

Perceived Causes of Family Physicians' Errors

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Background. Competent physicians occasionally make critical errors in patient care that can lead to long-lasting remorse and guilt. The perceived causes of self-admitted physician errors have not been previously explored.

Methods. Fifty-three family physicians were interviewed in depth and asked to describe their most memorable errors and the perceived causes. The authors analyzed transcripts of the audiotaped interviews to determine the frequencies of the different causes. Errors were classified according to four general categories.

Results. Family physicians collectively reported a mean of 8 different causes for each case in which an error was made (range, 1 to 16). In 47% of the cases, the patient died following the error, whereas in 26% of the cases, there was no adverse outcome. Only 4 of the 53 errors led to malpractice suits, and none were addressed by peer review organizations. Seven (10%) of the 70 physicians who were invited to participate could not recall

having made any errors. Family physicians attributed their most memorable errors to 34 different causes, which fit into the following categories: physician stressors (eg, being hurried or distracted), process-of-care factors (eg, premature closure of the diagnostic process), patient-related factors (eg, misleading normal findings), and physician characteristics (eg, lack of knowledge).

Conclusions. Family physicians attribute their memorable errors to a wide variety of causes, but most commonly to hurry, distraction, lack of knowledge, premature closure of the diagnostic process, and inadequately aggressive patient management. Physicians who understand common causes of errors may be better prepared to prevent them.

Key words. Diagnostic errors; physician's practice patterns; physicians, family; clinical competence; decision making. (*J Fam Pract* 1995; 40:337-344)

Good physicians occasionally make serious mistakes. Many studies have investigated physicians' errors as judged by patients, lawyers, and peer reviewers.¹⁻⁶ Both the malpractice system and peer-review organizations, however, are poor predictors of objectively identified errors.^{2-4,6-8}

The few investigators who have explored self-admitted errors have focused on physicians' reactions to their errors rather than on the causes.^{9,10} These reactions include remorse and guilt^{10,11} and reluctance to discuss the

error with others.^{9,10} In addition to the long-lasting emotional trauma suffered by physicians, self-admitted errors often lead to serious patient morbidity and mortality.^{9,10}

The purpose of this study was to explore the causes to which family physicians attribute their most memorable errors. Although errors cannot be eliminated, practicing physicians, house officers, and medical students are highly motivated to prevent them.⁹⁻¹² As a first step toward reducing the incidence of errors, we explored their potential causes.

Methods

Subjects

A computer-generated random sample of 70 family physicians and general practitioners was selected from 386

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eligible participants in the eastern third (telephone area code 319) of Iowa. Potential participants were identified using a demographic database of all practicing Iowa physicians, which is updated daily by the University of Iowa. The database includes self-reported specialty. The sample included both osteopathic and allopathic family physicians but excluded house officers, retired physicians, and full-time emergency room physicians.

Procedures

Before inviting any physicians to participate, we conducted a focus group of eight family physicians to generate possible causes of errors. We also completed five pilot interviews with academic family physicians before deciding on a final interview instrument.

Selected physicians received an introductory letter inviting them to participate, followed by a telephone call. Between October 1992 and August 1993, one of the investigators conducted individual, in-depth interviews in which he asked participants to describe their most memorable error. An error was defined as an act or omission for which the physician felt responsible and which had serious or potentially serious consequences for the patient.⁹ The interviews lasted 25 to 30 minutes and took place in the participant's office. Audiotapes of the interviews were erased following verbatim transcriptions, which omitted identifying information. The study protocol was approved by the University of Iowa review board for the study of human subjects.

The interview consisted of open-ended questions and probes followed by a sequence of closed-ended items. At the beginning of each interview, the interviewer described his own most memorable error in which he failed to diagnose and properly treat a patient with an upper airway obstruction. He attributed this error to his own anger and lack of medical knowledge. Following this description, the participant was asked to describe his or her most memorable error and the perceived causes.

In the subsequent closed-ended portion of the interview, participants were asked to rate 20 possible causes on a 4-point scale: 1=not a factor at all; 2=possibly a minor factor; 3=a definite but less important factor; 4=a major factor. These 20 potential causes had been generated by the focus group of eight family physicians, none of whom participated in the subsequent interviews. Finally, participants were asked about subsequent malpractice claims, patient or family anger, "take-home messages," and the reasons why the error was most memorable.

Analysis

Descriptive statistics were used to analyze the frequencies of the perceived causes. The demographic characteristics of participants and unselected Iowa family physicians were compared using the *t* test and the chi-square statistic.

Based on findings from the focus group and on the five pilot interviews, the investigators developed a classification of perceived causes. The classification, which was revised after the study transcripts were read, had four major categories: (1) physician stressors, such as time pressure, fatigue, and emotional reactions; (2) process-of-care factors, such as procedures and tasks that were omitted, improperly performed, or improperly included; (3) patient-related factors, such as patient characteristics and difficult patient-physician interactions; and (4) physician characteristics, such as personal traits and lack of knowledge or skills.

Using qualitative methods,^{13,14} transcript segments were classified into these four broad categories. One of the investigators analyzed all transcripts. The transcripts were distributed equally and randomly among the other four investigators, who reviewed and coded them independently. During subsequent discussions, the two coders reached consensus about the classification of each text segment.

Results

Characteristics of Participants

Ten physicians chose not to participate without explaining their reasons. Seven physicians chose not to be interviewed because they could not remember any errors they had made. The remaining 53 (76%) of the 70 selected physicians agreed to be interviewed. Five participants were in full-time teaching positions, and the remainder were in private practice. The participants had been in practice for an average of 16 years (median, 13 years; range, 1 to 41 years). Participants were younger than unselected physicians, and they were more likely to be residency-trained and board-certified (Table 1).

Description of Errors

Among the 53 errors, there were 30 delayed or missed diagnoses, 11 surgical mishaps, and 8 medical treatment mishaps. The delayed or missed diagnoses included cancer (6 cases), myocardial infarction (5 cases), trauma (5 cases), bowel obstruction (4 cases), and meningitis (3 cases). Nine of the 11 surgical errors were obstetric mis-

Table 1. Characteristics of Physician Respondents and Those Who Were Not Selected to Participate

Characteristic	Respondent Physicians (n=53)	Unselected Physicians (n=316)	P Value
Mean age, y	45	48	.03
Female, n (%)	7 (13)	47 (15)	NS
Board-certified, n (%)	35 (66)	143 (45)	.01
Residency-trained, n (%)	34 (64)	152 (48)	.03

NOTE: Physicians asked to participate in the study were from the eastern third of Iowa (telephone area code 319).

haps. In 6 of the 8 medical treatment errors, physicians administered contraindicated drugs.

The mean age of the patients was 41 years (range, under 1 year to 88 years). Twenty-two (42%) of the patients were female. Although house officers were excluded from the sample, 9 physicians described an error that occurred during residency training. The remaining 44 physicians described an error that occurred after a mean of 8 years in practice (median, 4 years; range, 1 to 35 years).

Causes of Errors

Table 2 lists the 34 causes that were either cited in the open-ended portion of the interview or rated as "major factors" or "definite but less important factors" in the closed-ended portion. Causes identified in both portions of an interview were counted only once. Participants reported a mean of 8 causes per case (range, 1 to 16).

PHYSICIAN STRESSORS

The most common physician stressors were a sense of being hurried (30 cases) and a sense of being distracted (25 cases). Most physicians who felt hurried were concerned about other patients waiting to be seen.

I was in a hurry and I just didn't stop to think about all the possibilities. I mean I knew about [name of disease], they teach that in medical school and I knew about it . . . but I just didn't even think about it. I was just in a hurry, you know, in a hurry to get to the next [patient].

Similarly, physicians who identified a sense of being distracted were most commonly distracted by an awareness of other patients waiting to be seen. Others were distracted by some aspect of the patient or by personal concerns.

They arrived and this guy was in terrible shape. He was bleeding like gangbusters. Here's where I screwed up. I forgot all the basic training about stabilizing the patient. I got

so excited about all the horrible injuries, that I didn't tend to business.

Since I've had time to reflect on this, I probably was busy thinking of an [upcoming trip] that we always take and I didn't remember to . . . Again a lack of concentration on my part and probably a little bit of preoccupation getting the office set up for [my absence].

Twenty participants said they were misled by the advice or the anticipated advice of other physicians. The specialties of the advising physicians included family practice (6 cases), internal medicine (6 cases), general surgery (4 cases), pediatrics (2 cases), and radiology (2 cases). One rural physician anticipated the response from an urban referral center:

Because to convince these guys to drive an hour and a half to go to [name of city] to get the CT scan and then [it would] be midnight and then try to convince the physician that I thought this person needed a CT scan . . . uh (shakes head) . . . you know, they'd say, "Yeah, right, doc."

Nineteen participants underestimated the seriousness of the patient's disease because of perceived stressors. The following example describes a "quitting time" phenomenon as one of the stressors that led to the underestimation.

And I can see, looking back . . . where you try and make it fit something less than it is to justify your course of action and plan at the time. I can see all those other pressures where everybody wants to shut down the clinic. It's been a long day, get home, get out. Do I really want to go up and do all this stuff? Do I want to have the [consultant] see him, do I want to do the blood count, and the [procedure] and mess with trying to get the IV started and all those other things that very quickly seem to go through your mind, and you say, "Well, I don't think the [patient] is that sick."

Ten participants attributed their errors to physician anger, usually directed at the patient or the patient's family.

All of a sudden, they're just super concerned, to the point where they were really irritating me. Like, "Did you check this, did you check this?" And the mother was in between me and the patient and wouldn't get out of the way so I could look at the patient. She wasn't doing this on purpose, but I was really getting angry. I examined her again, I don't find anything specific. And I'm really angry now. And by this time, I'm not listening, I'm not making the right decisions, I'm saying, "Absolutely not . . ."

Table 2. Causes of Physicians' Errors, As Perceived by Physicians (n=53)

Perceived Cause	N (%)*
I. Physician Stressors	48 (91)
A. The physician felt hurried†	30 (57)
B. The physician felt distracted†	25 (47)
C. The time of the visit was stressful to the physician (eg, night, weekend, "off-duty" hours, "quitting time")	22 (42)
D. The physician received or anticipated adverse advice from a consultant†	20 (38)
E. The physician underestimated the seriousness of an illness due to stressors such as hurry, fatigue, etc	19 (36)
F. The physician was fatigued†	16 (30)
G. The physician felt angry at the patient, patient's family, or another physician†	10 (19)
H. The physician avoided an intervention because of its cost†	6 (11)
I. The physician's behavior was affected by a nurse, laboratory technician, or radiology technician	5 (9)
J. Physician panic led to inadequate performance in a crisis	4 (8)
II. Process-of-Care Factors	48 (91)
A. The physician was too focused on one diagnosis or treatment plan†	26 (49)
B. The physician was not aggressive enough in diagnosing or treating†	26 (49)
C. The physician lacked an adequate follow-up plan†‡	18 (34)
D. The physician did not take the patient seriously enough†	12 (23)
E. The physician did not ask advice†	11 (21)
F. The physician did not take an adequate history or did not listen well to the history†	11 (21)
G. The physician did not do an adequate physical examination†	9 (17)
H. There was a problem with the system (hospital or office procedure)	5 (9)
I. The physician treated too aggressively	3 (6)
J. The physician did not check the results of a previously ordered laboratory test or radiograph†	1 (2)
III. Patient-Related Factors	38 (72)
A. The physician was misled by a normal or negative history, physical examination, laboratory result, or imaging study	22 (42)
B. The physician felt or anticipated an adverse influence from the patient	15 (28)
C. The physician's management was not aggressive enough because of patient characteristics such as "Do Not Resuscitate" status, old age, hypochondriasis, etc	9 (17)
D. The patient was new to the physician or was normally seen by a different physician, so that the participant felt less than full responsibility for the patient	9 (17)
E. The patient was a friend of the physician, and the physician's objectivity was impaired	7 (13)
F. The physician disliked the patient†	6 (11)
G. The physician may have felt bias toward a patient who presented with an alcohol-related problem	4 (8)
H. The diagnosis was difficult	4 (8)
I. The bad outcome was due to "fate" ("Some patients are just doomed.")	3 (6)
IV. Physician Characteristics	33 (62)
A. The physician lacked knowledge about the medical aspects of the case†	26 (49)
B. The physician reached beyond his or her capabilities†	12 (23)
C. The physician's pride in his or her own abilities led to a wrong decision†	5 (9)
D. The physician's female gender hindered interaction with a male physician	1 (2)
E. The physician was impaired by a psychiatric disorder or substance abuse	1 (2)

*Participants could select more than one cause. All percentages were calculated with the total sample (n=53) as the denominator.

†Causes generated by the focus group and included in the closed-ended portion of the interview.

‡Two questions concerning follow-up are combined into one item in the table.

PROCESS-OF-CARE FACTORS

Forty-eight physicians described process-of-care factors that led to their error. Twenty-six physicians cited premature closure of the diagnostic process.¹⁵

I guess his age, relatively young, the thought of [cancer] didn't even raise . . . I didn't think of it. I flat out didn't think of [the] connection of bone pain secondary to [cancer], I just didn't. Mainly because he was probably younger, and he wasn't real aggressive . . . and it's not his fault, it's mine.

Twenty-six physicians felt they had hesitated too long or were insufficiently aggressive in managing their patients. In contrast, only three physicians felt they had been too aggressive in patient management.

And [I] talked to him about the fact that he should see a cardiologist and he wasn't . . . In retrospect I probably should have pushed him to see him sooner but he felt, "Ah, it'll be fine," and so I didn't push it really that much, and (sigh) I wasn't aggressive enough to push him to see the cardiologist immediately.

PATIENT-RELATED FACTORS

The most common patient-related factor, cited by 22 physicians, was the tendency to be misled by a normal finding, which overshadowed other signals that the patient had a significant illness. These normal findings included a normal physical examination (6 cases), a normal imaging study (4 cases), a normal history (2 cases), a normal electrocardiogram (2 cases), a normal clinical course (2 cases), and a normal laboratory value (1 case).

But in the course of the exam I found what I thought was a [mass] on the left, and I evaluated him with an [imaging study] and it turned out normal. So I just kind of put it out of my mind.

Fifteen physicians attributed their error to patient wishes or anticipated patient wishes. In seven cases, patients minimized their symptoms or asked for inappropriately conservative management. Three physicians made wrong decisions based on their desire to relieve acute pain, and three wrong decisions were based on patient convenience.

He kept complaining, "My chest, it hurts, it hurts, it hurts!" . . . I always felt that I overtreated. I just think overreaction to the history, because I could still see him laying there, you know (demonstrates by clutching chest). He kept saying, "Do something! Do something!" You feel like you have to do

something. And I thought, [expletive deleted], he's gonna die from [name of disease], so you start to treat him.

Thirteen physicians attributed their error to their attitude toward the patient, either dislike (6 cases) or unusual fondness (7 cases). The following example of dislike also illustrates a nurse's adverse influence on the physician's attitude toward the patient.

And she was very obnoxious to my nurse [who said], "This lady's really not a very nice lady." And so my nurse kind of gives me a little preview, you know, so I was ready to go in there and thinking . . . [But] she wasn't obnoxious to me. She was actually kind of nice (tentative tone of voice). But then she got up off the exam table, she had a hundred questions. She stood there and they were these bizarre questions, and [with] each question I got more and more irritated.

Conversely, another physician felt that his friendship with the patient contributed to the error.

And I was thinking, does this guy have a [malignancy] or something, but of course, being a friend, I didn't want him to have anything bad so once I did that [normal study], I just kind of put it out of my mind . . . because I just didn't want him to be sick.

PHYSICIAN CHARACTERISTICS

Thirty-three physicians identified personal characteristics that they believed contributed to their error, most commonly lack of medical knowledge (26 cases). Five physicians were unable to seek consultation because their acutely ill patients could not be left unattended. This physician refers to a patient who died within minutes of arriving at the hospital:

. . . inexperienced, didn't know exactly what to do and panicked I guess you'd say. And he ultimately died, because I didn't know what to do with him. So I . . . needless to say, I looked up the treatment for [name of disease], and I still remember it all real well.

Four physicians who cited lack of knowledge had received inadequate support as house officers.

At that point, I was still in training and I wasn't completely competent when it came to technical things. I was fatigued, I was fearful of looking as incompetent as I was, so that I didn't feel that I could call on the people that I really needed to help me. I wasn't supposed to be calling. That was a sign that you were a "wuss" . . . that you weren't tough enough if you had to call the senior resident. I think in medical school

and often through your training programs is the time when you're most made to feel that asking and calling on people for help is an error.

Outcomes of Errors

Following the error, most patients sustained a severe adverse outcome, including death (25 cases), permanent major disability (6 cases), or long-term but temporary morbidity (8 cases). Fourteen patients had no adverse outcome.

Although the emotional toll on physicians was not the focus of this study, several physicians briefly described their reactions.

Mine didn't have a horrible outcome but it didn't seem to matter to me because I still felt like I went through all of the stages of grief afterwards. I went through bargaining, denial, depression. . . . I was going to leave medicine, I was tired of this, I just didn't want all that responsibility. If people were going to die, I wanted somebody else to be responsible for it. I wanted to be off in Idaho somewhere, living on a farm. There were many nights that I wasn't sleeping and it was fully six months before I started feeling comfortable again practicing medicine, and I think it was at least a year, year and a half before I finally was able to escape those intrusive thoughts—those thoughts that come jamming into your mind when you're having a good time or when you're having a bad time, you know, they just kind of make you feel like putty all of a sudden.

Most physicians said the error selected was most memorable because of the actual or potential adverse outcome (24 cases). Others mentioned the obviousness of the error (10 cases), the involvement of a child (9 cases), the involvement of a friend (8 cases), the preventability of the error (5 cases), or the involvement of a patient the physician continued to see (5 cases).

The most common "take-home message," cited by 15 physicians, was to be more aggressive diagnostically with similar patients in the future. Other take-home messages were to resist outside distractions (7 cases), to broaden the differential diagnosis (5 cases), to refer sooner if faced with a similar problem (5 cases), to be more aware that anger can cloud judgment (4 cases), and to resist pressures from other physicians to change an initial impression (4 cases).

When asked to rate the degree of fault they felt, 22 physicians said they were "clearly at fault," 8 said they were "mostly at fault," and 23 felt "some fault but understandable." No participant denied fault.

Only 4 of the 53 errors led to malpractice claims, all of which were settled out of court. In 21 cases, the patient

or family was angry at the physician. In 9 cases, the family was angry but the surviving, competent patient was not. In one case, the patient was angry but the family was not. None of the 53 errors were addressed by a peer-review organization.

Physicians were asked how many errors they could recall over their professional lifetimes and how many of these errors resulted in the patient's death. The mean number of errors per physician was 10.7 (median, 6; range, 1 to 9). The mean number of errors resulting in death was 1.2 (median, 1; range, 0 to 7).

Discussion

The physicians in this study attributed their errors to a variety of causes. Stressors such as hurry and distraction often led physicians to underestimate the severity of the patient's illness. A serious illness might require several hours of evaluation and treatment, whereas diagnosing a minor illness allowed a quick end to the visit.

Many physicians described well-known biases and shortcuts in clinical reasoning. Participants who focused too early on one diagnosis attributed their error to premature closure of the diagnostic process.¹⁵ Participants who focused on normal clinical findings while ignoring abnormal findings may represent instances of confirmation bias, which is defined as the tendency to reach a diagnosis and then seek only evidence that supports that diagnosis.¹⁵

Our participants were asked to describe their most memorable errors rather than their most serious errors because we wanted a detailed picture of the relevant circumstances. Most of the errors were serious, however, and led to serious outcomes. When asked why the error was memorable, most physicians cited an actual or potential adverse outcome or the clearly mistaken decision they had made.

Previous studies of errors have emphasized the physician's response to the error rather than the physician's attribution of causes for the error.^{9,10} In a study of 11 internists, participants seldom discussed their errors with others and suffered long-lasting guilt, shame, depression, and self-doubt.¹⁰ Although the causes of errors were not extensively explored, hurry, fatigue, and pride were the perceived causes cited by these internists.

In a mailed questionnaire study of 114 internal medicine house officers, only 54% of respondents said they had discussed their "most significant" errors with their attending physicians, and 24% had discussed the errors with patients or patients' families.⁹ These house officers attributed their errors to inexperience, job overload, and "faulty judgment in a complex case."⁹

In our study, most perceived errors did not lead to malpractice claims, and none was addressed by peer review organizations. Others have found that the malpractice system² and traditional peer review procedures^{3,4,6,7} lack both sensitivity and specificity in identifying physician negligence.

We did not verify the accuracy of the cited causes or the seriousness of the errors. However, the authors agreed that all 53 cases represented physician error and that the perceived causes were congruent with the case descriptions.

The interviewer's initial description of his most memorable error may have influenced the participant's selected error and the perceived causes. However, we felt it was important to build trust in the interview and to encourage self-disclosure.¹⁶⁻¹⁸ All but one participant said they had decided which error to describe before hearing the account of the interviewer's error.

Individuals tend to attribute their own behavior to environmental factors, while attributing the behavior of others to personal characteristics.¹⁹ To help reduce this tendency, the interview emphasized personal failings as well as external pressures. No participant denied responsibility, and most said they were "mostly at fault" or "clearly at fault." All participants admitted to personal failings, and many disclosed embarrassing details about their emotional state at the time of the error.

Selection bias may have influenced our results. The participants were younger and more likely to be board-certified and residency-trained than were unselected physicians. The participants practiced in rural areas and small cities; therefore, it is unknown to what extent our findings can be applied to urban physicians.

Understanding the causes of errors may not prevent them because humans have difficulty catching their own errors of thinking and decision-making.²⁰ Several participants, however, said that they temporarily backed away from subsequent interactions involving physician anger or dislike for the patient. Others described system changes, including greater availability of patient records and improved communication procedures. Physicians who are hurried or distracted should be wary of the tendency to underestimate the severity of illness when working under these stresses. To the extent that lack of knowledge resulted from inadequate time to seek consultation, certification in Advanced Cardiac Life Support, Pediatric Advanced Life Support, and similar courses may help prevent errors.

Physicians often do not identify their emotional reactions to patients.²¹⁻²⁴ The participants in our study, however, attributed errors to negative feelings of dislike for the patient and positive feelings of friendship. Physicians who learn to recognize and acknowledge their reac-

tions may be able to prevent problems in communication and errors in patient care.²⁴

In an effort to understand the phenomenon of physician error, this study examined family physicians' perceptions of the causes of their most memorable errors. Although a diversity of causes was identified and multiple causes were cited for most errors, the interviews revealed recurrent themes that may assist in developing preventive strategies.

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Many physicians described well-known biases and shortcuts in clinical reasoning. Participants who focused too early on one diagnosis attributed their error to premature closure of the diagnostic process.¹⁵ Participants who focused on normal clinical findings while ignoring abnormal findings may represent instances of confirmation bias, which is defined as the tendency to reach a diagnosis and then seek only evidence that supports that diagnosis.¹⁵

Our participants were asked to describe their most memorable errors rather than their most serious errors because we wanted a detailed picture of the relevant circumstances. Most of the errors were serious, however, and led to serious outcomes. When asked why the error was memorable, most physicians cited an actual or potential adverse outcome or the clearly mistaken decision they had made.

Previous studies of errors have emphasized the physician's response to the error rather than the physician's attribution of causes for the error.^{9,10} In a study of 11 internists, participants seldom discussed their errors with others and suffered long-lasting guilt, shame, depression, and self-doubt.¹⁰ Although the causes of errors were not extensively explored, hurry, fatigue, and pride were the perceived causes cited by these internists.

In a mailed questionnaire study of 114 internal medicine house officers, only 54% of respondents said they had discussed their "most significant" errors with their attending physicians, and 24% had discussed the errors with patients or patients' families.⁹ These house officers attributed their errors to inexperience, job overload, and "faulty judgment in a complex case."⁹

In our study, most perceived errors did not lead to malpractice claims, and none was addressed by peer review organizations. Others have found that the malpractice system² and traditional peer review procedures^{3,4,6,7} lack both sensitivity and specificity in identifying physician negligence.

We did not verify the accuracy of the cited causes or the seriousness of the errors. However, the authors agreed that all 53 cases represented physician error and that the perceived causes were congruent with the case descriptions.

The interviewer's initial description of his most memorable error may have influenced the participant's selected error and the perceived causes. However, we felt it was important to build trust in the interview and to encourage self-disclosure.¹⁶⁻¹⁸ All but one participant said they had decided which error to describe before hearing the account of the interviewer's error.

Individuals tend to attribute their own behavior to environmental factors, while attributing the behavior of others to personal characteristics.¹⁹ To help reduce this tendency, the interview emphasized personal failings as well as external pressures. No participant denied responsibility, and most said they were "mostly at fault" or "clearly at fault." All participants admitted to personal failings, and many disclosed embarrassing details about their emotional state at the time of the error.

Selection bias may have influenced our results. The participants were younger and more likely to be board-certified and residency-trained than were unselected physicians. The participants practiced in rural areas and small cities; therefore, it is unknown to what extent our findings can be applied to urban physicians.

Understanding the causes of errors may not prevent them because humans have difficulty catching their own errors of thinking and decision-making.²⁰ Several participants, however, said that they temporarily backed away from subsequent interactions involving physician anger or dislike for the patient. Others described system changes, including greater availability of patient records and improved communication procedures. Physicians who are hurried or distracted should be wary of the tendency to underestimate the severity of illness when working under these stresses. To the extent that lack of knowledge resulted from inadequate time to seek consultation, certification in Advanced Cardiac Life Support, Pediatric Advanced Life Support, and similar courses may help prevent errors.

Physicians often do not identify their emotional reactions to patients.²¹⁻²⁴ The participants in our study, however, attributed errors to negative feelings of dislike for the patient and positive feelings of friendship. Physicians who learn to recognize and acknowledge their reac-

tions may be able to prevent problems in communication and errors in patient care.²⁴

In an effort to understand the phenomenon of physician error, this study examined family physicians' perceptions of the causes of their most memorable errors. Although a diversity of causes was identified and multiple causes were cited for most errors, the interviews revealed recurrent themes that may assist in developing preventive strategies.

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