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Why patients do not attend for their appointments at a genetics clinic

EDITOR—When a patient does not attend a scheduled appointment, or cancels so late that a replacement cannot be found, there is a cost to the health care system in terms of personnel time, extended waiting lists, and the loss of potentially beneficial services to patients who miss their visit. These costs are particularly important for genetics clinics because a great deal of preparation is often required before a clinic visit. Preparation may include sending out a family history questionnaire from which a pedigree diagram is constructed, and a review of the medical reports and charts of the patient and other family members. In the case of rare genetic conditions, a preliminary review of publications/computer database search may be conducted and research laboratories may be sought which would be willing to receive patient samples. Furthermore, genetics departments typically set aside at least an hour for each new patient visit.

Failed appointment rates at community and university medical clinics have been reported to range between 10 and 30%.[1 2] Studies involving hospital clinics set in low socioeconomic status populations have shown no show rates in the upper end of this range, whereas family practice clinics have reported fail rates as low as 5%.[3]

There is some evidence to suggest that missed appointments may be more likely among certain demographic groups, such as young adults and adults with young children,[3] patients with lower socioeconomic and educational status, and those with larger families.[1] Moreover, geographical distance from the clinic or the inability to obtain transport or both have been found to impede appointment keeping.[1] Sex and race have not been associated with compliance.[1]

Problems with communicating to patients about the timing or nature of an appointment and in providing them with information about their diagnosis may lead to missed appointments,[1 4] and a strong recommendation by the referring physician has been shown to have a major benefit on compliance.[5–7]

There may be a relationship between clinic attendance rates and certain attitudinal factors. There is evidence that patients are more likely to miss their appointments if they perceive the appointment as less urgent[1 3] or less helpful.[4] Other potential psychological determinants of health care use are variables from the Health Belief Model (HBM),[8] including people's perceived risk of developing a particular health condition, perceived severity of the health condition, and the perceived benefits, weighed against the costs, of an associated health behaviour. The HBM has been applied to a variety of health behaviours, such as breast cancer screening practices.[5 6 9] Patients' beliefs about the personal costs of medical clinic visits have also been shown to affect appointment keeping rates.[10]

The Children's Hospital of Eastern Ontario (CHEO) genetics clinic provides diagnostic and counselling services to patients of all ages, including routine advanced maternal age (AMA) counselling, personal or family history of known genetic disease, and the assessment of subjects whose condition is of unknown cause. At a time when clinical demands on our programme are increasing, we became concerned about the negative impact of no shows on our ability to deliver efficient and timely services. On that basis we undertook a study in order to determine the approximate rates of appointment cancellations and no shows at different Canadian genetics clinics, and to identify factors that may be associated with missing clinic appointments. It was hoped that some associated variables might be amenable to modification and lead to improved attendance rates.

Twenty genetics clinics across Canada responded to a survey regarding the frequency of broken appointments (no shows and cancellations). The centres provide genetic services free of charge as part of their respective provincial health services. The non-attendance rate at the CHEO genetics clinic was also determined. The clinics were separated into three groups according to number of patients seen per year; eight clinics had fewer than 500 patient visits per year (small), eight saw between 500 and 2000 patients per year (medium), and five clinics saw more than 2000 patients per year (large). Representatives of each genetics clinic, usually a medical geneticist or clinic administrator, completed a single page postal questionnaire designed to assess their estimated rates of missed appointments, the extent to which they considered these rates to be a problem, and the strategies they used to reduce non-attendance.

The CHEO genetics clinic operates according to the following pre-appointment procedure. Patients are referred to the clinic by their physician. The clinic receptionist schedules the appointment and, for non-AMA cases, sends the patient a family history questionnaire and consent form for release of medical information. Before the clinic appointment, the patient's case is reviewed with relevant documents and, for non-AMA patients, a family pedigree is drawn. Non-AMA patients are contacted by telephone 24-48 hours before the scheduled visit in order to confirm their attendance (AMA patients do not receive a reminder telephone call). At all stages, patients are asked to cancel if they do not plan to attend their clinic visit.

Data were collected by telephone from two groups of patients originally scheduled for clinic between 1 February 1998 and 30 April 1999: 75 who attended their appointments at the CHEO genetics clinic and 62 who either did not show up for their appointments or who cancelled with less than 12 hours notice. It should be noted that late cancellations (less than 12 hours notice) were counted as no shows because the ensuing consequences were considered to be equivalent. The other surveyed genetics clinics provided separate rates for cancellations in general and for "pure no shows".

A parent was interviewed if the index patient was under 18 years of age. All participants (total n=137) were English or French speaking and lived in the Ottawa-Carleton regional catchment area of approximately 1 million.

Two slightly different versions of the survey instrument were used, one for each group of participants. The instrument was developed by the authors to assess information in four main content areas: (1) demographics (age, marital status, children, education, family income, language spoken at home); (2) referral and genetic service information (reason for referral, the degree to which patients understood these reasons, the quality of explanations provided by referring physicians regarding these reasons, whether or not patients were referred at their own request, and the degree to which referring physicians recommended the genetics appointment); (3) environmental factors (transport, distance from home to the clinic, and arrangements for child care and taking time off work); and

Table 1 Rates of no shows and cancellations at Canadian genetics clinics

	Size of centre*			
	Small (n=8)	Medium (n=8)	Large (n=5)	Total (n=21)
Mean no show rate (%)	9.3	4.7	5.7	6.6
Mean cancellation rate (%)	7.3	5.9	7.0	6.7
Mean combined no show and cancellation rates (%)	15.1	10.0	10.8	12.0
% of centres that indicated non-attendance is a problem	50	75	80	67

*Small = <500 visits/year; medium = 500–2000 visits/year; large = >2000 visits/year.

(4) psychosocial factors (including perceived importance of the clinic visit as well as Health Belief Model variables). A variety of response formats were used, including yes/no, Likert scales, and open ended questions which were later categorised for analysis. The bilingual survey took approximately 15 minutes to complete and was administered by a trained research assistant.

Descriptive statistics were performed to assess the nature of the scheduled appointment at the clinic, as well as the reasons provided by non-attendees for missing their scheduled visit. Attendees and non-attendees were compared on the basis of variables in the four main content areas described above, using independent sample *t* tests and chi-square analyses as appropriate. Two by two factorial analyses of variance were also conducted in order to assess potential interaction effects between group membership and other relevant variables.

Representatives of 27 Canadian genetics clinics were sent copies of the no show survey and 20 (74%) completed and returned the survey. A summary of no show and cancellation rates for the three sizes of clinics is provided in table 1; data from the CHEO genetics clinic are included. Approximately half the data were estimated while the remainder were based on actual records of missed visits. The rate of combined no shows and cancellations at individual centres ranged between 2% and 25%, with an overall mean of 12%. Non-attendance rates were perceived as a problem by most genetics clinics across Canada. However, large and medium centres perceived a greater problem than did smaller centres, despite having lower non-attendance rates (mean rates were 10.8%, 10.0%, and 15.1% for large, medium, and small centres, respectively). If cancellations are eliminated, the mean overall rate of no shows is 6.6%.

For comparison purposes, failed appointment rates were obtained for a variety of other medical clinics at CHEO, including audiology, child development service, neuromuscular medicine, occupational therapy, physiotherapy, rehabilitation medicine, speech/language, and spina bifida clinics. The no show rates for 1998 ranged between 6% and 15%, yielding an overall mean of 11%.

The no show prevention strategies cited by the genetics clinics across Canada were compared. The centres were subdivided by their total non-attendance rate into three groups: low rate (5-11%), medium rate (12-18), and high rate (19-25%). The impact of the strategy most commonly cited (reminder phone call) could not be assessed because it was used virtually universally. However, the strategy of sending reminder letters to the patient was used most often by centres which reported low non-attendance rates.

A total of 258 households (120 potential attendees and 138 potential non-attendees) were telephoned regarding the study, of which 137 (53%) participated in the survey (75 attendees and 62 non-attendees). Among the subjects/families who did not participate, 24 (20%) could not be reached because of repeated busy signals or answering machines (no messages were left). Another 24 (20%) asked the interviewer to phone back at another time, and gave a similar response upon subsequent phone calls, even when the call was made at a prearranged time. Nineteen (17%) of the telephone numbers were either not in service or were wrong numbers, and two of the households (2%) reported that the patient (or parent of the patient) lived elsewhere and did not have a telephone. An additional 12 (10%) subjects had a language barrier. Finally, 30 (25%) of the non-participants stated that they were not interested in doing the survey. There were more no shows (76; 63%) than clinic attendees (45; 37%) among the households that did not participate in the survey.

Table 2 Demographic characteristics of the sample

	Attendees (n=75)		Non-attendees (n=62)	
Variable	No	% of group	No	% of group
Age of respondent				
20–29 years	6	8	9	15
30–34 years	12	16	13	22
35–40 years	43	58	34	56
>40 years	13	18	4	7
Marital status				
Married/common law	65	87	50	81
Single	5	7	7	11
Divorced, separated, or widowed	5	7	5	8
No of children				
0	21	28	10	16
1	24	32	18	29
2–3	27	36	29	47
>3	3	4	5	8
Planning more children*				
Yes	42	56	28	45
No	23	31	31	50
Language spoken at home				
English	48	64	42	68
French	19	25	8	13
Both English and French	3	4	8	13
Other	5	7	4	6
Education†				
Less than high school	4	5	4	7
High school	15	20	20	32
Some college or university	12	16	15	24
College or undergraduate degree	30	40	17	27
Graduate degree	14	19	6	10
Family income‡				
<$20 000	6	9	4	8
$20 000–$40 000	16	25	18	36
$40 000–$75 000	19	30	20	40
>$75 000	23	36	8	16

*Attenders had a higher overall education level than non-attenders, t (135) = −2.29, p<0.05.
†Attenders were more likely to be planning more children than non-attenders, $\chi^2(2) = 6.58$, p<0.05.
‡Numbers are smaller for this variable owing to missing data.

Table 2 provides a description of participants on the basis of key demographic variables. The average age of respondents was 36 years; where the respondent was a parent of the patient, the average age of patients was 5 years. The large majority of respondents were married/common law (84%) and had children (77%).

Attendees and non-attendees did not differ significantly on the basis of age (p=0.21), marital status (p=0.59), presence of children (yes or no; p=0.21), number of children (p=0.09), language spoken most often at home (p=0.11), or family income (p=0.11). Two demographic variables did yield significant results. Non-attendees had a lower mean level of education than attendees (p<0.05), and patients who were planning to have children (or more children) were more likely to have attended their clinic visits than those who were not planning on starting or expanding their families (p<0.05) (table 3).

Table 3 outlines the main reasons given by non-attendees for missing appointments. The reasons differed significantly between those who were referred for prenatal diagnosis (PND) services and those referred for other reasons (p<0.05). The main reasons given by all

Table 3 Reasons given by non-attendees for missing genetics clinic appointments

	Reason for referral to genetics			
	PND* (n=31)		Non-PND* (n=31)	
Reason given for missing appointment	No	%	No	%
Too busy/no time off work	8	26	14	45
Forgot/scheduling conflict	4	13	7	23
Believed appointment was non-mandatory or unimportant	4	13	1	3
Wanted to wait for lab results	3	10	1	3
Other	1	3	6	19
Unsure/afraid re risks of amniocentesis	4	13	1	3
Recent miscarriage	4	13	0	0
Morning sickness on day of appointment	3	10	1	3

PND = prenatal diagnosis.
*Reasons differed between PND and non-PND patients: $\chi^2(7) = 15.64$, $p<0.05$.

non-attendees for missing appointments were being "too busy" or unable to get time off work, forgetting the appointment or having a scheduling conflict, and believing the appointment to be non-mandatory or unimportant. Reasons associated with the PND group included being unsure or afraid of the risks associated with amniocentesis, having recently suffered a miscarriage, experiencing morning sickness on the day of the appointment, and wanting to wait for laboratory test results (such as maternal serum screening) before deciding whether to be seen at the genetics clinic.

Slightly less than half (46%) of all participants were scheduled to meet a medical geneticist at the clinic, and the remainder were scheduled to meet a genetic counsellor. There was no significant difference between attendees and non-attendees with respect to the type of health professional they were scheduled to see at the clinic ($p=0.86$). Approximately half (51%) of all participants were scheduled for appointments associated with advanced maternal age prenatal screening. Another 42 patients (31%) were being seen in order to seek a specific diagnosis; 23 patients (17%) were scheduled to discuss genetic risk information/carrier screening, and only two respondents (1.5%) indicated that they did not know the reason for their referral to the genetics clinic. Attendees and non-attendees did not differ on the basis of their reasons for referral to the clinic ($p=0.46$). Moreover, attendees were no more or less likely than non-attendees to have been referred to the clinic at their own request ($p= 0.92$), to understand well the reasons for their referral ($p=0.17$), or to indicate that their physicians had highly recommended the appointment ($p=0.15$) or had explained the reason for referral well ($p=0.13$).

It was hypothesised that some of the referral related variables (table 4) may have been confounded with patients' education level, and so additional analyses were performed in order to separate these effects. A dichotomous version of the education variable (originally in a Likert scale format) was created by cutting scores at the median, yielding the two categories of "high" (at least a college diploma or university undergraduate degree) and "low" (high school education or less). Two by two analyses of variance showed a significant group by education level interaction with regard to patients' reported degree of understanding of the reasons for their referral ($p<0.05$) and the reported quality of the explanation of these reasons by their referring physicians ($p<0.05$). An examination of cell means indicated that among patients with a higher education level, attendees understood their reasons for referral better and claimed their physicians had explained these reasons better than did non-attendees. No such group difference existed among patients with a lower education level.

Table 4 Comparison of attendees and non-attendees on referral/genetic service variables

	Attendees (n=75)		Non-attendees (n=62)	
Variable	No	% of group	No	% of group
Reason for referral to genetics				
Prenatal diagnosis	39	52	31	50
Carrier testing/risk information	12	16	11	18
Diagnostic evaluation	24	32	18	29
Other	0	0	2	3
How well was reason explained?*				
Very poorly	0	0	1	2
Poorly	2	3	3	6
Adequately	8	14	10	20
Well	14	25	12	25
Very well	33	58	23	47
How well did you understand the reason?*				
Not at all	0	0	2	3
Poorly	2	3	2	3
Adequately	3	5	4	7
Well	9	15	12	22
Very well	48	77	35	65
Referred at own request				
Yes	26	35	22	36
No	49	65	40	64
How strongly referring physician recommended the genetics appointment*				
Not strongly	5	8	7	13
Somewhat strongly	20	30	22	40
Quite strongly	15	23	9	16
Very strongly	25	38	16	29
Recommended against	1	1	1	2

*Numbers are smaller for these variables owing to missing data.

We hypothesised that patients with a higher education level would more likely have been referred to the genetics clinic at their own request, because of their presumed greater knowledge about genetic health services. A chi-square analysis showed this not to be the case ($0.55<p<0.60$).

The relationship between non-attendance and environmental variables is shown in table 5. Patients who reported having to arrange for child care in order to attend a clinic visit were more likely to have missed their scheduled appointments than those who indicated no such requirement ($p<0.05$). Although having to take time off work to attend a clinic visit was not associated with a greater likelihood of non-attendance ($0.70<p<0.75$), those respondents who were not paid for such time off were more likely to have missed their appointments than those who were able to take paid leave from work to attend the clinic ($p<0.05$). No significant differences between attendees and non-attendees were found in methods of transport to the clinic ($0.20<p<0.25$) or travel time to the clinic ($0.10<p<0.15$). Failure to make contact by telephone to remind the patient of the clinic visit occurred in 10 of the no shows and none of the attendees.

The relationship between non-attendance and psychosocial variables is shown in table 6. Respondents who attended their appointments perceived the clinic visit to be more important than respondents who did not attend ($p<0.01$). With regard to the Health Belief Model variables, no significant group differences were found in terms of perceived severity of the health condition (or potential health conditions) which were to be discussed during the appointment ($0.65<p<0.70$). Moreover, the two groups did not differ significantly with respect to their perceived risk of having (or eventually developing) these health conditions ($0.60<p<0.65$).

Non-attendance was significantly related to perceived benefits and disadvantages of the genetics appointment. Specifically, patients who missed their appointments perceived the potential benefits of the clinic visit to be less

Table 5 Comparison of attendees and non-attendees on environmental variables

	Attendees (n=75)		Non-attendees (n=62)	
Variable	*No*	*% of group*	*No*	*% of group*
Have to arrange for child care to attend the clinic?*				
Yes	12	16	19	31
No	63	84	43	69
Have to take time off work to attend the clinic?				
Yes	39	52	30	49
No	36	48	31	51
If yes, paid for this time off?*				
Yes	23	60	10	33
No	15	40	20	67
Method of transport to clinic				
Own vehicle	65	87	48	77
Get a ride	7	9	6	10
Bus	3	4	6	10
Walk	0	0	2	3
Travel time to clinic				
<15 minutes	4	5	4	7
15–30 minutes	35	47	24	39
30–45 minutes	18	24	10	16
45–60 minutes	7	9	7	11
>60 minutes	11	15	17	27

*p<0.05.

Table 6 Comparison of attendees and non-attendees on psychosocial variables

	Attendees (n=75)		Non-attendees (n=62)	
Variable	*No*	*% of group*	*No*	*% of group*
Perceived importance of clinic visit*				
Not at all important	1	1	6	10
Of little importance	4	5	5	8
Neutral	8	11	10	16
Somewhat important	16	21	2	3
Very important	46	62	27	43
Perceived severity of genetic condition				
Not at all serious	8	11	11	18
Of little severity	14	19	13	21
Neutral	18	24	5	8
Somewhat serious	12	16	14	23
Very serious	22	30	18	30
Perceived risk of genetic condition				
Very low	16	21	19	32
Somewhat low	13	17	11	18
Medium	26	35	12	20
Somewhat high	11	15	7	12
Very high	9	12	11	18
Perceived benefits of clinic visit*				
No benefits	1	1	7	12
Few benefits	4	5	4	7
Neutral	10	13	10	17
Some benefits	14	19	13	22
Many benefits	46	62	25	42
Perceived importance of disadvantages of clinic visit*				
Not at all important	56	74	30	52
Of little importance	6	8	5	8
Neutral	8	11	8	14
Somewhat important	2	3	3	5
Very important	3	4	12	21

*p<0.01.

important (p<0.01) and the potential disadvantages to be more important (p<0.01) than patients who kept their appointments.

The results of this study help to quantify the problem of missed appointments at genetics clinics across Canada. Over a one year period, approximately 11% of patients scheduled for visits at genetics clinics either cancelled or did not show up for their appointments. When cancellations are eliminated, this number decreases to 6%, representing the rate of "pure no shows". In comparison, 11% of patients failed to show up for their appointments at other non-genetics outpatient clinics at the Children's Hospital of Eastern Ontario (CHEO). These values are relatively low compared with the 10-30% range frequently reported.[1 2] Family practice centres have fewer broken appointments than adult medical centres.[3] Perhaps the family orientation of paediatric and genetics clinics is more akin to family practice and reduces the likelihood that appointments will not be kept.

It should be noted that in the survey of the CHEO genetics clinic, the non-attendees group included cancellations with less than 12 hours notice which, owing to their negative consequences, were considered equivalent to no shows. This distinction between early and late cancellations was not requested from the other genetics clinics surveyed in this study (they were simply asked to report two separate numbers for "pure" no shows and cancellations, respectively). If late cancellations had been included in the no show rates provided by the other clinics, the resulting no show rates would probably have been somewhat higher than reported.

Although an 11% rate of failed appointments at Canadian genetics clinics is comparatively low, it is still a sizeable barrier to the optimal provision of genetic health services. Unlike many clinics, where multiple bookings are common and visits are usually short, genetics clinics expend extensive resources for pre-appointment planning and generally allocate an hour for a clinic visit.

This study suggests a number of factors which may contribute to the problem of missed appointments. The most commonly stated reasons for missed appointments at the CHEO genetics clinic were scheduling conflicts and inability to get time off work. As these are predictable factors, it is surprising that more than half of respondents cited them, despite being called 24-48 hours before the appointment. The question arises as to whether the answers provided by patients over the telephone concealed underlying reasons such as anxiety, confusion, or personal belief systems, which lead to last minute decisions not to attend, or were too personal to admit to the secretary or the research assistant.

Some psychosocial variables appeared to contribute to the non-attendance rate. Patients who attended their scheduled appointments thought their visit to the genetics clinic to be more important than those who did not attend. This is similar to previous research which has found perceived urgency of medical clinic visits to be significantly related to compliance,[1 3] though urgency and importance may represent relatively distinct constructs.

Patients who attended the clinic also perceived more benefits and fewer barriers associated with their appointments than did non-attendees. This supports the Health Belief Model[8] and previous research, which has indicated such health beliefs to be important predictors of health behaviours.[6 9 10] Apparently, for non-attendees, the potential costs of the clinic visit (such as the anxiety or guilt that may be experienced after learning of one's carrier status) outweighed the possible benefits (such as relief from uncertainty or clarification of one's options). In contrast, the perception of the benefits of attending the genetics clinic appeared to outweigh the perceived disadvantages for those who kept their appointments.

We found that certain psychosocial factors may play a role in non-attendance, but not all of the anticipated effects were found. For example, perceived severity of the health condition (or potential health condition) for which patients were referred to the clinic, along with the perceived risk of having or eventually facing that health condition, were unrelated to clinic attendance. The former result is not surprising, given that the "perceived severity" component of the Health Belief Model has been shown to have limited value in predicting a variety of health behaviours.[11] However, a high perceived risk has been found to predict a number of health behaviours, including mammography,[5 12] genetic testing for susceptibility to breast cancer,[13 14] and

cystic fibrosis carrier screening.[15] One possible explanation for the absence of such an effect in this study lies in the nature of the "health condition" in question. Previous research has examined patients' health beliefs with respect to a single, specific illness or procedure. In the present study, patients were referred to the genetics clinic for a variety of reasons; consequently, a more general question regarding perceived risk was included in the survey which permitted patients to respond according to their own situation. This lack of specificity may have led to a varied interpretation of the question, thus reducing the strength of the "perceived risk" and "perceived severity" variables.

If the above health beliefs are the true reasons that underlie the stated explanations (for example, could not get time off work) given by some patients for missing their appointments, this holds important implications for the provision of adequate public education regarding genetics related health issues. It is widely accepted that a thorough explanation of the risks and benefits associated with a given medical intervention is required in order for patients to provide informed consent. It is not clear how such standards extend to different contexts, such as a genetics clinic appointment. Greater public awareness of the services provided by genetics professionals will provide patients with a balanced and accurate understanding of the importance, risks, and benefits of a scheduled appointment. The fact that patients with a higher education level (at least an undergraduate university degree) were more likely to attend their appointments than those with less education reinforces this need for greater public education. Studies have found that people of lower educational status are more likely to miss their medical appointments.[1] People with a university education probably have greater access to (and experience with) health related information found in scientific journals, books, and news magazines. Delivery of health information to those who have less formal education may facilitate the use of health services by more subjects and families. An alternative interpretation of the education effect is equally possible: those working in higher level positions may simply have greater job flexibility and may thus have had less difficulty attending their clinic appointments.

Other demographic variables, including age, marital status, number of children, language spoken most often at home, and family income, did not differentiate between attendees and non-attendees. This is encouraging, in that most of these variables are not easily targeted by clinic based interventions to improve attendance rates. One exception may be language, which has been subject to limited previous research and is an important variable to assess in a country with two official languages; in our genetics clinic services are regularly provided in French and English. Our finding that language does not appear to be a barrier to attendance is encouraging, but the question may need to be addressed for patients who do not speak either official language. People not fluent in English or French were excluded from the sample. There were 12 people who did not participate in the survey because of a language barrier. Nine of these were in the group who missed their appointments, so this is an issue that may merit further investigation, as a language barrier would represent a potential target for intervention.

It should be noted that the lack of significant results for many demographic variables may be in part because of the narrow response ranges associated with the corresponding survey items. For example, the mean age of survey respondents was quite young (36 years) and people over the age of 45 were virtually absent from the sample. Studies of adult non-genetics clinics would encompass a wider range of patient ages, leading to a greater likelihood of significant age effects. Moreover, the majority of participants were married (84%) and had children (77%). Only 10 participants (7%) reported a family income of less than $20 000, indicating a clear under-representation of low socioeconomic status families. The lack of any association with family income may also reflect universal access under the Canadian health care system. Previous studies showing significant effects of socioeconomic status have generally been conducted in the United States, a country which lacks universal health care.

The quality of information given to patients by their referring physicians about the referral to genetics was not associated with the overall rate of missed appointments. However, it did play a role in the specific subgroup of patients with a higher education level. Among those participants, the attendees reported that they understood the reasons for their referral better, and that their physicians had explained these reasons better, than those who did not attend. It appears that while patients with a higher education level are more likely to attend their appointments, they are also more likely to require thorough explanations of the rationale for the appointment before deciding whether or not to attend. Thus there may be some argument for improving the quality of pre-appointment information provided to patients by health care professionals.

These results lend some support to previous research indicating that patients who understand the reasons for their referral relatively well are more likely to attend their clinic appointments.[4] Contrary to previous studies,[5 7] however, the degree to which the referring physician recommended the genetics clinic appointment did not influence the likelihood of attendance.

Finally, although difficulties with scheduling conflicts, transport, and inability to take time off work may often at least in part conceal more important underlying reasons for non-attendance, they may sometimes compromise appointment keeping. Patients who had to arrange for child care in order to attend the clinic were more likely to miss their appointments, and this confirms previous results indicating that broken medical appointments are more likely among larger families and those with younger children.[1 3] The need for child care is an important barrier to the provision of health services at a genetics clinic because families comprise most of the patient population. Provision of day care facilities within medical institutions might prove cost effective, given that all clinics experience a similar, if not higher, no show rate.

The need to take time off work for a clinic appointment does not appear to present a significant barrier to appointment keeping, except for those who are required to take time off without pay. This problem could be solved if clinics extended their hours of operation, so as to accommodate work schedules.

Contrary to previous research,[1] other practical matters such as distance from the clinic and available method of transport were unrelated to rates of failed appointments at the CHEO genetics clinic. Such effects were lacking, despite the fact that patients reported a wide range of travel times, including 28 patients (20%) who indicated that it took them more than an hour to get to the hospital. It may be that once the patient has made an assessment that the appointment is important, travel time may be irrelevant. We cannot draw any conclusions regarding any effects of transport method, because the vast majority (83%) of respondents drove their own vehicles to the clinic. This probably reflects the high mean socioeconomic status of the current sample; studies involving less privileged people

might show that lack of a convenient mode of transport is a significant obstacle in appointment keeping.

Our patient sample does not reflect the general population and is a limitation of the present study. Participants were highly educated and reported relatively high family incomes, which may account for the slightly lower rate of non-attendance at this clinic, as compared with the rates seen in previous studies which have focused mainly on low socioeconomic status populations. It is possible that factors other than those we have evaluated, or that we have found negative in our sample, may contribute to non-attendance rates in patients with a lower educational and socioeconomic status. Nevertheless, our results support some findings of previous studies which included low socioeconomic status populations.[3 4 10] Moreover, the fact that our non-attendance rate was consistent with those reported by genetics clinics across Canada suggests that these rates reflect an accurate portrayal of the problem in the context of genetics health care in Canada.

Other limitations of this study include the limited generalisability of results to the United States health care system, as well as the telephone interview methodology. For non-attendees in particular, the latter approach may have restricted the degree of candour in participants' survey responses; future studies may benefit from the use of a more anonymous data collection format. Finally, approximately half of the surveyed genetics clinics provided estimated as opposed to actual rates of non-attendance. Estimation may not accurately reflect no show rates; however, a comparison of means indicated that the actual and estimated numbers were similar.

Results of this study suggest a number of potential targets for improving attendance rates at genetics and other outpatient medical clinics. Better education of patients about their medical condition, the nature and purpose of specific options available to them, and the costs and benefits associated with such options, is clearly indicated. To be maximally effective, such education should come from a variety of sources, including the mass media, pamphlets distributed to pharmacies and medical clinics of all types, and, most importantly, open and detailed communication between patients and physicians. Some clinics could also attempt to extend or modify their hours of operation and on site child care initiatives could be explored. These larger scale approaches, in combination with more traditional methods such as telephone and mailed appointment reminders, may help to replace lengthy waiting lists and wasted physician time with more efficient and far reaching health care services.

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1 Barron WM. Failed appointments: who misses them, why they are missed, and what can be done. *Primary Care* 1980;**7**:563-73.
2 Deyo RA, Inui TS. Dropouts and broken appointments. *Med Care* 1980;**18**: 1146-57.
3 Oppenheim GL, Bergman JJ, English EC. Failed appointments: a review. *J Family Pract* 1979;**8**:789-96.
4 Blankson ML, Goldenberg RL, Keith B. Noncompliance of high-risk pregnant women in keeping appointments at an obstetric complications clinic. *Southern Med J* 1994;**87**:634-8.
5 Aiken LS, West SG, Woodward CK, Reno RR. Health beliefs and compliance with mammography: screening recommendations in asymptomatic women. *Health Psychol* 1994;**13**:122-9.
6 Fulton JP, Buechner JS, Scott HD, DeBuono BA, Feldman JP, Smith RA, Kovenock D. A study guided by the Health Belief Model of the predictors of breast cancer screening of women ages 40 and older. *Public Health Rep* 1991;**106**:410-19.
7 Lerman C, Rimer B, Trock B, Balshem A, Engstrom PF. Factors associated with repeat adherence to breast cancer screening. *Prev Med* 1990;**19**:279-90.
8 Rosenstock IM. The Health Belief Model and preventive health behavior. *Health Educ Monogr* 1974;**2**:354-86.
9 Yeomans-Kinney C, Vernon SW, Frankowski RF, Weber DM, Bitsura JM, Vogel VG. Factors related to enrollment in the breast cancer prevention trial at a comprehensive cancer center during the first year of recruitment. *Cancer* 1995;**76**:46-56.
10 Mirotznik J, Ginzler E, Zagon G, Baptiste A. Using the Health Belief Model to explain clinic appointment-keeping for the management of a chronic disease condition. *J Commun Health* 1998;**23**:195-209.
11 Janz NZ, Becker MH. The Health Belief Model: a decade later. *Health Educ Quart* 1984;**11**:1-47.
12 Calnan M. The Health Belief Model and participation in programmes for the early detection of breast cancer: a comparative analysis. *Soc Sci Med* 1984;**19**:823-30.
13 Chaliki H, Loader S, Levenkron JC. Women's receptivity to testing for a genetic susceptibility to breast cancer. *Am J Public Health* 1995;**85**:1133-5.
14 Lerman C, Daly M, Balshem A. Attitudes about genetic testing for breast-ovarian cancer susceptibility. *J Clin Oncol* 1994;**12**:843-50.
15 Tambor ES, Bernhardt BA, Chase GA. Offering cystic fibrosis carrier screening to an HMO population: factors associated with utilization. *Am J Hum Genet* 1994;**55**:626-37.

CORRECTION

In the April 2000 issue of the journal, in the paper by Mortier *et al* on "Report of five novel and one recurrent *COL2A1* mutations with analysis of genotype-phenotype correlation in patients with a lethal type II collagen disorder", the mutation T1191N should have been T1190N throughout.