Physician Practice Variation in Assignment of Return Interval

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**Background:** Recent shifts in reimbursement toward capitation make appointment availability a significant resource and stimulates us to understand primary care physician (hereafter referred to as “provider”) behavior concerning appointment assignment. The results of prior studies suggest significant provider variability in this area.

**Objective:** To examine the influences on assigning patient revisit intervals in the ambulatory setting.

**Methods:** Survey regarding general care issues of hypothetical diabetic and hypertensive patients seen in an ambulatory setting was given to 62 providers in the Internal Medicine Program at the Tulane University Internal Medicine Residency Program and outpatient clinics, New Orleans, La. Measurements evaluated included survey responses for demographics (sex, year of birth, year of graduation from medical school, and level of training) and practice style (decision to change therapy, order tests, and recommended return appointment interval in weeks) variables.

**Results:** The response rate was 89% (56 providers). Most respondents were men (n = 39). Wide variation was noted in assignment of reapointment interval with mean return intervals for the scenarios ranging from 2.2 to 20.5 weeks. Significant influences on provider practice included patient stability (P<.001), the decision to change therapy (P = .001), and the decision to order tests (P = .001). All correlated with an earlier return appointment. Some providers exhibited test-ordering tendencies across scenarios. Sex was a significant provider independent variable and was not influenced by other study variables. Female providers assigned earlier reappointment intervals for their patients.

**Conclusions:** Wide variation exists among practitioners with similar training background and practice setting. As expected, patient stability was a major determinant of assigned return interval. Test-ordering behaviors may consume appointments inappropriately and may be a productive area for efforts to reduce provider variability. The influence of the provider’s sex on scheduling follow-up appointments warrants further investigation.

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**PATIENT appointments are the foundation of ambulatory medical practices—functioning as the main forum for providing patient care and representing one of the chief sources of income for most physicians. Recently, health care systems have been in transition from fee-for-service models to those involving capitation for physician reimbursement. Because seeing patients less often allows a larger panel size, this transition puts significant pressure on primary care physicians (hereafter referred to as “providers”) to determine the most desirable appointment intervals for their patients. Despite this pressure, little is known concerning the optimum pattern for return intervals to ensure quality patient care.

Provider behavior for this vital resource is also not well understood. Others have shown that wide variation in provider assignment of revisit appointments exists.1,3 The influences on a provider’s decision-making process are complex. Prior work has shown that contributors include provider and patient characteristics such as training background and disease severity index.1,3,6-8

Despite these studies, there is still considerable uncertainty regarding all of the factors affecting assignment of revisit interval. To improve efficiency in provider practice styles, we must better understand what leads to the variability among practitioners. Therefore, we surveyed providers about their selection of reappointment intervals for hypothetical patients with common ambulatory diagnoses to investigate potential influences on provider practice. We assessed demographic and practice style characteristics of providers for their effect on follow-up intervals assigned to patients with varying degrees of illness stability.

**RESULTS**

Complete data were available on 56 providers (89%) (Table 1). The Levene test confirmed wide variation in assignment of...
MATERIALS AND METHODS

PROTOCOL

A waiver from the Institutional Review Board was obtained. We developed 7 scenarios of ambulatory patients at varying levels of stability with reference to their diabetes mellitus (n = 4) and hypertension (n = 3). We individually rated each case for the simulated patient’s “stability” on a nominal scale from 1 (most) to 4 (least). Inter-rater agreement among us was 100% for the patient stability level assigned to each scenario.

The survey was distributed in person to 62 providers affiliated with the Tulane University Internal Medicine Residency Program and outpatient clinics, New Orleans, La.

MEASUREMENTS

Respondents were requested to evaluate the cases and document their desired return interval in an open-ended fashion. They were also asked to report whether they would change the patient’s therapy or order any tests. Demographic information was gathered for the providers including sex, year of birth, year of graduation from medical school, and level of training.

STATISTICAL ANALYSIS

The Levene test was employed to assess variation in appointment interval on a case-by-case basis and variation in appointment interval was likewise evaluated by visual analysis of histograms.

Because male respondents (n = 39) outnumbered female respondents (n = 17), a random within-group deletion was employed to confirm observed significant effects obtained from the original data set with unequal cell sizes. P < .05 was considered statistically significant for all analysis.

Analysis of variance was conducted to evaluate the effects of independent variables including both patient and provider characteristics on assigned return visit interval. Analysis of covariance was conducted to assess the interaction between independent variables determined to have significant effect in analysis of variance. Post hoc t tests were used to assess significance. Spearman rank correlation coefficient was employed as a nonparametric test of association across scenarios.

return interval across all cases. Further evaluation of assigned return intervals demonstrated that providers viewed the scenarios differently (P < .001, analysis of variance). Mean revisit intervals for the 7 scenarios ranged from 2.2 to 20.5 weeks (Figure).

The scenarios were created to simulate varying levels of patient stability. In analysis, patient stability was confirmed to have a significant effect on assigned patient return intervals. The less stable patients were assigned shorter revisit intervals (data not shown).

Provider characteristics, practice style, and demographics also affected return interval assigned. The decision to change therapy consistently influenced the return interval with providers who elected to change therapy scheduling shorter return intervals for patients in 6 of 7 cases. This was statistically significant for all scenarios (P < .001) (Table 2). In one simulation, all providers elected not to change therapy. There was no tendency for providers to change therapy across scenarios. Stability was a significant factor affecting decisions to change therapy (P for interaction < .001, analysis of covariance).

The decision to order tests influenced visit frequency. In 4 of 7 cases, the providers selected a shorter return interval for patients in whom they ordered tests and this was statistically significant for all scenarios (P < .001, Table 2) and in 2 individual cases. In scenario 4, all providers elected to order tests. A provider tendency to order tests across scenarios was also evident. This was significant in cases concerning patients with diabetes (Table 3).

Of the provider demographic variables, level of experience exerted only a marginal effect. The sex of the provider was found to have a significant independent effect on assignment of reappointment intervals. Female providers assigned shorter revisit intervals than male providers for the entire data set (P = .02) and in 6 of 7 scenarios. This difference reached statistical significance in 2 scenarios (Table 2). This sex tendency occurred independently of other provider variables including the decision to change

Table 1. Survey Respondent Characteristics*

<table>
<thead>
<tr>
<th>Level of Experience</th>
<th>Female</th>
<th>Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>PGY-1</td>
<td>4</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>PGY-2</td>
<td>8</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>PGY-3</td>
<td>2</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>&gt;PGY-3†</td>
<td>3</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>39</td>
<td>56</td>
</tr>
</tbody>
</table>

*PGY indicates postgraduate year.
†Includes junior faculty and a nurse practitioner. P > .1 for sex vs year of training.

Figure

Variation in assigned return interval. Scenarios refer to simulations created for varying levels of patient stability. Box indicates 75% confidence interval for each scenario; vertical bars, 95% confidence interval; circles, outliers; and asterisks, extreme outliers. Complete information was available on 56 respondents for a response rate of 89%.
The physician has always desired to provide quality, efficient, and effective medical care to his or her patients. The recent dynamic economic shifts in the health care market have put further pressure on the system to improve efficiency. Some inefficiency does exist in the system as evidenced through provider practice variation. One key area of this variability is in assignment of return intervals for clinic patients. Patients assigned appointments earlier than needed can unnecessarily consume vital health care resources. To reduce this variation, its origins must be better characterized.

Prior surveys of physician practice patterns have shown wide variation in the assignment of recommended follow-up intervals. For example, a survey of Iowa practitioners reported wide variation in the assigned revisit interval for common ambulatory problems including hypertension and diabetes.4 Other studies1-3,5,7-9 have reported similar patterns. In essence, this demonstrates that despite the existence of consensus guidelines such as the Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure,10 little agreement exists among practitioners on the day-to-day practice of treating common ambulatory problems. Our findings support this variability.

Table 2. Factors Influencing Primary Care Physician Assignment of Return Interval*

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Female</th>
<th>Male</th>
<th>Therapy Changed</th>
<th>Tests Ordered</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.82 (1.13)</td>
<td>2.33 (1.56)</td>
<td>2.20 (1.48)</td>
<td>2.33 (1.86)</td>
</tr>
<tr>
<td>2</td>
<td>16.71 (7.82)</td>
<td>19.15 (11.23)</td>
<td>11.27 (7.51)</td>
<td>19.90 (9.79)</td>
</tr>
<tr>
<td>3</td>
<td>6.59 (3.87)</td>
<td>9.56 (4.25)</td>
<td>8.52 (4.47)</td>
<td>9.31 (3.86)</td>
</tr>
<tr>
<td>4</td>
<td>2.71 (3.04)</td>
<td>3.56 (3.16)</td>
<td>3.09 (2.88)</td>
<td>4.20 (4.49)</td>
</tr>
<tr>
<td>5</td>
<td>4.94 (4.79)</td>
<td>4.87 (3.74)</td>
<td>4.28 (3.37)</td>
<td>5.91 (4.91)</td>
</tr>
<tr>
<td>6</td>
<td>15.41 (6.77)</td>
<td>22.41 (12.00)</td>
<td>0.00 (0.00)</td>
<td>20.55 (10.63)</td>
</tr>
<tr>
<td>7</td>
<td>3.88 (2.96)</td>
<td>4.54 (4.17)</td>
<td>4.41 (4.66)</td>
<td>5.83 (4.22)</td>
</tr>
<tr>
<td>Overall</td>
<td>7.44 (7.37)</td>
<td>9.49 (10.13)</td>
<td>4.67 (4.51)</td>
<td>15.79 (11.01)</td>
</tr>
</tbody>
</table>

*All values are expressed as mean (SD) number of weeks. Differences were evaluated by t tests. Scenarios refer to simulations created for varying levels of patient stability.

†P = .02.
‡P = .03.
§P = .004.
P< .001.
P = .018.

Table 3. Nonparametric Correlations for Test-Ordering Behaviors*

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
<th>Scenario 5</th>
<th>Scenario 6</th>
<th>Scenario 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>1.000</td>
<td>†</td>
<td>†</td>
<td>†</td>
<td>†</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>0.046 (.73)</td>
<td>1.000</td>
<td>†</td>
<td>†</td>
<td>†</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>0.127 (.33)</td>
<td>0.455 (&lt;.01)†</td>
<td>1.000</td>
<td>†</td>
<td>†</td>
</tr>
<tr>
<td>Scenario 5</td>
<td>-0.044 (.74)</td>
<td>0.306 (.018)†</td>
<td>0.394 (.002)†</td>
<td>1.000</td>
<td>†</td>
</tr>
<tr>
<td>Scenario 6</td>
<td>0.030 (.82)</td>
<td>0.339 (.009)†</td>
<td>0.116 (.37)</td>
<td>0.171 (.19)</td>
<td>1.000</td>
</tr>
<tr>
<td>Scenario 7</td>
<td>0.121 (.35)</td>
<td>0.269 (.04)†</td>
<td>0.705 (&lt;.001)†</td>
<td>0.580 (&lt;.001)†</td>
<td>0.093 (.48)</td>
</tr>
</tbody>
</table>

*Correlation coefficient (value for P in parentheses). Scenarios refer to simulations created for varying levels of patient stability. No primary care physicians elected to order tests in scenario 4.
†Statistically significant.

The factors that affect this variability are complex and have yet to be fully identified. From this work, we have further elucidated some of the causes and confirmed some of the influences previously described. For example, patient characteristics are known to influence provider behavior. Prior studies have shown that physicians assign significantly shorter revisit intervals to more unstable patients.2,4 Knowing this, we preassigned patient stability as an independent variable. Analysis con-
firmed that it had a significant effect with the less stable patients assigned an earlier return appointment.

We noted that some providers tended to order tests. This tendency for test ordering was associated with shorter revisit intervals. This physician tendency to order tests has previously been correlated with the assignment of a shorter return visit interval. Others have inferred from similar data that physicians who see their patients more often may be greater users of system resources in general.7,11,12

There are other provider variables that have been found to be significant in this and prior studies. For example, the decision to treat a patient has led to earlier return appointments. Similarly, our study demonstrated that therapy changes affected revisit interval. Providers who changed patients’ medical therapy scheduled earlier return visits for these patients. Patient stability was an important correlate for the decision to change therapy.

Provider demographic characteristics are likewise important. Some work has shown that background training will influence decision making regarding clinic follow-up intervals. Our survey controlled for this by querying providers with the same training background, working in the same ambulatory setting.

An association between level of training and revisit interval has been reported. A shorter appointment interval has been assigned by those with less training. We did note an insignificant trend, but our sample size may not have been large enough to establish significance.

Our work is the first to report the sex of the provider as a significant influence on provider practice. Another similar survey did not find this to be a variable. Yet in our work it is clearly significant. Furthermore, female providers’ assignment of earlier return appointments is unassociated with test ordering behaviors, with level of training, or with patient stability level.

Studies have shown practice styles do vary between male and female physicians. Female physicians have been shown to focus more on preventive care during their patient interactions when compared with male practitioners. Women have also been shown to be more vigilant about screening for colon cancer via ordering more fecal occult blood tests and doing more rectal examinations than their male counterparts. The implication for patient outcome and the reasons for this difference are unclear at this juncture but warrant further study.

It has been suggested that external influences (ie, work environment) on physician practice have been shown to contribute more than internal influences (ie, training background). It seems clear, however, from our study that provider behavior is influenced by internal characteristics such as sex. Nevertheless, these characteristics account for only a portion of the variance.

Our study has several limitations. The sample size was insufficient to evaluate the effect of provider level of training that has been shown to be significant in other work. Additionally, the sampling consisted almost entirely of house staff. A broader survey including practicing physicians may have expanded the influence of the level of training experience. Nevertheless, our responses are very similar to those of surveys of fully trained practitioners.

Although we noted a significant effect of patient stability on the assigned return interval, the influence of stability may be better evaluated by allowing the provider rather than the investigator to assign a stability level. A few respondents requested the option to provide interval telephone contact with patients to lengthen the follow-up interval, but this was not given as an option. Others noted that the option of ordering tests was worded too vaguely and implied too broad a spectrum.

The variables we identified are responsible for only 43% of the variance noted for the assigned patient return interval. The other potential influences on this decision making are numerous. They include patient characteristics such as level of education, social situation, and demand for specific services. Likewise, their work environment and the availability of resources influence physicians’ practice patterns.

Understanding provider practice patterns for return visit assignment is only a step toward improving physician practice to provide effective yet efficient care. Decreasing practice style variability in the assignment of return appointments may hinge on altering the significant influences on provider behavior such as trends toward test ordering. Prior to implementing revisit interval recommendations, we must correlate desired efficiency and constancy in practice with good patient outcome.

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REFERENCES