

Contextual Errors in Medical Decision Making: Overlooked and Understudied

Saul J. Weiner, MD, and Alan Schwartz, PhD

Abstract

Although it is widely recognized that effective clinical practice requires attending to the circumstances and needs of individual patients—their life context—rather than just treating disease, the implications of not doing so are rarely assessed. What are, for instance, the consequences of prescribing a medication that is appropriate for treating a clinical condition but inappropriate for a particular individual either because she or he cannot afford it, lacks the skills to administer it correctly, or is unable to adhere to the regimen because

of competing responsibilities such as working the night shift? Conversely, what are the gains to health and health care when such contextual factors are addressed? Finally, can performance measures be employed and developed for the clinician behaviors associated with contextualizing care to guide improvements in care? The authors have explored these questions through observational and experimental studies to define the parameters of patient context, introduce strategies for measuring clinician attention to patient context, and assess the impact of that

attention on care planning, patient health care outcomes, and costs. The authors suggest that inattention to patient context is an underrecognized cause of medical error (“contextual error”), that detecting its presence usually requires listening in on the visit, and that it has significant implications for quality of care. Also described is preliminary work to reduce contextual errors. Evidence suggests that this nascent area of research has significant implications for performance assessment and medical education in addressing deficits in quality of care.

From William Osler’s attributed assertion that “the good physician treats the disease; the great physician treats the patient who has the disease” up to present writings on social medicine, there is a widespread appreciation that “applying social science principles to medicine—a practice sometimes called ‘social medicine’—enables us to contextualize patient care to achieve more sustainable and equitable health outcomes.”¹

But what, exactly, is the great physician doing to contextualize patient care? Specifically, can we distill those skills into a set of observable behaviors? And, finally, are such behaviors in fact predictive of better health care outcomes?

S.J. Weiner is staff physician and deputy director, Veterans Affairs (VA) Center of Innovation for Complex Chronic Healthcare, Jesse Brown VA Medical Centre, and professor of medicine, pediatrics, and medical education, University of Illinois at Chicago College of Medicine, Chicago, Illinois.

A. Schwartz is professor and associate head, Department of Medical Education, and research professor, Department of Pediatrics, University of Illinois at Chicago College of Medicine, Chicago, Illinois.

Correspondence should be addressed to Saul J. Weiner, University of Illinois at Chicago, 601 S. Morgan St., 2732 UH, Chicago, IL 60607; telephone: (312) 413-2799; e-mail: sweiner@uic.edu.

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In an era of performance measurement and value-based care, these are questions that physician educators, payers, and providers themselves all should be asking.

Physicians are now widely assessed for their adherence to guidelines which are, in turn, based on research evidence.² However, that research evidence is intrinsically devoid of patient context. While a particular medication may outperform placebo in a randomized controlled trial, it may be of no benefit to subgroups of patients who can’t afford it, don’t understand how to take it, or have competing responsibilities that preclude adherence to the studied dosing schedule.³ The physician who is treating the patient with the disease rather than just the disease will accommodate these challenges. What is lacking is a performance measure for physician attention to such contextual factors. In short, while we assess physicians in their performance at following guidelines, we are not assessing whether they know when not to, or when following them is not enough, and what to do instead.

How Does Inattention to Patient Context Lead to Medical Errors?

What are the implications of omitting patient context in care planning? In 2004, one of us explored the question

through a case analysis of a middle-aged woman with obesity, referred for bariatric surgery after unsuccessful attempts at more conservative measures to reduce her weight.⁴ She had two complications of overweight: diabetes and hypertension, and a history of adhesions following a cholecystectomy. The research evidence supported the decision to recommend surgery from a risk–benefit standpoint, despite the need for an open rather than laparoscopic procedure; and her stated preference was to have the surgery done.

What had not been explored, however, was her life context. The physician picked up on an offhand comment she made that one reason she wanted the surgery was that she would be “better able to take care of her son.” When the doctor inquired about what was wrong with her son, she poured out how she had sole responsibility for lifting, bathing, and feeding a young man with end-stage muscular dystrophy, supporting her eight-year-old daughter, and tolerating an abusive, alcoholic husband who she’d not thrown out because she needed the money that came from his disability income and a small pension he received. When the physician observed that she might not be able to lift the boy for weeks after the surgery because of the risk of wound dehiscence, the direction of the conversation and care plan changed. After

more discussion, the patient concluded that this was the wrong time for her to have the surgery. She canceled the procedure. An error in planning was averted.

What do we call this sort of error? The Institute of Medicine has defined a medical error as “the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim.”⁵ Sending the patient to the operating room at that particular time would have been “the wrong plan to achieve an aim”—her aim, which was to care for her son. It would also have put her at unnecessary risk of a postsurgical complication as noted above. It would have been a medical error.

Unlike other kinds of medical errors, however, it would not have been possible to detect from a review of the medical record because the information needed to know that the care plan was wrong—information about the patient’s context—would not have been recorded if it were overlooked. The case illustrates how these particular types of medical errors, which occur because of an inattention to patient context, fly under the radar of chart-based approaches to detecting medical error.⁶ We decided to assign them a descriptive name. We called them “contextual errors.”⁷ A contextual error is what happens when the clinician is treating the disease rather than the patient who has the disease.

Contextual errors occur when clinicians overlook patient context that is essential to planning appropriate care.^{7,8} We define patient context as all that is expressed outside the boundaries of a patient’s skin that is relevant to planning the patient’s care. Patient context may be organized into at least 10 broad domains including competing responsibilities, social support, access to care, financial situation, and skills and abilities, among others (Table 1).⁴ Note that it includes emotional state and spiritual beliefs that—while originating in the brain—are manifest as behaviors and actions expressed “outside the skin” and, hence, are a part of the context of a patient’s care.

How common are cases like the one we’ve described, in which inattention to patient context results in a contextual error? How does one detect them? How often do they occur? Are they preventable? And, perhaps most important, do they really

matter, in terms of their impact on health care outcomes and costs? We describe here a series of studies we have conducted to explore these questions. We conclude by considering the implications of what we’ve learned for further study, and offer some preliminary recommendations that may reduce contextual error rates through performance improvement interventions and medical education reforms.

How Is Attention to Patient Context Evaluated?

Recognizing that we are not the first to identify inattention to social/contextual factors as compromising care, we canvassed the literature for specific tools and strategies for identifying contextual errors in care delivery and did not find any. There has, of course, been much consideration of the importance of psychosocial factors in the process of care planning, dating to the work of George Engel, followed by many initiatives to incorporate psychosocial and biomedical elements into patient care.^{9–16} What we were unable to identify, however was a method for ascertaining whether relevant psychosocial factors have, in fact, been integrated into a care plan. Available instruments for analyzing physician–patient communication behavior do not track this specific task.¹⁷

We conceptualize the process of “contextualizing care,” as we term it, as consisting of addressing four sequential questions during a clinical encounter¹⁸: first, are there clues—“contextual red flags”—suggesting that context essential to care planning may be present? In our case study, the patient’s comment about her son is a contextual red flag. Second, if a contextual red flag is present, did the clinician explore it? We term this a “contextual probe.” For this illustration, that entailed asking about her son. Third, are there, in fact, “contextual factors” essential to care planning, revealed either in response to probing or unsolicited? The patient’s responsibility for lifting and bathing her son is a contextual factor because addressing it in the care plan is necessary to avoiding contextual error. Finally, was the contextual factor addressed in a *contextualized care plan*? That meant canceling the surgery following a discussion of the patient’s situation. Table 1 provides examples of contextual red flags, probes, factors,

and contextualized care plans across 10 domains of context.

Some might argue that a physician should not rely on contextual red flags but, rather, should take a more comprehensive approach to taking a social history in which all patients are routinely asked about potential life challenges such as caretaker responsibilities, inability to pay, or loss of social support. We regard such an approach as impractical and akin to the exhaustive review of systems taught to second-year medical student but soon replaced by a hypothesis-driven approach. Not all care requires contextualization. An insured woman with an uncomplicated urinary tract infection may simply need a prescription for an antibiotic. Routinely inquiring whether such a patient can afford the medication is impractical. On the other hand, if she hints that she may not take the antibiotics (a contextual red flag), and happens to be pregnant, the clinician should probe for possible contextual factors in the domains of “skills and abilities” (a lack of knowledge about the consequences) and cultural perspective/spiritual beliefs (favoring traditional remedies), among others.

As outlined above, knowing whether context is a factor in care planning and, if so, whether those factors were addressed, requires hearing if clues are present, if the right questions have been asked, if the patient in turn revealed contextual factors essential to care planning, and if those factors were subsequently accommodated. Hence, knowing whether care is appropriately contextualized or whether there are contextual errors requires listening in on the visit.

Do Physicians Make Contextual Errors?

To determine whether physicians make contextual errors when given an opportunity to do so, and to benchmark the rate of these errors against errors that occur when physicians overlook biomedical information, from April 2007 to April 2009 we sent unannounced standardized patients (USPs) to internal medicine ambulatory practices across the Chicago, Illinois, and Milwaukee, Wisconsin, areas. They presented with one of four clinical scenarios, each with four different variants of common conditions, such as asthma, in which

Table 1

Examples of Contextual Red Flags, Probes, Factors, and Potential Care Plans for the 10 Domains of Patient Context, as They Relate to Contextual Errors in Medical Decision Making^a

Contextual domain ^b	Contextual red flag	Contextual probe	Contextual factor	Contextualized plan of care
Competing responsibilities	Patient with chronic care needs misses two appointments and is late for the third	Inquire about difficulty making appointments	Patient explains he has been given the night shift and is struggling to manage with meds and appointments	Advocate for patient to get day shift back, in accordance with disability laws
Social support	Patient's caretaker wife has arm in sling when she accompanies patient to clinic	Inquire how she is managing with injury	Wife explains she was injured attempting to assist husband with transfer, and it's occurred twice	Social work meets with family to explore options for home health assistance
Access to care	Patient presents with high blood pressure, stating that he ran out of medications because they were stolen	Explore circumstances of theft	Patient reports package was stolen when medications arrived in entryway of apartment building	Arrange for patient to pick up medication at clinic pharmacy
Financial situation	Patient with loss of control of asthma comments that it's been tough since he lost his job	Inquire what he means by comment about job loss	Patient no longer insured for coverage of brand name inhaler he is supposed to be taking but cannot afford	Switch patient to less costly generic
Skills and abilities	Patient has rising glycosylated hemoglobin	Explore reasons for loss of diabetes control	Vision loss impairs reading insulin syringe	Prescribe insulin pen for visually impaired
Emotional state	Patient appears agitated after receiving a grave diagnosis	Inquire if patient is too distressed to consider his options now	Patient confirms he is too distressed to discuss care plan	Ask patient to return when he feels ready to discuss care options
Cultural perspective/spiritual beliefs	Patient declines treatment for depression, stating his beliefs and saying that prayer will suffice	Ask if he has a spiritual advisor whom he trusts	Patient says that yes, he does have a minister whom he can talk with	Advise patient to meet with his minister to discuss accepting medical care and return for follow-up
Attitude toward illness	Patient declines narcotic pain relief after shoulder dislocation	Inquire why patient is reluctant to take pain medication when he is suffering	Patient reveals he has been taught to "tough it out" if he wants to get better	Advise patient that pain control will aid in physical therapy and reduce risk of frozen shoulder
Relationship with health care team members	Patient with heart failure goes to emergency department instead of contacting doctor with three days of shortness of breath	Inquire why patient did not contact her doctor's office	Patient admits she had binged on some salty foods and was ashamed to admit this to her doctor	Reassure patient that she is not judged and that her doctor appreciates that changing how she eats is a challenge
Environment	Patient mentions that it's hard to quit smoking since she moved into city because of a new job	Inquire why move makes quitting harder	Patient reveals she now has roommates who smoke	Discuss need to tell roommates about plans to quit, engage their support, or consider moving. Refer to cessation program

^aThe contextual domain is where the contextual factor is located. The contextual factor is the contextual information that must be addressed in the care plan to avoid a contextual error.

^bThe domains are adapted from Weiner SJ. Contextualizing medical decisions to individualize care: Lessons from the qualitative sciences. *J Gen Intern Med.* 2004;19:281–285.⁴

appropriate care depended on attention either to a contextual factor (e.g., can't afford medication), a biomedical factor (e.g., untreated gastroesophageal reflux), both, or neither (i.e., on simply following guidelines; termed an "uncomplicated" variant). Our team documented, based on audio recordings of the encounters, the length of the visits and whether the physicians identified the complicating factors by probing red flags (biomedical or contextual), and addressed them.^{19,20}

Several striking findings emerged from an analysis of 399 visits²⁰: First, whereas physicians provided error-free care in 73% of uncomplicated encounters, their

care was appropriate in only 38% of biomedically complex encounters, 22% of contextually complex encounters, and just 9% of the combined biomedically and contextually complicated encounters. Second, there was no guarantee that they would provide biomedically or contextually appropriate care even when they successfully probed and prompted the USP to reveal the underlying problem. For instance, even when the physician learned that a patient could not afford his or her asthma medication, there was still more than a 50% chance that the physician would prescribe a higher dosage rather than switch to a cheaper generic. Third, clinicians tended

to favor biomedical information over contextual information even when both were equally important to getting the care plan right. Specifically, they probed biomedical red flags 63% of the time and contextual red flags 51% of the time. All of these differences were significant ($P < .05$).

One of the most unexpected findings was that those encounters in which physicians probed contextual red flags, identified contextual factors, and addressed them in the care plan were not on average any longer than those in which they did not.²⁰ Although surprising, the likely reason becomes clear when one listens to high-

performing clinicians: For instance, on hearing the comment “It’s been tough since I’ve lost my job,” the contextually sensitive clinician would promptly ask, “How has it been tough?” and, on learning about insurance problems, switch the patient to a less costly generic. This is in lieu of a misguided discussion of the need to add additional medications or increase dosages. In sum, contextualizing care is not necessarily a longer process, but it requires sensitivity and responsiveness to contextual information.

A limitation of these findings is that they are based on an analysis of physician performance across just four scenarios, each portraying one of four contextual factors. Other cases could be “harder” or “easier” depending on, for instance, the contextual factors scripted. Nevertheless, the factors selected—low health literacy, inability to afford medications, caretaker responsibility, and nutritional deprivation—are well-documented problems presenting in ambulatory care.^{21–24}

Do Contextual Errors Impact Health Care Costs?

Inattention to context can lead to overuse and misuse of medical services. For instance, in one case a USP presented to multiple clinicians as an elderly gentleman with unexplained weight loss due to poverty and malnutrition. There were four contextual red flags pointing to a social cause of his condition. Physicians who identified the underlying problem referred the patient to social services (e.g., “Meals on Wheels”). Those who missed the clues ordered an extensive battery of tests to evaluate for malignancy.²⁰

In a secondary analysis of the USP study, the costs of errors were computed.⁶ For comparison purposes, frequency and types of biomedical errors were also tabulated. Whereas the median cost of biomedical errors across all encounters with errors was \$30, it was \$231 for contextual errors. In sum, when physicians were challenged with clinical situations complicated by biomedical or contextual factors, errors resulting from inattention to the latter were more costly than from the former. Because these costs reflect the consequences of inappropriate care for the particular cases used in this study, neither the absolute nor relative costs should be generalized.

How Often Does Patient Context Matter to Care Planning?

In a subsequent study, we invited real patients to carry concealed audio recorders, from July 2009 to November 2012, into their encounters at two larger Veterans Affairs (VA) internal medicine ambulatory practices in the Chicago area.²⁵ Unlike the USP study in which every “patient” presented with hints that contextual issues might underlie problems in their clinical presentations, there was no way to know in advance how often that would occur in actual practice. Hence, the team developed a coding schema, Content Coding for Contextualization of Care (“4C”), that assessed each visit by listening to the audio recording and reviewing the medical record for the presence or absence of contextual red flags.¹⁸ When a contextual red flag was present, the coders followed the same protocol discussed above, listening for physician probing, contextual factors, and, when indicated, whether care plans were contextualized.

Across 774 audio recorded encounters with 139 physicians, there were 403 encounters with contextual red flags (52%), from among which 208 contextual factors were confirmed. Care was contextualized in 59% of these, meaning that inattention to context leading to inappropriate care plans occurred in the remaining 41%.²⁵ These findings from real cases affirmed the high incidence of contextual factors, confirming that much care planning hinges on whether care is contextualized.

Note that the frequency of contextual red flags and contextual factors reflects the particular population of patients in this study, all of whom were veterans and many quite poor. The proportion of visits in which attention to context is essential to care planning might be lower, for instance, in a more affluent, resource-rich population. In addition, the contextual error rates of the participating physicians cannot be generalized.

Is Contextualized Care Associated With Better Health Care Outcomes?

Following the index visit at which the clinician’s attention to context was measured, members of the research team not involved in coding physician performance tracked sentinel patient health care outcomes for nine months

after the initial presenting red flag.²⁵ For instance, if a patient presented with loss of control of diabetes as evidenced by a rising HbA_{1c}, the case was scored not only on whether the physician addressed the underlying contextual factor (e.g., deteriorating vision in a patient no longer able to read his insulin syringes correctly) but also on whether diabetes control improved over the subsequent nine months of follow-up. The coders charged with scoring health care outcomes were blind as to whether the patient’s physician had been coded as contextualizing care versus making a contextual error. From among the 157 encounters for which outcomes data were available, health care outcomes improved in 71% of those encounters in which care was contextualized and in just 46% of those in which it was not—a significant difference ($P < .05$). These findings demonstrate that contextual errors are consequential because they predict health care outcomes.

Can Physicians Improve at Contextualizing Care?

As illustrated in the USP study, physicians prioritize biomedical over contextual information even when both are essential to care planning.²⁰ In other words, they are more likely to attend to biomedical issues than contextual issues in patients’ lives even when both are essential to address in an effective care plan. Attempts to provide medical students and residents with a brief educational intervention to mitigate what one might term a “biomedical bias” have met with partial success. In one study, randomized fourth-year medical students received four hours of either intensive instruction or usual training during a fourth-year subinternship rotation.²⁶ All students were then assessed using standardized patients (SPs) presenting with the same contextual red flags and contextual factors as in the USP study; SPs and assessors were blinded to student training. Those in the intervention group were more likely to contextualize care (69% versus 22%, $P < .001$).

Unfortunately but perhaps not surprisingly, the skills documented in the intervention group using SPs did not carry over to the actual clinical care environment in a follow-up study of residents assessed with both standardized and real patients.²⁵ Although residents

demonstrated improved performance in contextualizing care for SPs seen in a simulation center (as had the medical students), there was no improvement in performance in the clinical setting. Clearly, four hours of education is not enough to offset long-standing habits in actual practice.

Implications: Where Do We Go From Here?

What are the next steps in light of evidence of unmeasured errors that are costly, are common, and adversely impact health care outcomes? First, we recommend more widespread tracking of clinician performance at contextualizing care both to corroborate our work and extend it. It is not possible to meaningfully address a problem unless it is monitored. However, doing so will require widespread adoption of strategies for directly observing care, as detailed above.

Second, we propose using performance data on contextualization of care to drive performance improvement, through a process referred to as “audit and feedback.”²⁷ We are piloting such a process at two VA hospitals in Illinois, where patients volunteer to audio record their care.²⁸ Every one to two months, clinicians and their medical home care teams receive aggregate data on the proportion of contextual red flags they probed and the proportion of contextual factors they addressed. In addition, they receive a report with representative examples of effectively contextualized care and contextual errors. The strategy is to provide clinicians with the data they need to understand where they are performing well and where they are falling short at contextualizing their patients’ care. Recently, the program has expanded to include over 100 resident clinics at two internal medicine programs.

Third, we recommend efforts to avert a biomedical bias in medical school, starting in the first year through practical case-based training. Although medical schools teach about taking a social history, doing so does not necessarily build the skills and habit of thinking about patient context during the clinical encounter. Medical students and the physicians they become are too busy and too task oriented to habitually elicit information unless they appreciate how

it will inform decision making. Consider if every teaching case used to illustrate biomedical principles to medical students starting in the first year of training included a contextual dimension on which appropriate care might hinge. For instance, in pharmacology, when students identify the preferred therapeutic option for a clinical presentation, they would then be told that for *this* patient, it was an ineffective choice. They would be challenged to determine why, prompting them to probe and assess the contextual information as outlined above until they discovered that the patient could not afford to fill the prescription. Without a contextual dimension that mirrors real life, we should not be surprised by inattention to context.

We hope a growing number of research colleagues and medical educators will join efforts to characterize and measure contextual error, devise practical ways to track clinician performance at contextualizing care, and assess strategies to intervene both through performance-in-practice improvement initiatives and preclinical curricula designed to build the skills and cognitive behaviors to provide care that is consistently sensitive to patient context. A growing body of evidence suggests that it is worth the effort and feasible.²⁹

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Teaching and Learning Moments

Meeting at the Table

The anatomy lab on the reproductive system was an intimate and vulnerable tightrope walk between knowledge and respect. My lab group had successfully navigated this balancing act when another classmate approached us and asked if she could feel inside my donor’s vagina to palpate the ischial spine. This activity was not required by our lab manual, but its importance for identifying a pudendal nerve block had been discussed earlier in class. Although her request was for an educational pursuit, I felt a strange, visceral aversion to this unguided exploration. The bodily metaphors of power, life, and pain that I had cultivated through a background in gender studies made this a difficult request. The classmate and I began to argue. She asked, “Is this just an ethical issue for you?”

Flustered, I nodded and rhetorically blurted, “Would she want this to be done to her?”

The rest of my group stood indifferent. My classmate reached inside my donor, and after palpating the ischial spine, she waved over others to do the same. I could not watch, so I excused myself from the table.

I would dissect this moment, the conversation, and my reaction for weeks. Throughout the course, I had held my donor’s heart in my hands and ultimately peered into her life from the inside out,

yet this lab upset me the most. The moment would swish around in my head, and pieces would wash up for me to pick through. Perhaps my reaction stemmed from having taken classes that theorize corporeal power dynamics or the simple fact that I could place myself on the table. I threw these pieces back to be recovered again or lost to a sea of microbiology. Then, a shred surfaced that I would keep: “Would she want this to be done to her?”

It was the first time I had acknowledged my donor’s ability to choose or, rather, her ability to make choices in the past. She had chosen to give herself to me, and I wondered if she would want her ischial spine palpated or her heart held in my hands. I am not sure if I will ever stop wondering who she was and what her decisions would have been.

The ischial spine is not a landmark for a pudendal nerve block for me; rather, it is a reminder of the values of autonomy and patient connection. In considering my donor’s past autonomy, she became a patient rather than an inanimate model for *Netter’s*. This acknowledgment of her autonomy and personhood—or perhaps the realization that I had lacked this recognition for the majority of the course—was the piece of the encounter that left a lasting impression on me. The reproductive lab clarified the value I place on autonomy, which I hope to recall when difficult decisions need to be made with patients and family members.

Further, my clinical detachment before this lab horrified me, and I will remember my donor when faced with draining times in my training and career.

As medical students, we train to stand between life and death. One of our first steps toward this position is to intimately meet the foe from whom we protect our patients and the friend toward whom we respectfully navigate our patients. We first meet at the table, and bring with us our own experiences. Some students are acutely aware of the death of their donor, while others choose to avert their thoughts from this fact. However, I believe that most students leave the table with more than just knowledge of the brachial plexus. Perhaps through structured reflection, we can consider our unique first reactions to death in the clinical setting and its effects on our future patient care. My own anatomy experience instilled in me the importance of autonomy, but the lessons that other medical students learn vary. Through reflection, we all could take more than anatomical structure from the lab table to the bedside.

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Megan Lane

M. Lane is a second-year medical student, University of Michigan Medical School, Ann Arbor, Michigan; e-mail: megalane@med.umich.edu.