients defer to their doctor for treatment decisions.

The nature of our sampling involved clustering of patients around their GP. For this reason our statistical estimates and testing have considered the impact of clustering on the variance. All analyses were conducted using the SAS program, using statistical analysis procedures (proc surveymeans and proc surveyfreq) that considered the cluster sampling study design. The Rao-Scott Chi-square test was used to test for associations.[6]

Results

One thousand and ninety-nine women aged 60 years or over were surveyed. Type of condition (preventive, chronic or acute), medication experience (weekly, daily or intermittent) and perceived control (patient, shared or doctor) subsets were investigated for differences in mean age and number of medications (*Table 1*). Statistical differences were made using the principle of nonoverlapping 95% confidence intervals.

When analysed according to type of condition, the preventive group was significantly older than both other groups. When we compared the most frequent medications currently taken by the preventive and chronic groups (data not shown) they showed similar frequency of medication types with the only apparent difference between the groups being the use of osteoporosis fracture prevention medication in the preventive group.

The medication experience analysis (*Table 1*) revealed that the group taking weekly medication

Table 2. Preference for starting, continuing and stopping long term medications by type of condition and medication experience subsets

		Type of condition			Medication experience		
		Preventive (n=557)	Chronic (n=454)	Acute (n=88)	Weekly (n=421)	Daily (n=590)	Intermittent (n=88)
		%	%	%	%	%	%
Start	Daily	58.7	79.1	67.8	52.4	78.8	67.8
	Weekly	28.1	9.1	10.3	33.3	9.8	10.3
	Monthly	12.0	10.2	18.4	12.8	10.1	18.4
	Don't know	1.3	1.6	3.4	1.4	1.4	3.4
			X^2=72.73, p<0.0001			X^2=110.22, p<0.0001	
		%	%	%	%	%	%
Continuing	Daily	49.2	70.4	54.0	42.0	70.5	54.0
	Weekly	32.1	11.6	12.6	37.9	12.2	12.6
	Monthly	16.2	15.8	26.4	17.4	15.1	26.4
	Don't know	2.6	2.2	6.9	2.7	2.2	6.9
			X^2=79.87, p<0.0001			X^2=120.73, p<0.0001	
		%	%	%	%	%	%
Stop	Daily	19.4	29.9	29.9	19.0	27.8	29.9
	Weekly	6.2	4.7	3.4	7.3	4.3	3.4
	Monthly	15.2	19.8	20.7	14.8	19.0	20.7
	Don't know	59.2	45.6	46.0	58.9	49.0	46.0
			X^2=28.30, p<0.0001			X^2=22.85, p=0.0008	

was significantly different from the other groups in terms of age and number of medications.

Patients who left the decision making to the doctor were a significantly older group and tended to use more medications.

Starting, continuing and stopping medications

When assessing preference for dosing frequencies of long term medications there were significant differences within the type of condition and medication experience subsets in terms of starting, continuing and stopping medications (*Table 2*).

There was a greater preference for starting (67%) and continuing (58%) long term medications in a daily dose. However, when analysing the data without the daily preference, there were differences in secondary preferences between groups, with the preventive group and those with weekly medication experience having a greater preference for starting weekly medication (28.1% and 33.3%) over monthly, while those patients in the chronic and acute conditions/daily and intermittent medication experience groups were more likely to prefer monthly over weekly medication.

Preference for stopping medication was not significantly different between the groups.

When we compared preference for starting, continuing and stopping long term medication among the 'perceived control subset', there was a significant association (X^2=19.73, p=0.0031) between group membership and the preference for starting long term medication. The 'patient decides' group are more likely to have a preference for monthly medication over weekly (17.8% compared with 13.3%), whereas the 'shared' and 'doctor decides' groups were more likely to prefer weekly over monthly. There were no other differences for the control subsets.

Reasons for and attitudes about preference

All groups significantly associated daily medication with the statements 'easier to remember to take' and 'fits in better with my other medications'. However, for both statements, the preventive/weekly groups were significantly more likely than the chronic/daily groups to choose weekly medication, and the acute/intermittent groups were significantly more likely to support monthly medication (*Table 3*).

The preventive/weekly groups were more likely to say that weekly medication 'may work better for me' (28.8% and 35.7%) than the chronic (8.7%)/daily (8.4%) and acute/intermittent (14.9%). A similar trend was found for the statement 'may give me less side effects'. There were no differences for the control subsets.

Discussion

There is little information about patient preference for dosing frequencies in general practice, where many patients have multiple comorbidities.[7] Most of the work has been done either in relation to single conditions such as HIV or osteoporosis, with single medications such as neuroleptics, or theoretically.[8–16] We sought to identify whether the types of conditions, medication experience and perceived control over treatment decision making have any significant effect on patient preferences in a large sample of general practice patients.

While all patients in this study preferred to take long term medication daily, it is interesting to note that there are differences in preference between weekly and monthly medication. Patients on medications for a preventive condition – in this case osteoporotic fracture

prevention – who have experienced weekly medication were more likely to prefer weekly dosing frequency over monthly. Patients who had only experienced daily medication were more likely to prefer monthly medication over weekly. It may be that patients are more likely to prefer a dosing schedule that they have experienced rather than preferring the actual frequency of dosing, as suggested by other authors.[1]

Clearly, experience alters preference. In our study, patients with experience of weekly medication preferred weekly over monthly medication, whereas patients with no experience of weekly medication preferred monthly over weekly. This latter group may reflect a 'true' preference – ie. a preference based on choice rather than experience – as this group was not influenced by the experience of weekly or monthly medication.

The picture in relation to stopping medications is not that clear. Preference for stopping a medication compared with starting and continuing may not be related to type of condition, medication experience or perceived control. Evidence from community settings suggests that consumers do not view medications as something to be taken 'as prescribed' but rather as a resource for use as they see fit.[18] Patients place hope in their medicines, the most common being for relief or control of symptoms. Other hopes were for avoidance of relapse and hospitalisation, for disease progression to slow down or halt, for the prevention of a future illness, or for normality.[19] Further research into whether these issues affect preference for stopping may clarify the picture.

Studies have found that people are motivated to minimise their medications.[13,20] However, it was not demonstrated in our study that this desire for minimisation extended to the number of tablets taken. The taking of fewer tablets was interpreted in a variety of ways – that they must be less effective and have stronger side effects, for example.

In conducting this study, we were limited in a number of ways. First, as there are no monthly oral medications available in Australia, the answers about monthly preference could not be based on experience. Using osteoporosis fracture prevention as our target preventive

Table 3. Perceived benefits for choosing between taking the daily, weekly or monthly medication for type of condition and medication experience subsets

		Type of condition			Medication experience		
		Preventive (n=557)	Chronic (n=454)	Acute (n=88)	Weekly (n=421)	Daily (n=590)	Intermittent (n=88)
		%	%	%	%	%	%
Easier to remember to take	Daily	63.0	84.5	68.2	56.6	84.2	68.2
	Weekly	25.2	8	13.6	35.8	8.5	13.6
	Monthly	7.4	7.5	18.2	7.6	7.3	18.2
			X^2=87.3, p<0.0001			X^2=130.40, p<0.0001	
Fit in better with my lifestyle	Daily	61.2	82.8	65.9	54.9	82.4	65.9
	Weekly	28.0	8	12.5	33.7	8.4	12.5
	Monthly	10.8	9.2	21.6	11.3	9.1	21.6
			X^2=84.87, p<0.0001			X^2=127.46, p<0.0001	
Fit in better with my other medications	Daily	64.7	85.5	74.4	58	85.5	74.4
	Weekly	27.0	7.6	9	32.9	7.8	9
	Monthly	8.3	6.9	16.7	9	6.7	16.7
			X^2=74.98, p<0.0001			X^2=117.72, p<0.0001	
May be stronger	Daily	36.2	53.1	46.4	32.2	52.1	46.4
	Weekly	29.4	8.8	7.1	35.4	9.3	7.1
	Monthly	34.3	38.1	46.4	32.4	38.6	46.4
			X^2=79.91, p<0.0001			X^2=112.69, p<0.0001	
May work better for me	Daily	60.1	83.9	67.8	52.4	83.8	67.8
	Weekly	28.8	8.7	14.9	35.7	8.4	14.9
	Monthly	11.2	7.4	17.2	11.9	7.8	17.2
			X^2=78.44, p<0.0001			X^2=132. 90, p<0.0001	
May give me less side effects	Daily	54.0	76.7	57.6	47.4	76.2	57.6
	Weekly	28.7	8.1	11.8	35	8.3	11.8
	Monthly	17.4	15.1	30.6	17.6	15.5	30.6
			X^2=88.71, p<0.0001			X^2=133.04, p<0.0001	

condition limits our study to older persons. However, osteoporosis is one of the few conditions for which there is a range of dosing frequencies available. Second, our study groups were stratified according to their medication experience in the past 6 months. There is some evidence that patient recall longer than this period may be poor and the groups may not have been exclusive over a longer period. Third, we did not measure preference against actions in terms of starting, continuing and stopping medications.

Emerging evidence in the HIV field has shown that drug regimens for chronic conditions have a long term impact beyond daily routines. The impact on men and women appears to be different. Men fit their social world around their medical regimen, whereas women made their social world their priority.[8] While we do not have any data on men, our data from women confirms this conclusion. In our study, the impact on social life was not seen by any group as a determinant of preferred dosing frequency; however the age of the patients in this study may also have influenced this finding. In HIV studies high frequency of dosage also seems to be an issue.[9–12] In our study we found that low frequency also poses problems. The process of weighing costs against benefits – which has been found to be a major determinant of continuation in studies of neuroleptic drugs and benzodiazepines – may also have been an issue in our study, however we made the assumption that the majority of medications for this age group were subsidised by the National Health Service and therefore the relative costs were the same.[13–16]

In previous studies of acute conditions such as the common cold, treatment type (tablet versus other), monetary and opportunity costs appear to be important in influencing preference patterns only if there is a significant reduction in the duration of acute symptoms.[21] In our study, patients who had only experienced acute conditions were unable to exhibit a preference for long term medications where symptom relief was not an issue.

In a recent review of decision making about preventive medications, it was concluded that in the area of prevention, the patient evaluative process for decision making was difficult because of the lack of immediate symptoms to use as indicators of efficacy. It was concluded that lay people could only evaluate medications in terms of their immediate impact on their lives.[24] This finding held true in our study, with patients who had no experience of weekly and monthly medications exhibiting a preference for daily medications. Anecdotally, our study nurses reported that some women had difficulty in postulating about monthly medications without any experience of them. How or whether these views affect choices about preference is an area for further study.

By analysing several subsets of patients (type of condition, medication experience and perceived control), the study identified more clearly the factors that have the greater influence over choice of dosing frequencies. From the analyses, it became clear that all these factors have a significant influence. This will be important in understanding patient preference and in communicating benefits when longer dosing schedules are introduced for other conditions.

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