FROM THE EDITORS' DESK

Caring for the Complex Patient: The Next Hurdle for Information Technology Is Care Coordination

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I recently saw Mr. N., an elderly Vietnamese-speaking man with uric acid kidney stones and recurrent urinary tract infections.¹ He had suffered at least six documented infections in the past 21 months. He looked well, but complained of frequency, dysuria, and mild right-sided flank pain. His urine dipstick was positive for nitrites and leukocyte esterase.

The patient's previous urine cultures had grown *Enterococcus faecium* resistant to all oral antibiotics; if he was to be treated he would require intravenous therapy with vancomycin. Although we had doubts about the long-term benefits of antibiotics, the patient wanted treatment, so the resident and I arranged for admission. We asked the admitting service to consider consulting Urology (which had previously declined to intervene because of renal scarring) and the Infectious Disease service (which we thought could provide a more refined estimate of the benefits versus risks of recurrent short courses of intravenous antibiotics and perhaps recommend a more creative long-term plan).

The patient received IV vancomycin for 5 days. His symptoms improved "a little," and he was discharged on oral linezolid (to which the organism ultimately proved sensitive). Consultation with the urology and infectious diseases departments was "deferred to the outpatient setting." However, no appointments were made. It is easy to see how this might have occurred. Inpatient consultation services are not well connected to the outpatient appointment system, and these structural barriers were undoubtedly compounded in this case by daunting cultural and linguistic barriers. I expect the resident and I will see him back in our general internal medicine clinic soon, and I would not be surprised if the patient returns with exactly the same

problem within the next few months—only this time with vancomycin resistance.

In the unlikely event that readers of *JGIM* need reminding, this case illustrates how clinical complexity, sociocultural factors, and systemic disorganization can conspire to defeat our best efforts to deliver care of the highest quality at the lowest cost. Is technology the answer? In this issue of *JGIM*, four articles address technological solutions to high-value care, two from the clinician's perspective and two from the patient's. The first piece, authored by Shelton et al., addresses a relatively simple problem in an elegant way¹. The problem is too many prostate-specific antigen (PSA) tests in men over age 75, a group in which such testing should occur selectively, if at all. The investigators' solution is a highly specific computerized alert system that helps providers about to order PSA tests in men over 75 to "think again." The evaluation involved an interrupted time series, a quasi-experimental approach that addresses several threats to internal validity (e.g., history, maturation, and regression to the mean)² that tend to overwhelm many purely observational designs, even those employing sophisticated statistical adjustments using propensity scores. In a related vein, Newman et al.³ demonstrate that providing physicians with electronic feedback about antibiotic costs along with antimicrobial susceptibility results can reduce inpatient antibiotic expenditures. Simply displaying dollar signs (from \$ to \$\$\$) as part of culture results produced a small but significant shift toward use of lower-cost antibiotics.

PSA ordering and initial antibiotic selection, however, are relatively straightforward compared with managing multidrug resistant infections—or deciding when it is time to write a Do Not Resuscitate order. One factor driving such complexity is the need to understand, incorporate, and integrate the values of patients, family members, and clinicians. In a randomized trial reported in this issue, El-Jawahri et al.⁴ evaluated an educational video that teaches medical inpatients about intubation and cardiopulmonary resuscitation (CPR). Based on a framework developed by co-author Angelo Volandes and popularized in his book (*The Conversation*, Bloomsbury, 2015), the videos were designed to help patients

¹Some personal details have been altered to protect confidentiality.

understand what to expect from these procedures. Patients randomized to the video were more likely to reject intubation and CPR and to have DNR orders written.

Over the past 15 years, academics and entrepreneurs have developed a growing catalog of electronic information resources, clinical decision aides, and health “apps” of all varieties. One implication of the study by Zulman et al.⁵ is that the resources that are currently available to patients with complex multimorbid conditions and their physicians have almost nothing to do with what they actually need. Focus group patients in Zulman’s study needed help making appointments, coordinating care among multiple physicians, and getting their doctors to communicate with each other. While many barriers exist (not least of which is lack of interoperability of electronic medical records), patients are sending a clear message: the next big challenge for medical informaticians and developers is care coordination. The answer will certainly involve some of the innovations that JGIM has in the past helped to disseminate, such as patient navigators, collaborative care, team care, and patient decision aides. But I suspect that unless we find ways to make it easier for patients, families, physicians, and other members of the health care team to coordinate

their efforts, complex patients like Mr. N will continue to struggle.

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