

Physician Ability to Predict Appointment-Keeping Behavior of Prenatal Patients

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Background. Prenatal appointment-keeping is considered an important component of adequate prenatal care. Interventions designed to increase the frequency with which patients keep prenatal appointments would be most effective if directed toward patients at greatest risk of missing prenatal appointments; however, it is difficult to identify this population of patients. The purpose of this study was to determine whether physicians could accurately predict the appointment-keeping behavior of their prenatal patients.

Methods. A simple questionnaire was completed by physicians at the time of the initial visit for prenatal care. On these surveys, physicians made predictions concerning each patient's subsequent appointment-keeping behavior. At the conclusion of prenatal care, predictions were compared with actual appointment-keeping as determined by chart audits.

Results. More than one half (57%) of patients kept at least 80% of their scheduled appointments. Physicians predicted fair to poor appointment-keeping for 23% of the patients, but 43% of all patients met the criteria for fair to poor appointment-keeping. There was no correlation between physician predictions and actual appointment-keeping. The physician's sex, level of training, and degree of certainty about his or her predictions had no impact on the accuracy of the predictions. In identifying patients at high risk of missing appointments, physician predictions had a sensitivity of 26%, a specificity of 79%, and a positive predictive value of only 47%.

Conclusions. Physician prediction was not found to be an accurate method of identifying patients at risk for missing appointments.

Key words. Prenatal care; appointments and schedules; patient compliance. (*J Fam Pract* 1996; 42:482-486)

It is generally accepted that healthy outcomes in pregnancy are related to and may be in part dependent on adequate prenatal care.¹⁻⁴ Adequacy of prenatal care is, in turn, dependent on early entry into care and appropriate frequency of subsequent prenatal visits.^{1,5,6} Numerous studies have demonstrated that a significant number of women in this country do not receive adequate care as determined by these factors.^{4,5}

In a previous study conducted in our family practice center (Feierabend RH. Prenatal appointment-keeping behavior: correlation with demographic and psychosocial factors. Unpublished report, 1994), only 30% of women had adequate prenatal appointment attendance, while

60% had intermediate and 10% had inadequate attendance. These findings were determined by using a modification of the Kessner index,¹⁻³ the most commonly used measure of prenatal appointment-keeping. Only 34% of women in that study had their initial prenatal visit during the first trimester, and only 62% kept 80% or more of their subsequent prenatal appointments.

Timeliness of the first prenatal visit is an important factor but one that individual physicians may have relatively little ability to affect, since preconception counseling tends to be the exception rather than the rule. Once a patient presents for her initial visit, however, the physician has the opportunity to address the importance of prenatal care, and thus may be able to influence subsequent appointment-keeping behavior. Strategies to improve appointment-keeping include interventions such as mail and telephone reminders, patient education, and patient contracts.⁷ More comprehensive interventions that have been

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suggested include community outreach programs, assistance with transportation and child care, and increased accessibility of health care facilities.⁸⁻¹⁰ Such programs are expensive, however, and may not be cost-effective if provided to all prenatal patients. Targeting a subset of high-risk patients would be more feasible but would require a method for identifying women at highest risk of missing follow-up prenatal appointments.

Only one published study has identified sociodemographic factors associated with poor prenatal appointment-keeping after the initial visit. The identified risk factors include younger maternal age, higher parity, unplanned pregnancy, longer travel time for appointments, and lack of private insurance.¹¹ In our previous study (Feierabend RH. Prenatal appointment-keeping behavior: correlation with demographic and psychosocial factors. Unpublished study, 1994), higher parity, unmarried status, and ambivalent or negative feelings about the pregnancy were associated with lower rates of appointment-keeping. No other sociodemographic factors have been identified, however, that would more accurately characterize patients at risk.

Wells et al¹² demonstrated that teenagers' prenatal appointment-keeping rates were associated with the extent of agreement or disagreement between the health care professional and the teenager regarding her health care risks and needs: the greater the disagreement, the greater the patient's risk of not keeping prenatal appointments. Although this study suggests one method of identifying those patients at risk, routine completion and scoring of the instrument used in the study would likely be impractical in clinical practice.

If physician prediction of follow-up prenatal appointment-keeping were accurate, it would be a quick, simple, and inexpensive method of identifying patients at risk. Unfortunately, the limited volume of literature currently available on the subject of patient adherence to physician recommendations suggests that physicians are not at all accurate in predicting patient behavior.¹³⁻¹⁵ Although these studies did not specifically address prenatal appointment-keeping, they demonstrated that physicians perform little better than chance in predicting patient adherence to other recommended aspects of their care. This study was designed to determine how well physicians in a family practice residency program can predict their prenatal patients' appointment-keeping behavior.

Methods

The study setting was the model practice for a family medicine training program in a community of approxi-

mately 40,000 in northeastern Tennessee. During the time of the study, obstetrical care was provided to patients in the practice by all 18 residents and three of the full-time family practice faculty.

Each physician was asked to complete a brief questionnaire immediately following each initial obstetrical workup during a 9-month period. They were asked to predict how well the patient would keep subsequent prenatal appointments and how certain they were of the prediction. Before the study, the physicians were familiarized with the criteria to be used in determining adequacy of appointment-keeping. Good to excellent adherence with appointment-keeping was defined as 80% or more scheduled appointments kept; fair to poor adherence was defined as fewer than 80% of scheduled appointments kept. Because of potential logistical problems in scheduling office appointments in a timely manner, some flexibility was allowed in determining whether an appointment was missed. For each recommended return date, additional days were allowed.

The following formula was used to determine whether scheduled prenatal appointments were kept by patients: for a return appointment within 7 days of the current visit, the appointment was considered to have been kept if the patient was less than 2 days late for the appointment; for an appointment within 7 to 13 days of the current appointment, less than 4 days late; 14 to 20 days of the current appointment, less than 6 days late; 21 to 27 days, less than 8 days late; and 28 or more days, less than 11 days late.

Charts were reviewed after patients gave birth. Data extracted included basic sociodemographic information, recommended time of return for each visit as recorded in the chart, and actual office or hospital visit dates. Adherence to each recommended return visit was determined from these data.

The data were analyzed using simple descriptive statistics, standard nonparametric tests, and standard formulas for accuracy, sensitivity, specificity, and predictive values.

Results

During the 9 months of the study in which physicians made predictions, approximately 140 patients visited the practice for initial obstetrical workups; 92 usable forms were returned by 19 different physicians. Of these, 17 patients were subsequently excluded for various reasons: 3 of the patients' charts did not include information concerning recommended return visit dates, 11 patients transferred or dropped out of care during the prenatal care period, and 3 patients had spontaneous abortions.

Table 1. Frequency of Physician Prenatal Appointment-Keeping Predictions, by Physician Group

Physician Group	Physician Predictions of Patient Adherence to Scheduled Prenatal Appointments	
	Good to Excellent* n (%)	Fair to Poor† n (%)
All physicians	58 (77.3)	17 (22.7)
By level		
PGY I	9 (75.0)	3 (25.0)
PGY II	19 (70.3)	8 (29.6)
PGY III‡	24 (96.0)	1 (4.0)
Faculty	6 (54.5)	5 (45.5)
By sex		
Female	37 (74.0)	13 (26.0)
Male	21 (84.0)	4 (16.0)

*Good to excellent denotes $\geq 80\%$ of appointments kept.

†Fair to poor denotes $< 80\%$ of appointments kept.

‡ $P = .007$ for PGY III compared with PGY I and II and faculty.

PGY denotes postgraduate year.

The 75 remaining cases were analyzed. There were no significant differences in either resident predictions or certainty of the predictions between the group of patient charts included and those excluded from analysis.

Tables 1 and 2 display information concerning physicians and their predictions. The majority of predictions submitted were made by second- and third-year residents and by female physicians. Most of the predictions were for good to excellent appointment-keeping. PGY III (third postgraduate year) residents were more likely to predict good to excellent appointment-keeping. There was a relatively high degree of certainty in the predictions for all physicians, especially for PGY I and male physicians.

Physicians were somewhat more likely to predict fair

Table 2. Physician Certainty of Prenatal Appointment-Keeping Predictions, by Physician Group

Physician Group	Physician Level of Certainty About Accuracy of Prenatal Appointment-Keeping Predictions	
	Very Certain to Certain n (%)	Uncertain to Very Uncertain n (%)
All physicians	50 (66.7)	25 (33.3)
By level		
PGY I*	11 (91.7)	1 (8.3)
PGY II	18 (66.7)	9 (33.3)
PGY III‡	12 (48.0)	13 (52.0)
Faculty	9 (81.8)	2 (18.2)
By sex‡		
Female	27 (54.0)	23 (46.0)
Male	23 (92.0)	2 (8.0)

* $P = .046$ for PGY I compared with PGY II and III and faculty.

† $P = .016$ for PGY III compared with PGY I and II and faculty.

‡ $P = .001$.

PGY denotes postgraduate year.

Table 3. Prenatal Appointment-Keeping, by Patient Group

Patient Group	No. (%) of Patients Who Kept	
	$> 80\%$ of Appointments	$< 80\%$ of Appointments
All patients (N=75)	43 (57.3)	32 (42.7)
Age, y		
< 20	19 (44.2)	24 (55.8)
≥ 20	12 (37.5)	20 (62.5)
Parity		
0	22 (59.5)	15 (40.5)
1	14 (60.9)	9 (39.1)
> 1	7 (46.7)	8 (53.3)
Trimester of first visit		
First	23 (67.6)	11 (32.4)
Second or third	20 (48.8)	21 (51.2)
Previous visits to study practice		
Yes	16 (59.3)	11 (40.7)
No	27 (56.3)	21 (43.8)
Prior visit to same physician		
Yes	6 (54.5)	5 (45.5)
No	37 (57.8)	27 (42.2)

* $P > .05$ for all differences.

NOTE: $\geq 80\%$ is considered good to excellent adherence to recommended appointments; $< 80\%$, poor to fair.

to poor appointment-keeping for patients older than 20 years of age and for those who initiated care during the second or third trimester; however, these differences were too small to be statistically significant. Physicians were no more likely to predict good to excellent appointment-keeping for patients they had followed previously in the practice.

Table 3 displays appointment-keeping data of patients in the study. Fifty-seven percent of patients kept 80% or more of their appointments. Appointment-keeping was not correlated with patient age, parity, trimester of first prenatal visit, or previous experience at the study practice. Although there appeared to be a trend toward better appointment-keeping among women of lower parity and among those with a first-trimester initial appointment, these differences were not significant ($P < .05$). In addition, there was no correlation between appointment-keeping and the PGY level or sex of the predicting physician.

Overall, there was no correlation between predictions and appointment-keeping. Physicians predicted good to excellent appointment-keeping, defined as keeping at least 80% of scheduled appointments, for 77% of cases, whereas only 57% of patients actually complied at the good to excellent level. For fair to poor compliance, the percentages were 23% predicted and 43% actual. Subgroup analyses further revealed that physician level of training, sex, and degree of certainty had no impact on the

accuracy of the predictions. In addition, there was no correlation between accuracy of the predictions and patient age, parity, trimester of first visit, or prior visits to the predicting physician.

To evaluate the utility of physician prediction of appointment-keeping as a method of identifying those at high risk of missing appointments, the results were examined for sensitivity, specificity, and positive predictive value. As a test for determining which patients are at risk for poor to fair appointment-keeping, physician predictions had an accuracy of 56%, with a sensitivity of only 26%, specificity of 79%, and positive predictive value of 47%.

Discussion

Physician prediction of patient adherence has been the subject of only a few studies. Caron and Roth¹³ studied internal medicine residents on an inpatient gastroenterology service and found that they were unable to predict which patients would adhere to a prescribed antacid regimen. Physician confidence in their predictions did not correlate with their accuracy. In a study of 10 practicing Canadian family physicians, Gilbert et al¹⁴ demonstrated that the physicians were unable to do better than chance at identifying which patients of those for whom digoxin had been recently prescribed were taking at least 80% of the prescribed doses. Their accuracy did not improve even when making predictions for patients who had been in the practice for more than 5 years.

In the only previously published study of physician accuracy in predicting patient appointment-keeping, Mushlin and Appel¹⁵ demonstrated very poor accuracy among internal medicine house staff. Thirty-nine physicians were asked to predict which patients discharged from the hospital would keep their first hospital follow-up appointment. Interns correctly identified 8 of the 40 patients who subsequently missed appointments, while residents correctly identified 14 of the 40. Approximately one half of all predictions of missed appointments were incorrect, and physician certainty about the predictions did not affect the accuracy of their predictions.

The findings in this study are consistent with those of other studies. The physicians providing prenatal care were unable to predict with any degree of accuracy at a patient's first prenatal visit whether she would keep her subsequent prenatal appointments in a timely manner. There were no differences in the accuracy of predictions based on physician sex, level of training, or certainty of prediction. Although small statistical differences between the groups might have been missed because of the relatively small number of predictions in the study, it is unlikely that clinically relevant differences exist.

A number of methodologic difficulties should be noted. The methods used to measure appointment-keeping adherence were somewhat arbitrary, and the clinical significance of missed appointments is unknown. The Public Health Service Expert Panel on the Content of Perinatal Care has recommended a reduced number of routine prenatal visits in low-risk pregnancies,¹⁶ and a recent unpublished study supported this recommendation.¹⁷ The current study was not limited to low-risk pregnancies, however, and prenatal appointment-keeping was based on individual patient adherence to actual physician recommendations for return visits, rather than an arbitrary number of recommended visits. The thresholds set were considered low enough to be clinically relevant, the participating physicians were aware of the criteria being used, and all agreed that the criteria were reasonable.

Not all physicians in the practice participated, and not all of those who participated made predictions for all pregnancies they followed. It is possible that the physicians not included in the study might differ from those who participated. There is no compelling reason to expect that physicians who did not complete forms would be more accurate in their predictions than those who did participate.

There was no way to determine the appointment-keeping behavior of patients who transferred their care or who did not return to the study practice for follow-up. Although some who dropped out might subsequently have received no prenatal care, some might have established care with other providers. Since the physicians were no more likely to predict poor appointment-keeping for this group, it is unlikely that their inclusion would have resulted in more accurate identification of those at risk.

No attempt was made to identify or understand the factors used by physicians in making their predictions. This information could be studied using qualitative methodologies.

No discernible trends were apparent in the overall ability of physicians to predict appointment-keeping. It should be noted that the number of predicted cases was relatively small and that a larger number of cases might have demonstrated differences between subgroups. It is unlikely, however, that a larger study would alter the primary conclusion that physician prediction is not an effective tool for identifying prenatal patients who are likely to miss subsequent appointments. If high-risk patients are to be targeted for early intervention to improve prenatal appointment-keeping, additional strategies will be needed to identify these patients.

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