Assessing the Timeliness of Ambulatory Medical Care

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Abstract: The extent to which individuals receive necessary and timely care (timeliness) is one dimension of the process of care that has received little attention. Timeliness can be viewed as the interaction between patient care-seeking behavior and system accessibility, both of which are expected to influence the effectiveness of medical care. This study examines the provider's assessment of the timeliness of care received in the department of medicine of a prepaid program. Provider judgments are found to be significantly related to the provider's perception of problem severity and to the patient's prognosis. Analysis of patient-reported problem status one week later are also found to be related to the timeliness of care. Implications of timeliness assessments for monitoring and improving access and care-seeking behavior are discussed. (Am. J. Public Health 68:547-556, 1978.)

Considerable attention has been focused on access to care[1] and factors that contribute to the delay or denial of medical care services. Studies[2-4] have identified organizational and behavioral characteristics that are associated with varying levels of access and subsequent utilization. However, for those who receive care, little is known about the extent to which services are received at the appropriate time (timeliness) as judged by either the provider or patient. Additionally, there is the unanswered question of what differences exist, if any, in the process, outcomes, and cost of care as a function of the timeliness of care received. As a result, the question of how accessible health care services should be remains largely unresolved. The purpose of this study is to apply a simple measure of the timeliness of care to patients seen in a prepaid group practice setting and to examine its potential importance for explaining differences in outcomes of care.

Methods

Timeliness can be conceptualized as measurable along a continuum from too early (cannot be diagnosed and treated), to optimum, and to delay to the point where care can no longer be effective. The approach taken in this study was to divide the continuum into intervals based on two questions directed at the provider. The provider was asked to assess whether the patient needed medical care at the time of the visit and whether he/she should have been seen earlier in the course of his/her condition.

Responses to these questions separated the patients into four mutually exclusive categories:

- Medical care not indicated (does not need to be seen and did not need to be seen earlier);
- Medical care no longer needed (did not need to be seen at this time, but should have been seen earlier);
- Delayed care (should have been seen earlier and still needs to be seen); and
- Timely care (needs to be seen and did not need to be seen earlier).

The first category—medical care not indicated—might be expected to include patients who have ill-defined or self-limited problems about which they are concerned, but are viewed by the provider as not benefiting from medical care. These patients may be expressing excessive concern about their health, e.g., "worried well,"[5] or it may be the case that the patient is being seen in the early stages of a progressing condition. The second and third categories—medical care no longer needed; delayed care—include all cases for which the judgment is made that benefit would have resulted from earlier care. Factors that may contribute to delay in the receipt of care could involve the entire process of symptom recognition, symptom evaluation, and the steps taken by the individual to seek care. The last category—timely care—is the desired outcome of the interaction of the patient's health care-seeking behavior with the medical care setting.

Patient and provider perceptions of what constitutes

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timely care may be expected to differ. The provider's perspective would be expected to involve considerations of his capability to diagnose and treat effectively the presenting condition. Specifically, he would consider the natural history of the condition, the extent to which therapeutic interventions could be expected to alter its course, and the relationship of the intervention's timing to improvement in outcome. The patient's behavior would be expected to be influenced by similar considerations. However, the appraisal may differ from that of the provider. The patient's decision regarding when to seek health care may be more heavily affected by such factors as his/her usual pattern of seeking health care, cost, accessibility, and availability of care. To measure congruence between patients and providers assessment of timeliness, the patient was asked if he/she should have been seen sooner. It was assumed that by presenting for care, patients are answering the question affirmatively that they need to be seen.

Setting of Study

Data were collected on patients seen in the Columbia Medical Plan (Maryland), a comprehensive prepaid group practice program with approximately 19,000 enrollees. This population is predominantly white, middle class with higher than average incomes. The Plan is organized into departments (Pediatrics, Adult Internal Medicine, Ob-Gyn, etc.) with a 24-hour Urgent Care Clinic to meet immediate medical care needs on a walk-in basis. Departments function primarily using scheduled appointments and providing same-day appointments as available. The Departments of Pediatrics, Internal Medicine, and the Urgent Care Clinic were included in the study. Only the findings for the Department of Medicine will be discussed in this paper. The Department of Medicine has a full-time staff of four board-certified internists and five health associates (similar to nurse practitioners in function).[6] The Department provides continuing care for chronic medical problems and acute episodic care. When appointments are not immediately available for acute care, patients are referred to Urgent Care. Patients may also elect to go to Urgent Care without referral.

Data Collection

Data were collected for a two-week period in November 1975 on all enrollees visiting the Department of Medicine. Each patient was asked to complete a waiting room questionnaire which sought information about the reason for seeking care, whether or not the patient felt he/she should have been seen sooner, whether he/she had a usual source of care (provider) in the Department, and the patient's perception of the status of his/her problem at the time of the visit; that is, the level of symptoms, activity limitation and anxiety caused by the specific problem for which he/she sought care. These three measures of patient problem status have been developed and applied in an Experimental Medical Care Review Organization (EMCRO) project conducted at the Columbia Medical Plan. The problem status measure (PSM) was designed to assess the severity of a specific health problem in terms of the three dimensions: symptoms, activity limitation, and anxiety. Experience with the PSM indicates that it is understood and accepted by patients and providers and that when patients report the presence of symptoms and/or activity limitation, a clinician examining the patient will generally find evidence of illness.[7] The PSM has been applied and tested in an ambulatory quality assurance program as a mechanism for identifying substandard outcomes through follow-up inquiries to patients previously seen.[8]

Also at the time of the visit, each provider of care was requested to complete a brief questionnaire attached to the routine encounter form. The encounter form captures the identity of patient and provider, the purpose of the visit, provider's statement of diagnosis, procedures ordered, and disposition. In the supplemental questionnaire, the provider was asked to judge whether or not the patient needed to be seen and whether the patient should have been seen earlier in the course of his/her condition. If earlier care was indicated, the provider identified the expected benefits from more timely care; that is, would it have shortened the problem's duration, reduced activity limitation or anxiety, or decreased the likelihood of complications? Providers were asked to indicate their perception of the level of symptoms, activity limitation, and anxiety the patient was experiencing at the time of the visit and their prognosis for the patient's PSM one week later given good medical care. A sample of 50 per cent of patients were interviewed by telephone at one week to obtain their reported PSM as an indicator of proximal outcome. Providers completed forms on 87 per cent of the visits; patients returned 76 per cent of the questionnaires at the time of the visit; and 76 per cent of follow-up telephone interviews were successfully completed.*

Results

As stated earlier, the purpose of this study was to apply a simple measure of the timeliness of care and to examine its characteristics, focusing on its relationship to outcomes of care. Specifically, the results will address: 1) the extent to which patients receive timely care as assessed by the provider and its expected benefits; 2) the reliability of provider timeliness judgments; 3) the relationship of patient characteristics to timeliness; and 4) differences in patient-reported problem status outcomes associated with timeliness of the visit.

The providers responded to the timeliness questions for 332 patients seen for initial visits (i.e., scheduled follow-up visits were not included in the analysis). They judged that 21 per cent of these patients would have benefited from earlier care, 68 per cent were seen on a timely basis, and 10 per cent did not need to be seen. Only one patient was identified as benefiting from earlier care, but not now needing it.

Table 1 shows the age, sex, and diagnostic characteristics of patients distributed by the provider's assessment of the timeliness of care received. No significant differences are

*No statistically significant basis in age, sex, or type of condition distinguished the non-respondents.

associated with sex, but delayed care was inversely associated with age, while those in the oldest and youngest categories were more likely to be in the "medical care not needed" group. Patients with acute conditions were more likely to receive delayed care than patients with other types of conditions.**

TABLE 1—Patient Characteristics Distributed by Provider Assessments of the Timeliness of Care

	Provider Reported			
	Total	Per Cent Delayed	Per Cent Timely	Per Cent Not Needed
Age	($p < .01$)†			
Under 45	217	25	63	12
45-64	81	17	80	2
65+	34	9	76	15
Sex	(N.S.)†			
Female	199	24	65	11
Male	133	18	73	9
Type of Condition	($p < .001$)†			
Acute	50	34	60	6
Acute Chronic	27	26	63	11
Chronic	143	22	71	8
Symptom	58	21	72	7
Other	34	9	79	12
No Diagnosis	20	5	50	45
TOTAL	332	21	68	10

†Level of statistical significance for Chi-Square Test. ("N.S." indicates no statistical significance at the .1 level)

Ideally, to examine the inter-rater-reliability of the timeliness measure, one would have different providers judge timeliness for the same visits. Since it was not practical to do this, reliability was examined by comparing the distribution of the timeliness categories by individual provider, while controlling for differences in case mix. Of the 331 encounters in the analysis, physicians were the primary provider for 220, while non-physician providers accounted for 121. There were four different physicians that accounted for 90 per cent of all "physician-encounters" and five non-physicians who accounted for 93 per cent of all "non-physician encounters." The remaining encounters were grouped into "other-physician" and "other non-physician" categories. When controlling for type of condition, there were no statistically significant differences (X^2 test, $p > .05$) among physicians, nor among the non-physicians, in their judgments of timeliness. Physicians, as a group, however, did differ from the non-physicians for patients having acute conditions and symptoms. For both of these categories, physicians were more likely to judge a visit as not needed; in addition, for symptoms, physicians were less likely to judge a visit as delayed.

Comparing the provider's assessments of timeliness with the patient's (Table 2), there is reasonably high congruence (69 per cent). In 91 per cent of cases judged by the provider to be receiving timely care, the patient agreed. Differences in patient and provider assessment of timeliness were a result of 71 per cent of patients judged to have benefited from earlier care who felt they had received timely care and those patients (10 per cent) the provider indicated did not need to be seen.

TABLE 2—Cross-Tabulation of Provider and Patient Assessments of the Timeliness of Care

	Patient Assessment of Care Received		
Provider Assessment of Care Received	Per Cent Delayed	Per Cent Timely	Per Cent Total
Delayed	6	15	21
	(29)*	(71)	(100)
Timely	6	63	69
	(9)	(91)	(100)
Not Needed	2	8	10
TOTAL	14	86	100

*Row Per Cents Shown in Parenthesis

The relationship of the timeliness of the visit and the provider's and the patient's assessments of problem status at the visit are shown in Tables 3 and 4, respectively. The provider is more likely to identify patients in the delayed group in comparison to the timely group as experiencing higher levels of discomfort and anxiety. Most patients were judged to have no activity limitation, showing no statistical difference between the delayed and the timely groups. Patient-reported problem status shows similar relationships: higher levels of discomfort, anxiety, and activity limitation among patients judged to have received delayed versus timely care.

In comparing patients in the "care not needed" and "timely" groups, the provider perceived lower levels of discomfort and activity limitation when care was judged unnecessary. The provider saw no difference in anxiety levels, assessing 79 per cent of patients in the "care not needed" group as having at least some anxiety in relation to their problem. In contrast, patient reported problem status shows no differences between the "care not needed" and "timely" groups across all three measures.

Thus, both patients and providers agreed that those receiving delayed care were experiencing poorer problem status than those receiving timely care. For those in the "care not needed" group, the patient's and provider's assessments of problem status differed considerably. Patients viewed themselves as similar to those in the "timely" group while

**The diagnostic categories shown in the Table were developed as part of an earlier study[9] in order to aggregate diagnostic data recorded by the providers on the encounter form for analytical purposes. A panel of physicians, including two internists and one pediatrician, grouped all diagnoses into the following categories: well-person care; injuries; problems undiagnosed beyond the symptom level (e.g., backache); chronic conditions, defined as those medical problems with a probable duration of three months or longer (e.g., diabetes, hypertension); acute conditions, defined as self-limiting problems and other conditions of relatively short duration (e.g., upper respiratory infection); acute/chronic conditions, defined either as acute manifestations or underlying chronic conditions, or those conditions that could not be classified as either acute or chronic (e.g., allergic rash, urinary tract infection); and other.

TABLE 3—Provider Assessment of Patient Problem Status at Visit Distributed by Timeliness of Care (Per Cent Distribution)

	Provider Assessment of Care Received				
	Delayed		Timely		Not Needed
Intensity Of Discomfort ($p < .001$)†					
None	34		41		74
Some or Moderate	49		53		24
Considerable or Extreme	18		7		3
TOTAL	100%		100%		100%
		($p < .05$)*		($p < .01$)**	
Anxiety (N.S.)†					
None	13		20		21
Some or Moderate	73		73		67
Considerable or Extreme	15		7		12
TOTAL	100%		100%		100%
		($p < .01$)*		(N.S.)**	
Activity Limitation ($P < .01$)†					
None	68		72		94
Minimal	23		18		3
Moderate or Severe	8		11		3
TOTAL	100%		100%		100%
		(N.S.)*		($p < .01$)**	
(n)	(68)		(215)		(33)

†Statistical significance across all categories.
*Statistical significance between delayed and timely categories.
**Statistical significance between timely and not needed categories.

TABLE 4—Patient Reported Problem Status at the Visit Distributed by the Provider's Assessment of Timeliness (Per Cent Distribution)

	Provider Assessment of Care Received				
	Delayed		Timely		Not Needed
Intensity Of Discomfort ($p < .001$)†					
None	26		41		43
Some	23		18		38
Moderate	28		26		19
Considerable or Extreme	23		15		—
TOTAL	100%	(NS)*	100%	(NS)**	100%
Anxiety ($p < .001$)†					
None	17		22		29
Some	32		36		19
Moderate	26		29		38
Considerable or Extreme	26		12		14
TOTAL	100%	($p < .1$)*	100%	(NS)**	100%
Activity Limitation ($p < .001$)†					
None	23		40		45
Minimal	36		24		15
Moderate	28		23		30
Severe	13		13		10
TOTAL	100%	($p < .1$)*	100%	(NS)**	100%
(n)	(47)		(147)		(20)

†Statistical significance across all categories.
*Statistical significance between delayed and timely categories.
**Statistical significance between timely and not needed categories.

TABLE 5—Percentage Distribution of Provider's Assessment of Benefit† to Patient if Seen Earlier in the Course of the Condition for Those Judged to Have Received Delayed Care

Type of Condition	Number Of Cases	Per Cent Shorter Duration	Per Cent Reduce Activity Limitation	Per Cent Decrease Likelihood Of Complication	Per Cent Reduce Anxiety
Acute	17	82	18	47	77
Acute/Chronic	7	57	14	14	71
Chronic	31	32	18	43	54
Symptoms	12	67	—	8	83
TOTAL	67	55	16	33	69

†All applicable categories were checked by the provider

the providers saw them as having less discomfort and activity limitation, but comparable levels of anxiety. Not unexpectedly, providers indicated anxiety as the primary problem status component among those judged not to need care.

Since differences in case mix, age, and sex among the timeliness groups might contribute to the observed differences, multivariate regression techniques were applied (Appendix A). The results of this analysis indicate that the differences in the provider assessment of problem status between the timely and delayed groups persist after controlling for the other variables. The difference in activity limitation between the care not needed and timely groups is no longer significant. All the differences in patient-reported problem status are explained by variations in age, sex, and type of condition among the timeliness groups. Of particular importance is the type and number of conditions diagnosed by the provider in explaining problem status differences.

Patients were asked in the visit questionnaire whether there was a particular doctor (or team) that they usually saw in the Department of Medicine. Whether a patient had such a regular provider was found to be an important explanatory variable of the timeliness of patient care. First, patients who identified a regular source of care were more likely, whether or not they were seeing their regular provider at the visit, to agree with the provider's assessment of timeliness. The regression analysis further indicates that in comparing patients in the delayed and timely categories, patients who identified a regular source of care were more likely to receive timely care. In comparing patients receiving timely care versus those not needing care, having a usual provider increased the likelihood of being judged not to need care unless the usual provider was seen.

Provider Expectation of the Effects of Timeliness

Two approaches were used in this study to examine the provider's expectations of the impact of timely care on patient outcomes. One involved asking the provider to identify the anticipated benefits from earlier care and the other inquired into the provider's prognosis for the patient's problem status one week after the visit.

Table 5 shows the distribution of anticipated benefits of earlier care by type of condition. Multiple categories could be selected for any patient judged to have received delayed care. Shorter duration and anxiety are the most frequently cited benefits and in a reasonably high proportion of cases, a decrease in the likelihood of complications is expected. Clearly, the providers perceive substantial benefits to the patient that should be observable in the problem status outcome assessments.

Table 6 shows the distribution of the provider's prognosis at one week by the timeliness of the initial visit. Distributions of discomfort and activity limitation differ significantly across the categories of delayed, timely, and not needed. No significant differences are present in the distribution of anxiety levels.

Although these differences are consistent with expectations of poorer problem status in the delayed group and better in the not needed, they could be a result of age, sex, and diagnostic differences. After controlling for the effects of these variables, the provider's prognosis for patients receiving delayed care continues to indicate significantly higher levels of discomfort at one week. Similarly, activity limitation is greater for those receiving delayed care, but there are no differences in level of anxiety. Those judged not to need

TABLE 6—Provider Prognosis of Patient Problem Status at One Week Following the Visit Distributed by Timeliness of Care (Per Cent Distribution)

	Provider Assessment of Care Received		
	Delayed	Timely	Not Needed
Intensity Of Discomfort ($p < .01$)†			
None	49	60	81
Some or Moderate	47	39	19
Considerable or Extreme	5	1	—
TOTAL	100%	100%	100%
Anxiety (N.S.)†			
None	52	50	48
Some or Moderate	46	47	48
Considerable or Extreme	3	4	3
TOTAL	100%	100%	100%
Activity Limitation ($p < .001$)†			
None	77	79	100
Minimal	20	17	—
Moderate or Severe	2	5	—
TOTAL	100%	100%	100%
(n)	(66)	(214)	(31)

†Statistical test on None versus all other categories of discomfort, anxiety, and limitation

care are not expected to experience significantly different problem status outcomes from those receiving timely care.

Timeliness and Outcome

The importance of timeliness in the receipt of ambulatory care must ultimately be judged in terms of its impact on patient outcomes. In Table 7, patient-reported problem status at one week (50 per cent sample) shows similar trends to those expected by the provider, although the distributions of discomfort and anxiety are not statistically significant. This may be the result of the small numbers in the follow-up sample. Multivariate analysis of relationships between timeliness and outcomes, controlling for age, sex, and type of condition, indicates some differences in the anxiety component; patients judged not to need care are found to experience a greater reduction in anxiety than other patients. For patients receiving delayed care, the level of activity limitation after one week is higher and they experience less of an overall improvement than do patients receiving timely care. But those judged not to need care experience the greatest improvement in limitation of activity after one week.

TABLE 7—Patient Reported Problem Status One Week after the Visit Distributed by the Provider's Assessment of Timeliness (Per Cent Distribution)

	Provider Assessment of Care Received		
	Delayed	Timely	Not Needed
Intensity Of Discomfort (N.S.)†			
None	61	57	88
Some	22	28	13
Moderate	11	9	—
Considerable or Extreme	6	6	—
TOTAL	100%	100%	100%
Anxiety (N.S.)†			
None	26	46	63
Some	47	31	38
Moderate	21	17	—
Considerable or Extreme	5	5	—
TOTAL	100%	100%	100%
Activity Limitation ($p < .001$)†			
None	28	67	100
Minimal	44	16	—
Moderate	17	12	—
Severe	11	5	—
TOTAL	100%	100%	100%
(n)	(18)	(93)	(8)

†Statistical test of None versus all other categories of discomfort, anxiety, and limitation.

Discussion

The results of this study indicate that timeliness, a qualitative dimension of the process of care, is perceived to be of clinical importance to providers and is related to patient reported outcomes of care. The clinical importance attached to timely care is probably best shown in Table 5. For patients judged to have received delayed care, the anticipated benefits of more timely care included shorter duration, decreased likelihood of complications, reduced anxiety, and reduced activity limitation. Whether these would have been achieved is uncertain but their significance reaffirms the perceived importance of accessibility and health care seeking behavior in assuring quality care. Furthermore, the timeliness of care is significant in explaining variability in provider prognosis. Patients judged to have received delayed care were expected to experience a higher level of discomfort and a slightly higher level of activity limitation than those receiving timely care.

The analysis of patient-reported outcomes shows that the timeliness of care is not significant in explaining discomfort levels at one week, but does have significance for anxiety and activity limitation. Patients judged not to need care experienced a greater reduction in anxiety than did other patients; patients judged to have received delayed care experienced higher levels of activity limitation as well as a smaller decrease in activity limitation from that reported at the visit. Clearly, these differences in outcome may not totally disappear through more timely care, especially for those judged not to need care who are achieving substantial reductions in anxiety levels. Also, these outcome assessments may not be measuring all the benefits that earlier care is expected to contribute to patients in the "delayed" category. These patients may have already experienced the longer duration, greater activity limitation, and increased anxiety which more timely care might have reduced.

This study raises several challenging questions concerning the organization and quality of ambulatory care. How accessible should health care services be? What is the effect of having a regular provider within a practice setting on access, health care seeking behavior, and outcomes? And, assuming improvements in the timeliness of care are indicated, what educational and structural interventions should be applied?

The question of how accessible health care services should be cannot be resolved through an examination of timeliness alone; however, this adds a new and important dimension to any evaluation of alternative access configurations. Considering the economics of ambulatory care, one must be concerned if increased access causes only minimal reductions in the delayed category, but significantly increases the numbers of patients seeking care that is judged unnecessary. This could well be the result if patients in the delayed care group don't appreciate the need to seek care sooner or don't place a sufficiently high priority on timely care. Table 2 clearly indicates differences in provider and patient assessments of the timeliness of care that may not be highly sensitive to access. Patient education[10] and new approaches to the triage of patient complaints may be required.

The differences in timeliness of care between patients identifying a regular provider in the Department and those not, points to the need for a better understanding of the effects of continuity. The population studied is already receiving care from one organization with a single unified medical record. But, patients identifying a usual provider were less likely to receive delayed care, independent of whether or not they saw their regular care source. Having a usual provider also increased the likelihood of being judged not to need care

unless the usual provider was seen. These findings could be interpreted that patients having a usual provider are experienced in accessing the Department and the differences in timeliness are simply a result of better access. Providers seeing their regular patients may simply have a different perspective on the need for care based on a more comprehensive knowledge of the patient. However, provider continuity may also contribute to the greater patient/provider congruence regarding appropriate care seeking behavior. The extent to which this is the case would argue for improved organizational mechanisms to establish and maintain patient/provider continuity. The importance of gaining a better understanding of the effects of continuity on the quality of care is clear.[11-13]

The last question posed concerning interventions to improve the timeliness of care is also complex. Periodic measurements of timeliness could provide a mechanism for an ongoing assessment of certain attributes of access and health care seeking behavior. Furthermore, this would provide a basis for examining the impact of organizational changes that are expected to modify the patterns of seeking and receiving care. To design and implement such changes, however, would presume an understanding of which elements of the delivery system contribute to patients not receiving timely care. One means for obtaining these insights would be to incorporate the timeliness measure as part of the minimal data[14-15] set captured by many routine encounter data information systems. An analysis of encounter data would make it possible to assess the extent to which there are definable groups of patients who repeatedly receive care that is delayed or not needed. Whether these patterns are patient specific or are to be found within categories of patient complaints, diagnoses or within clinical departments is of particular importance in the development and testing of interventions. Previous studies[16] have indicated unexpectedly high levels of constancy in patterns of utilization over time. One explanation is that individuals have different thresholds with respect to seeking medical care. Low utilizers may have higher thresholds and thus be more likely to seek delayed care, while high utilizers may have lower overall thresholds and be more likely to seek care that is judged unnecessary. Understanding the relationship among these variables (propensity to seek care, access, and timeliness) is fundamental to the design of interventions directed at patients and/or changes in the organization of services.

Further research is needed to refine the measurement of timeliness and to examine its reliability among many different providers and across various delivery settings and patient populations. For those visits in the delayed category, data on the extent of the delay and the reasons for it (patient and/or system causes) would aid in the determination of interventions that would be effective in achieving more timely care. There is a need to gain a better understanding of the provider's use of the "care not needed" category and, perhaps, a refinement to include a category for care needed only to reduce patient anxiety. Although there is much to learn regarding this measure, the findings of this study would suggest that a medical care program could obtain significant insights into the process of care through routine collection of timeliness assessments. The implications for an ambulatory quality assurance program of linking timeliness measures with process and outcome data are significant. Enhanced identification of access and care seeking problems would be possible with the potential to begin to examine the medical and economic impacts of patients not receiving timely care.

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ACKNOWLEDGMENTS

This study was done in collaboration with David Levine, MD, Laura Morlock, PhD, Alvin Mushlin, MD, Sam Shapiro, and Frank Appel. It was supported in part by Grants HS00429, HS01964 and HS01310 from the National Center for Health Services Research. The authors would like to express their appreciation for the cooperation of the staff of the Columbia Medical Plan and the Patuxtent Medical Group which made this study possible.

APPENDIX A—Multivariate Analysis of the Timeliness of Care

The distribution of the timeliness of care categories (delayed, timely, and not needed) vary with age, type of condition, and problem status. To examine the relationship of timeliness with any single variable, such as problem status, it is necessary to control for the effects of other variables that may intervene. Throughout this analysis, contingency tables were employed to examine the different relationships. To assure that the observed distributions were not the result of patient characteristics being distributed unevenly, regression analyses were done.

Figure 1 defines the variables in the regressions and their possible values. Table A-1 shows the relationship of the timeliness of the visit, with patient characteristics and provider perceptions of problem status, for those patients classified as timely or delayed. The patients having a regular provider, the provider's perception of the level of discomfort

FIGURE 1—Definition of Variables

YDLD (1*)+	= 1 if provider judged care to be delayed = 0 if provider judged care to be timely
YNN (2*)	= 1 if provider judged care to be not needed = 0 if provider judged care to be timely
REG (1,2)	= 1 if patient reported having a regular care source (provider) in the Department of Medicine = 0 otherwise
REG SN (1,2)	= 1 if patient reported regular source and saw identified provider at visit = 0 otherwise
AGE (1,2,3,4,5)	= 1 if 45 years or over = 0 if under 45 years of age
SEX (1,2,3,4,5)	= 1 if male = 0 if female
DG ACT/SYM (1,2,3,4,5)	= 1 if first diagnosis is a symptom or acute condition = 0 otherwise
DG ACT-CHR (1,2,3,4,5)	= 1 if first diagnosis is an acute/chronic condition = 0 otherwise
DG CHR (1,2,3,4,5)	= 1 if first diagnosis is a chronic condition = 0 otherwise
DG SEC (1,2,3,4,5)	= 1 if there is a second diagnosis recorded = 0 otherwise
DELAYED (3,4,5)	= 1 if provider indicated that the receipt of care was delayed = 0 otherwise
NOT NEEDED (3,4,5)	= 1 if provider indicated the receipt of care was neither needed nor delayed = 0 otherwise
P INT VIS (1,2,4)	= 2 if considerable or extreme intensity of discomfort perceived by provider at visit = 1 if some or moderate intensity of discomfort perceived by provider at visit = 0 if no discomfort perceived by provider at visit
P ANX VIS (1,2,4)	= 2 if considerable or extreme anxiety perceived by provider at visit = 1 if some or moderate anxiety perceived by provider at visit = 0 if no anxiety perceived by provider at visit
P LIM VIS (1,2,4)	= 2 if moderate or severe activity limitation perceived by provider at visit = 1 if minimal activity limitation perceived by provider at visit = 0 if no activity limitation perceived by provider at visit
INT VIS (3*,5)	= 3 if considerable or extreme intensity of discomfort reported by patient at visit = 2 if moderate intensity of discomfort reported by patient at visit = 1 if some discomfort reported by patient at visit = 0 if no discomfort reported by patient at visit
ANX VIS (3*,5)	= 3 if considerable or extreme anxiety reported by patient at visit = 2 if moderate anxiety reported by patient at visit = 1 if some anxiety reported by patient at visit = 0 if no anxiety reported by patient at visit
LIM VIS (3*,5)	= 3 if severe activity limitation reported by patient at visit = 2 if moderate activity limitation reported by patient at visit = 1 if minimal activity limitation reported by patient at visit = 0 if no activity limitation reported by patient at visit
P INT OUT (4*)	= 2 if prognosis is for considerable or extreme intensity of discomfort at one week = 1 if prognosis is for some or moderate intensity of discomfort at one week = 0 if prognosis is for no discomfort at one week
P ANX OUT (4*)	= 2 if prognosis is for considerable or extreme anxiety at one week = 1 if prognosis is for some or moderate anxiety at one week = 0 if prognosis is for no anxiety at one week
P LIM OUT (4*)	= 2 if prognosis is for severe or moderate activity limitation at one week = 1 if prognosis is for minimal activity limitation at one week = 0 if prognosis is for no activity limitation at one week
INT OUT (5*)	= 3 if patient reported considerable or extreme discomfort at one week = 2 if patient reported moderate discomfort at one week = 1 if patient reported some discomfort at one week = 0 if patient reported no discomfort at one week
ANX OUT (5*)	= 3 if patient reported considerable or extreme anxiety at one week = 2 if patient reported moderate anxiety at one week = 1 if patient reported some anxiety at one week = 0 if patient reported no anxiety at one week
LIM OUT (5*)	= 3 if patient reported severe activity limitation at one week = 2 if patient reported moderate activity limitation at one week = 1 if patient reported minimal activity limitation at one week = 0 if patient reported no activity limitation at one week

+ refers to tables in the Appendix using this variable
* indicates a dependent variable

and anxiety are all significantly related to being placed in the timely versus delayed categories. A parallel analysis in Table A-2 shows a different set of variables associated with being judged as timely versus not needing care.

Table A-3 shows three regressions controlling patient reported problem status at the visit for age, sex, and type of condition. The purpose of the analyses is to determine if the timeliness variables explain problem status differences when patient characteristics are introduced. The analyses indicate no statistical significance.

Table A-4 examines the provider's prognosis for patient outcomes at one week using the same approach. Two regressions are shown for each problem status dimension. The first relates timeliness to the expected problem status level and the second examines the same dependent variable, but controls for problem status at the visit. As anticipated, introducing the initial problem status assessment raises the explanatory power considerably and provides insight into differences in the expected change in problem status associated with the timeliness of care.

Table A-5 shows a parallel set of analyses using patient-reported outcomes at one week. In both Tables A-4 and A-5, the timeliness variables are significant in explaining variation in some dimensions of problem status, but not all.

TABLE A-1—Regression Analysis of Differences between Patients Identified by the Provider as Receiving Timely versus Delayed Care

VARIABLES	B	STD. ERROR
YDLD	Dependent Variable	
AGE	−.028	.061
SEX	−.125††	.057
REG	−.252**	.074
REG SN	.083	.081
DG ACT/SYM	.098	.092
DG ACT/CHR	.089	.122
DG CHR	.093	.087
DG SEC	−.016	.065
P INT VIS	.108††	.053
P ANX VIS	.120††	.056
P LIM VIS	.032	.044
Constant	.128	
R^2 = .18 Significant (p < .001)	N = 283	

††p < .05
**p < .001

TABLE A-2—Regression Analysis of Differences between Patients Identified by the Provider as Timely Care versus Not Needing Care

VARIABLES	B	STD. ERROR
YNN	Dependent Variable	
AGE	−.104†	.056
SEX	−.005	.052
REG	.127††	.065
REG SN	−.157††	.067
DG ACT/SYM	−.190††	.078
DG ACT/CHR	−.112	.103
DG CHR	−.154††	.069
DG SEC	.031	.063
P INT VIS	−.099†	.049
P ANX VIS	.068	.051
P LIM VIS	−.010	.042
Constant	0.265	
R^2 = .13 Significant (p < .01)	N = 248	

†p < .1
††p < .05

TABLE A-3—Regression Analysis of Patient-Reported Problem Status at the Visit

		Intensity of Discomfort (INT VIS)		Anxiety (ANX VIS)		Activity Limitation (LIM VIS)	
	MEAN	B	STD ERROR	B	STD ERROR	B	STD ERROR
AGE	.285	−.116	.157	.212	.152	.332††	.159
SEX	.383	−.120	.146	−.162	.141	.044	.147
DG ACT/SYM	.374	.320	.233	.186	.225	.268	.235
DG ACT-CHR	.084	−.274	.310	−.122	.300	−.342	.313
DG CHR	.411	−.572††	.225	−.130	.217	−.359	.227
DG SEC	.780	−.534*	.168	−.329††	.162	−.385††	.169
DELAYED	.220	.226	.171	.241	.165	.167	.172
NOT NEEDED	.094	−.375	.246	.063	.238	.076	.248
Constant		1.802		1.567		1.357	
R^2		.22		.07		.12	
Significance		p < .001		p < .01		p < .001	
N = 214							

††p < .05
*p < .01

TABLE A-4—Regression Analysis of Provider's Prognosis of Patient Problem Status after One Week

	Intensity Of Discomfort (P INT OUT)				Anxiety (P ANX OUT)				Activity Limitation (P LIM OUT)			
	B	STD ERROR	B	STD ERROR	B	STD ERROR	B	STD ERROR	B	STD ERROR	B	STD ERROR
AGE	.131††	.064	.139*	.046	.300**	.066	.264**	.057	.226**	.066	.123**	.034
SEX	.042	.062	.027	.045	.004	.064	.042	.055	.028	.064	−.010	.033
DG ACT/SYM	.256*	.094	.048	.069	.085	.098	−.076	.085	.005	.097	−.107††	.051
DG ACT-CHR	.160	.127	.199††	.091	−.160	.132	−.196	.113	−.070	.131	−.019	.068
DG CHR	.070	.091	.146††	.065	.158	.094	.038	.082	.087	.094	.032	.049
DG SEC	−.005	.072	.050	.052	.110	.074	.149††	.064	−.056	.074	.028	.039
DELAYED	.147††	.075	.028	.054	.049	.078	−.029	.067	.057†	.077	.005	.040
NOT NEEDED	−.159	.103	.060	.075	.121	.107	.059	−.092	.194	.107	.050	.056
P INT VIS			.621**	.037								
P ANX VIS							.543**	.052				
P LIM VIS											.684**	
Constant	.227		−.194		.236		−.159		.175		−.040	
R^2	.08		.53		.10		.34		.08		.75	
Significance	p < .01		p < .001		p < .001		p < .001		p < .001		p < .001	
N = 311												

†p < .1
††p < .05
*p < .01
**p < .001

TABLE A-5—Regression Analysis of Patient Reported Problem Status at One Week

	Intensity of Discomfort (INT OUT)				Anxiety (ANX OUT)				Activity Limitation (LIM OUT)			
	B	STD ERROR	B	STD ERROR	B	STD ERROR	B	STD ERROR	B	STD ERROR	B	STD ERROR
AGE	.173	.193	.204	.181	.197	.220	.049	.198	.394†	.221	.266	.192
SEX	−.001	.176	.042	.166	.154	.201	.182	.179	−.147	.202	−.153	.174
DG ACT/SYM	.906*	.295	.551†	.297	.383	.213	.077	.306	.753††	.338	.375	.300
DG ACT-CHR	.956*	.353	.949*	.332	.143	.055	.110	.358	.688†	.405	.623†	.349
DG CHR	.209	.297	.240	.279	−.044	.338	−.136	.301	.324	.340	.339	.294
DG SEC	.099	.200	.216	.191	.052	.228	.204	.205	−.159	.229	−.016	.200
DELAYED	.007	.231	−.006	.218	.309	.263	.188	.236	.532††	.265	.520††	.229
NOT NEEDED	−.378	.340	−.258	.322	−.626	.387	−.860††	.348	−.445	.390	−.566†	.337
INT VIS			.281*	.085								
ANX VIS							.431**	.093				
LIM VIS											.423**	.081
Constant	−.070		−.429		.499		−.022		.132		−.316	
R^2	.23		.33		.11		.31		.18		.40	
Significance	p < .01		p < .001		Not Significant		p < .001		p < .05		p < .001	
N = 119												

†p < .1
††p < .05
*p < .01
**p < .001