Patient-Centered Decision Making and Health Care Outcomes

An Observational Study

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Background: Patient-centered decision making (PCDM) is the process of identifying clinically relevant, patient-specific circumstances and behaviors to formulate a contextually appropriate care plan.

Objective: To ascertain whether encounters in which PCDM occurs are followed by improved health care outcomes compared with encounters where there is inattention to patient context.

Design: Patients surreptitiously audio-recorded encounters with their physicians. Medical records of these encounters were then screened for "contextual red flags," such as deteriorating self-management of a chronic condition, that could reflect such underlying contextual factors as competing responsibilities or loss of social support. When a contextual factor was identified, either as a result of physician questioning or because a patient volunteered information, physicians were scored on the basis of whether they adapted the care plan to it.

Setting: Internal medicine clinics at 2 Veterans Affairs facilities.

Participants: 774 patients audio-recorded encounters with 139 resident physicians.

Measurements: Individualized outcome measures were based on the contextual red flag, such as improved blood pressure control in a patient presenting with hypertension and loss of medication coverage. Outcome coders were blinded to physician performance.

Results: Among 548 contextual red flags, 208 contextual factors were confirmed, either when physicians probed or patients volunteered information. Physician attention to contextual factors (both probing for them and addressing them in care plans) varied according to the presenting contextual red flags. Outcome data were available for 157 contextual factors, of which PCDM was found to address 96. Of these, health care outcomes improved in 68 (71%), compared with 28 (46%) of the 61 that were not addressed by PCDM ($P = 0.002$).

Limitation: The extent to which the findings can be generalized to other clinical settings is unknown.

Conclusion: Attention to patient needs and circumstances when planning care is associated with improved health care outcomes.

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Evidence-based medicine has been described as the "conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (1). The process of adapting *best evidence* to the care of the *individual patient* has been characterized as "contextualizing care" or "patient-centered decision making" (PCDM) (2).

Inattention to relevant patient context that results in an inappropriate care plan is a type of medical error termed "contextual error" (3). A patient's context comprises all that is expressed outside of the boundaries of their skin and that may be relevant to their care, including their life circumstances and behaviors. For instance, failure to recognize when a worsening chronic condition, such as diabetes, is due to progressive cognitive disability and deteriorating medication adherence rather than a need for intensified medication therapy is a contextual error. Although dementia is a disease process, it also changes behavior and hence is part of the context of diabetes self-care.

Clues that contextual factors may be affecting a patient's care, such as poor control of a clinically manageable chronic condition, have been termed "contextual red flags" and should trigger the clinician to explore the patient's context (2). Clinicians may consider 10 domains of a patient's context: access to care, social support, competing responsibilities, relationship with health care providers, skills and abilities, emotional state, financial situation, cultural beliefs, spiritual beliefs, and attitude toward illness (2). Contextualizing care involves identifying the relevance of one or more of these domains to a patient's care plan and adapting the plan accordingly (4). For instance, if a patient is unable to adhere to a thrice-daily medication regimen because of work responsibilities, modification of the plan to accommodate these circumstances is an adaptation to competing responsibilities.

Evidence shows that physicians are prone to contextual errors. In a study involving nearly 400 visits to more than 100 board-certified primary care internal medicine physicians by unannounced standardized patients presenting with common clinical problems, appropriate care was provided 73% of the time when adherence to research evidence (that is, guidelines and best practice recommendations) was all that was required. When contextual factors were introduced that required attention to avoid ineffectual or potentially harmful care, appropriate care was provided just 22% of the time (5). Moreover, a cost analysis of the study found that the average cost of contextual errors

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Context

Although inattention to contextual variables specific to each patient's situation is viewed as a medical error, whether taking these issues into consideration when customizing care plans is associated with improved outcomes has not been studied.

Contribution

This study evaluated audio recordings of physician visits to identify encounters in which contextual variables contributed to medical problems. Encounters in which physicians considered these variables when formulating care plans were more often followed by improvements in the medical issues than in those where such contextualization of the patient's individual circumstances was not considered.

Caution

The study was done in the setting of a residents' practice.

Implication

Further study is warranted to better understand how to best contextualize individual patient circumstances when formulating care plans, and this study provides a means of measuring this process.

—The Editors

when present was greater than that of error due to failure to adhere to research evidence (6).

In this study, we explored whether PCDM—defined as adapting care to patient context—positively affects outcomes in real patients. Specifically, we assessed whether patients' presenting problems are more likely to partially or fully resolve when contextual issues are addressed than when they are not addressed in the care plan.

METHODS

Study Design

To determine whether a care plan was patient-centered, we used a structured approach to reviewing the medical record and coding audio-recorded encounters to answer 3 questions: Are there contextual red flags, as defined earlier? If so, did the physician explore them for underlying contextual factors that could be addressed in a care plan or did the patient volunteer such information? If so, did the physician address the contextual factors in the recommended care plan? To determine whether a care plan was associated with an improved health care outcome, we monitored the patient's medical record for 9 months after the visit to determine whether the original contextual red flag partially or fully resolved.

In addition, half of the physicians in the study were randomly selected to participate in 4 one-hour seminars on PCDM that were based on a curriculum designed for medical students and described in a prior publication (7). Although not related to the principal research question of whether improved PCDM is associated with improved health outcomes, the inclusion of this educational intervention provided an opportunity to assess whether brief, intensive instruction would result in improved PCDM.

Patient Recruitment

Internal medicine residents in 2 residency programs at 2 Veterans Affairs (VA) outpatient continuity clinics were invited to participate. During the consent process, we informed the physician-participants that we would recruit several of their patients to surreptitiously audio-record their encounters for a study of clinical decision making. We sought to collect 3 audio-recorded encounters with contextual red flags from each participating resident's practice. Resident physicians were assured that their participation was voluntary, that it was unconnected to assessment in their residency training, and that all performance data extracted from the recordings would be deidentified.

Intake clerical staff were provided a list of participating physicians and instructed to inform patients of the study during appointment registration and direct them to a research assistant (RA) in the waiting area if they were interested in participating. Patients who approached the RA were informed that the study would provide new information on how physicians make clinical decisions when their patients' life situation is a factor in their care. They were informed that they would carry a small concealed audio recorder in their clothing or bag. We also asked for permission to examine their medical records. Patients were assured that their physicians had consented to the protocol and were at no professional or personal risk from the results of the study. The institutional review boards of the University of Illinois at Chicago, Jesse Brown VA Medical Center, and Hines VA Hospital approved the study.

Performance Assessment

For this study, we developed a method of assessing physician performance at contextualizing care on the basis of data extracted from the medical record and the audio-recorded encounter. The method, 4C (Content Coding for Contextualization of Care), is an adaptation of the method developed for comparing contextualization-of-care skills during interactions with unannounced standardized patients (when the red flag and contextual factor are scripted) (8) to those during interactions with real patients (when the red flag and contextual factor are unscripted). A detailed manual for 4C that includes a step-by-step protocol and examples is available online (9). It does not require any skills other than those described in the manual and summarized as follows.

In the first step, a "chart coder" reviews the medical record of a patient with an audio-recorded encounter for contextual red flags that should alert a physician to screen for contextual factors. The coder uses a data extraction instrument to record red flags, including missed appointments; nonadherence with medications; poor control of a

Table 1. **Prospectively Determined Outcomes Based on the Presenting Contextual Red Flag**

Red Flag	Criterion	Good Outcome	Poor Outcome
Missed appointments	≥2 in past 4 mo or ≥4 in past 12 mo	Patient keeps next scheduled appointment	Patient misses next scheduled appointment
Medication nonadherence (missed prescription fills or refills)	≥1 in past 4 mo or ≥4 in past 12 mo	Patient fills or refills medications	Patient does not fill or refill medications
Missed laboratory tests and/or scheduled studies	≥1 in past 4 mo or ≥4 in past 12 mo	Patient has laboratory tests or recommended procedures done	Patient does not have laboratory tests or recommended procedures done
Nonadherence to agreed-upon self-care plan	Does not follow self-care plan (e.g., exercise or diet)	Patient adhering to plan at next visit	Patient still not adhering to plan at next visit
Declined recommended preventive care	Declined colonoscopy or recommended vaccines (e.g., influenza vaccine)	Patient receives recommended vaccines or procedures	Patient does not receive recommended vaccines or procedures
Missed screenings or vaccinations	Whether due to patient declining in past or agreeing but not adhering to care plan is undocumented	Patient has recommended screening or receives vaccines	Patient does not have recommended screening or receive vaccines
Urgent care	≥2 visits to urgent care center in past 12 mo	Patient has fewer visits to urgent care center	Patient has identical or higher number of visits to urgent care center
Diabetes	HbA_{1c} level >8%	Any decrease in HbA_{1c} level	Identical or higher HbA_{1c} level
Hypertension	SBP >140 mm Hg or DBP >90 mm Hg	Any decrease in SBP or DBP	Identical or higher blood pressure
ED visits	≥2 in past 12 mo	Patient has fewer ED visits	Patient has identical or higher number of ED visits

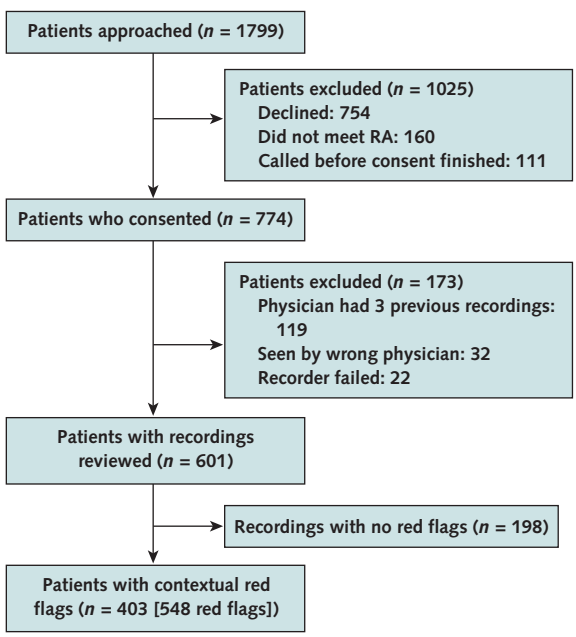
DBP = diastolic blood pressure; ED = emergency department; HbA_{1c} = hemoglobin A_{1c}; SBP = systolic blood pressure.

chronic condition; or lack of follow-through with laboratories, tests, or referrals. If there are none in the medical record, the audio recording is reviewed for red flags, defined as patient statements suggestive of underlying contextual factors essential to care. If any are identified, another coder confirms the finding; otherwise, no further analysis of the encounter is done.

When a contextual red flag is identified, the audio recording and a description of the red flag are forwarded to 2 "audio coders," who listen independently to the recording to assess and document whether the red flag was explored by the clinician. If it was, the coders note whether a contextual factor (that is, an underlying contextual problem, such as inability to afford a medication) was revealed. This is a necessary step because some contextual red flags are false alarms—on further exploration, there are no underlying contextual factors relevant to the patient's care. If a contextual factor was revealed, the coders document whether the clinician addressed the problem when planning care. Occasionally, when physicians fail to explore red flags, patients nevertheless reveal the underlying contextual factors without prompting (for example, "Doc, I can't afford these pills"). In these instances, the coders also document whether the physician addressed the factor in the care plan. When there are discrepancies between the coders, the audio-coding supervisor reviews the notes and recordings to make a determination.

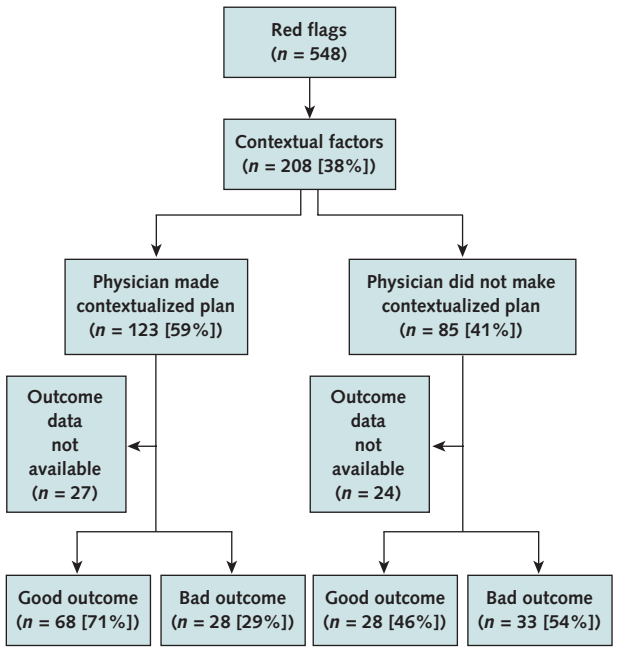
The coding of audio recordings after a contextual red flag has been identified is a structured process involving 5 steps. First, the coder composes an unambiguous model probe in response to the red flag—for example, "I notice that your diabetes used to be well-controlled but your sugars have been very high over the past couple of months. What do you think is going on in your life that might be a factor in this problem?" The model probe is always in the form of a question by the clinician in response to the red flag. The purpose of this exercise is to clearly frame in the coder's mind what they should be listening for to indicate that the health care provider has noticed and is pursuing the red flag. Second, the coder listens for whether the provider pursued the red flag in a manner that substantively approximates their model probe. Third, if the provider probed, the coder determines whether the patient revealed a contextual factor, such as, "I've been moved to the night

Figure 1. **Study flow diagram.**



RA = research assistant.

Figure 2. **Outcomes according to physician performance at contextualizing care.**



shift and it's a lot more difficult for me to take my medication when I'm supposed to." Fourth, if the patient revealed a contextual factor in response to the probe, the coder formulates a direct response to the information revealed, indicating that the provider recognized the need to address the contextual factor in the care plan—for example, "Let's talk about how you could adapt your medication schedule to fit your new work schedule". Fifth, the coder listens for whether the provider recommended a care plan that substantively approximates the model response.

In instances where the physician does not probe but the patient reveals contextual factors without prompting, the coder follows the same protocol beginning at the fourth step. If the coders are unable to document a contextual factor, they terminate coding for physician response to the red flag. Finally, the coders are instructed to document any additional red flags they hear when listening to a recording of an encounter and fully code the physician's performance for these as well. Red flags that were independently identified by both coders were included for analysis in this study.

Outcomes Assessment

Individualized outcome measures were based on the contextual red flags, and the threshold for a positive outcome was any improvement (**Table 1**). For instance, if the red flag was loss of blood pressure control in a patient who previously had good control, the outcome measure would be improved versus unimproved blood pressure control at the next visit. The patient's chart was monitored until the prospectively determined outcome measure was obtained or until 9 months had elapsed.

Statistical Analysis

The primary analysis was at the level of the encounter. Each encounter in which a contextual factor was identified was coded for whether the physician formulated a contextualized care plan, and each patient's subsequent outcome was coded by an independent blinded coder as representing improvement or nonimprovement of the contextual red flag. We performed the Pearson chi-square test to examine the simple association between contextualized plan and outcome improvement among encounters.

In addition, using PROC GLIMMIX in SAS, version 9.3 (SAS Institute, Cary, North Carolina), we fitted a

Table 2. **Clinician Probing, Identification of Contextual Factors, Contextual Care Planning, and Health Care Outcomes for Each Category of Contextual Red Flag**

Red Flag	Total, *n* (%)	Probed, *n* (% of total)	Contextual Factors, *n* (% of total)	Contextualized Plan, *n* (% of factors)
Missed appointments	124 (23)	21 (17)	30 (24)	15 (50)
Missed laboratory tests and/or scheduled studies	81 (15)	7 (9)	13 (16)	7 (54)
Medication nonadherence	74 (13)	35 (47)	41 (55)	26 (63)
Diabetes	68 (12)	30 (44)	34 (50)	23 (68)
Hypertension	54 (10)	22 (41)	21 (39)	15 (71)
Declined recommended preventive care	44 (8)	15 (34)	25 (57)	10 (40)
Urgent care	22 (4)	1 (5)	3 (14)	1 (33)
Nonadherence to agreed-upon self-care plan	18 (3)	12 (67)	12 (67)	8 (67)
Emergency department visits	11 (2)	1 (9)	0 (0)	NA
Missed screenings or vaccinations	10 (2)	8 (80)	7 (70)	5 (71)
Other*	42 (8)	25 (59)	22 (52)	13 (59)
Total	548 (100)	177 (32)	208 (38)	123 (59)

NA = not applicable.
* Does not fit any category (e.g., a patient with the carpal tunnel syndrome who continues to engage in the inciting activity or an urban patient with frostbite suggestive of lack of shelter or protective clothing).

mixed-effects logistic regression model to the patient outcomes with contextualized plan as the predictor variable; resident year in training (continuous, ranging from the first through the third year), resident sex (male or female), clinic site (clinic 1 or clinic 2), whether the patient had seen the same resident at one or more of their three visits before the index encounter (yes or no), whether the resident participated in a contextualization seminar (yes or no), and whether the patient was accompanied during the encounter (yes or no) as control variables; and a random physician intercept to control for clustering of patients by physician.

Role of the Funding Source

The funding source had no role in the design or conduct of the study; collection, analysis, or interpretation of the data; or preparation, review, or approval of the manuscript.

RESULTS

Participants and Visits

Among 222 eligible resident physicians with primary care clinics at the VA, 139 consented to participate over a 30-month period. Twenty-six percent were first-year residents, 40% were second-year residents, and 34% were third-year residents. Fifty percent were women, and 50% had participated in the PCDM seminar series. Among the population of study-eligible categorical residents in these programs during the study period, 48% were women, 29% were first-year residents, 36% were second-year residents, and 35% were third-year residents. The consenting residents did not differ from the eligible population in sex ($P = 0.34$) or training year ($P = 0.41$).

More than 115 000 patient visits (33 242 unique patients) occurred in fiscal year 2012 at the 2 participating clinics. Average patient age was 62 years, and 98% were men. The 10 most common medical diagnoses were hyperlipidemia (69%), hypertension (71%), diabetes (36%), osteoarthritis (28%), depression (27%), ischemic heart disease (25%), posttraumatic stress disorder (17%), chronic obstructive pulmonary disease (14%), obstructive sleep apnea (14%), and gout (9%). Patients were receiving an average of 10 medications.

A total of 1799 patients were informed of the study at check-in (**Figure 1**). Among these, 160 were not interested in meeting with the RA, 754 declined during the consent process, and 111 were called to their appointments before the consent process could be completed, leaving 774 who consented to participate. These patients were provided audio recorders to conceal during the encounter and return after their visit.

Each physician was repeatedly audio-recorded until we had 3 encounters with contextual red flags identified. In 22 instances, the recording device failed. Thirty-two recordings were discarded because a patient was seen by a nonparticipating physician. In 198 recordings, no red flags were identified. Finally, there were 119 instances in which a recording was discarded after we determined that we already had the requisite 3 recordings with an identified red flag. These excess recordings occurred because the presence of a red flag could not be assessed until the data had been collected and analyzed. The final data set comprised 403 encounters with a total of 548 identified red flags.

Relevant Patient Context

The presence of an underlying contextual factor relevant to the patient's care was confirmed for 208 of the identified contextual red flags (**Figure 2**). Although the chart coder prospectively defined outcomes for all of these, there were 51 instances in which the patient either did not have a follow-up visit or the outcome measure was not documented in the medical record during the 9 months

Table 2—**Continued**

Contextualized Plan With Outcomes, *n (% of contextualized plans)*	Noncontextualized Plan, *n (% of factors)*	Noncontextualized Plan With Outcomes, *n (% of noncontextualized plans)*	Contextualized Plan With Good Outcome, *n (% of contextualized plans with outcomes)*	Noncontextualized Plan With Good Outcome, *n (% of noncontextualized plans with outcomes)*
13 (87)	15 (50)	11 (73)	11 (85)	4 (36)
5 (71)	6 (46)	5 (83)	3 (60)	0 (0)
20 (77)	15 (37)	7 (47)	18 (90)	7 (100)
19 (83)	11 (32)	10 (91)	13 (68)	6 (60)
12 (80)	6 (29)	5 (83)	12 (100)	5 (100)
8 (80)	15 (60)	13 (87)	2 (25)	3 (23)
1 (100)	2 (67)	2 (100)	0 (0)	1 (50)
6 (75)	4 (33)	3 (75)	3 (50)	0 (0)
NA	NA	NA	NA	NA
4 (80)	2 (29)	1 (50)	1 (25)	0 (0)
8 (62)	9 (41)	4 (44)	5 (63)	2 (50)
96 (78)	85 (41)	61 (72)	68 (71)	28 (46)

after the visit. In the final data set, there were 157 identified contextual factors relevant to planning the patient's care for which outcomes had been prospectively assigned. A total of 73 physicians were involved in these encounters.

Physician Performance

Care plans were coded as contextualized for 123 (59%) of the 208 identified red flags and as inattentive to relevant patient context in the remaining 85 (41%) (**Figure 2**). In 85% of the coding decisions, there had been concordance between the independent coders (Cohen κ = 0.69). The remaining 12% were reconciled by the audio-recording supervisor and team through review and consensus.

Outcomes

Contextualized care plans were formulated for 96 of the 157 encounters with available outcomes; the proportion of these encounters did not differ according to whether the care plan was contextualized (P = 0.300). As shown in **Figure 2**, 68 (71%) of the 96 encounters with contextualized care plans met criteria for a positive outcome compared with 28 (46%) of the 61 encounters with care plans that were inattentive to patient context (P = 0.002).

Table 2 shows outcomes grouped by their presenting red flags and includes all data on the numbers and proportions of red flags, probes in response to red flags, contextual factors, and contextualized care plans. For instance, missed appointments accounted for 23% of red flags, of which 17% were probed by the physician. Contextual factors relevant to missed appointments were identified 24% of the time. The contextual factors were addressed in the care plan in half of these (**Table 2**, fifth column) and were not in the other half (**Table 2**, seventh column). Outcomes were available for 87% and 73%, respectively (**Table 2**, sixth and eighth columns). As shown in the last 2 columns of **Table 2**, the outcome was good (fewer missed appointments) in 85% of the former but only 36% of the latter. Of note, the totals for these 2 columns match the totals in **Figure 2** for good outcomes for contextualized (71%) and noncontextualized plans (46%), respectively.

The mixed-effects logistic regression on encounters (clustered by physician) revealed that patients with a contextualized care plan were more likely to have a positive outcome (odds ratio [OR], 3.7 [95% CI, 1.2 to 11.4]; P = 0.021). There was no effect from clustering of encounters by physician or from clinic site (P = 0.48), physician sex (P = 0.79), physician year in training (P = 0.42), whether the physician had participated in a PCDM seminar (P = 0.33), or whether the patient was accompanied during the encounter (P = 0.80). When the patient had seen the same resident at their most recent visit, they were more likely to have a positive outcome than when they had seen a different physician, regardless of whether the care plan was contextualized (OR, 3.0 [CI, 1.0 to 8.9]; P = 0.044).

Fifteen patients had more than 1 red flag during their physician encounter. We conducted a sensitivity analysis in which we retained the single red flag for each of these patients that would most strongly contradict our hypothesis. We refitted the mixed-effects logistic regression to 113 red flags, each in a unique encounter representing a unique patient, and used the same control variables. Results were essentially equivalent to those of the primary analysis (contextualization OR, 3.7 [CI, 1.2 to 11.5]; P = 0.022). Again, there was a positive association with the most recent visit having been to the same resident (OR, 3.3 [CI, 1.1 to 9.7]; P = 0.033).

DISCUSSION

We found that when physicians take into account the needs and circumstances (that is, context) of their patients when planning their care, individualized health care outcomes improve. Although it may seem intuitive that addressing a patient's inability to pay for medication results in improved diabetes control, addressing a misunderstanding about instructions essential to self-care results in lower blood pressure, or addressing competing responsibilities for the care of a chronically ill family member results in fewer urgent care visits, this study may be the first to document an association between contextualizing patient care and patient care outcomes. As shown in **Table 2**, for different categories of contextual red flags there was considerable variability in the degree to which clinicians probed and planned care in response to revealed contextual factors, as well as in the likelihood of good or poor outcomes. Given the small sample sizes of these subgroups, these are qualitative observations only.

In addition to, and independent of, whether the care plan was contextualized at the recorded visit, having seen the same physician at the most recent clinic visit was associated with improved patient outcomes. There was, however, no benefit to having seen the same physician at the second or third most recent encounter. We are unable to interpret this finding in the absence of a mechanism, such as contextualization of care.

Contextualizing care is, in essence, PCDM. To our knowledge, no prior study has attempted to examine the association of PCDM with health care outcomes, although many studies have used various tools for evaluating the effect of patient-centered communication (PCC). Studies of PCC that attempted to show an association with outcomes have been disappointing (10–12). There are subtle but critical differences between measures of PCC and PCDM that account for the positive findings of our study. These differences are related to whether one is measuring the process versus the content or substance of an interaction. The Roter Interaction Analysis System, for instance, is a widely used process method for evaluating PCC (13, 14). It characterizes PCC on the basis of the number of discrete utterances that are classified as patient-centered

(for example, psychosocial data gathering or rapport building). It is not designed to discern whether a communication process results in a care plan that is actually patient-centered. For instance, the comment, "Boy, it's been tough since I lost my job!" from a hypertensive patient might elicit an empathic, rapport-building response, such as, "I can imagine. I am sorry to hear that. It's a rough economy these days". The Roter Interaction Analysis System codes these utterances as patient-centered, regardless of the clinical decision making that follows (15). If the physician does not make the connection among the patient's comment, his poorly controlled blood pressure, and his inability to afford a costly brand-name antihypertensive medication, the care plan will not be patient-centered. The 4C tool was developed specifically to systematically examine the content of the interaction for a link between patient context and care planning.

A strength of this study is that, rather than focusing on a single disease or intervention, it measured individualization of care in an unselected patient population whose clinical problems and context varied considerably. Conversely, the limitations of our study are primarily related to the challenges of measuring PCDM in the care of actual patients. In our prior study, which involved unannounced standardized patients, we predetermined the errors that clinicians could make and simply documented whether they occurred. The 4C tool may underestimate the presence of essential patient context (that is, contextual factors). For instance, if a physician failed to probe a contextual red flag, such as poorly controlled hypertension, and the patient did not volunteer information to indicate whether there was, in fact, an underlying contextual factor (for example, "Doc, I can't afford these meds"), we had no proof of a contextual factor and did not include the encounter in our analysis. Furthermore, although 4C is highly systematic, with excellent agreement among raters, content coding remains fundamentally a judgment call about the substance of an interaction. Finally, whether the findings can be generalized to other settings is unknown.

Despite these limitations, 4C is a useful performance measure of PCDM, which is an essential clinical competency that is associated with health care outcomes. Patient-centered decision making requires answering the question, "What is the best next thing for this patient at this time?" (2). Our findings suggest that when clinicians successfully answer the question, as reflected in their care plan, there is an associated benefit to the patient that is measurable and substantial. These findings suggest that an emphasis on promoting and assessing PCDM may be a productive strategy for advancing patient-centered health care outcomes.

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Disclaimer: Dr. Weiner had full access to all of the data in the study and takes responsibility for their integrity and the accuracy of the analysis.

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Reproducible Research Statement: *Study protocol and statistical code:* Available on request. *Data set:* Not available.

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