antibiotic courses for those who do, elimination of antibiotic use for the promotion of growth in animals, bioengineering efforts to degrade antibiotics in sewage so as to avoid environmental contamination and selection for resistance, and conducting of studies to determine the shortest effective course of therapy for common infections.

A more innovative form of stewardship is the development of therapies that do not drive resistance. For example, the infusion of monoclonal antibodies (a modern advance on serum therapy, which is more than a century old) or white cells that attack microbes holds promise for treating infections. Finally, what if we were able to treat infections without seeking to kill the microbe? Casadevall and Pirofski's damage-response framework of microbial pathogenesis underscores the concept that clinical signs, symptoms, and outcomes of infection result as much, or more, from the host response to the microbe as from a direct effect of the microbe itself.[4] Thus, we should be able to treat infections by attacking host targets rather than microbial targets. Indeed, recent preclinical research demonstrates that we can successfully deploy therapies that either moderate the inflammatory response to infection or that limit microbial growth by blocking access to host resources without attempting to kill microbes. For example, an antibiotic of a novel class (LpxC inhibitors), which blocks synthesis of gram-negative lipopolysaccharide, could not kill *Acinetobacter baumannii* but prevented the microbe from causing disease in vivo.[5] Other examples include antiinflammatory monoclonal antibodies, probiotics to compete with microbial growth, and sequestration of host nutrients (e.g., iron) to create a resource-limited environment in which microbes cannot reproduce. Such strategies require clinical validation but have the potential to reduce resistance when pursued in concert with traditional antibiotic therapy.

The converging crises of increasing resistance and collapse of antibiotic research and development are the predictable results of policies and processes we have used to deal with infections for 75 years. If we want a long-term solution, the answer is not incremental tweaking of these policies and processes. Novel approaches, based on a reconceptualization of the nature of resistance, disease, and prevention, are needed.

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Speaking Up — When Doctors Navigate Medical Hierarchy

Ranjana Srivastava, F.R.A.C.P.

He's the first patient of the day: admitted overnight, he's scheduled for surgery this morning. "Do you want to catch him before or after?" the resident asks.

"Is there anything we need to do for him right away?" I say.

When she says that the night resident mentioned some pain issues, I decide to drop by.

As we walk, the resident describes the handover. The patient is a smoker in his early 50s who has a malignant pleural effusion that couldn't be managed at his local hospital. There was infection mixed with effusion, and antibiotics were ineffective. So he was referred here for video-assisted thoracoscopic surgery (VATS). After recovery, he would be transferred back closer to home for treatment of metastatic lung cancer.

In these situations, my role as a medical oncologist is usually limited to a courtesy call. It reassures the surgeon that there's an oncologist on board, and the patient appreciates seeing a friendly face without having to discuss serious news. But in the patient's room, what I find is unexpected. He's scrunched up in bed, tossing and turning, his sheets tangled between his legs. He's pale and uncomfortable, licking his lips, his IV fluids having run out. My immediate impression is that he's dying. But I remind myself that he's scheduled for surgery.

When I introduce myself, he's startled but speaks lucidly.

"I hear you are having an operation," I say.

"Yes, they need to get this fluid off my chest."

"Are you in pain?"

"Yes, it hurts like hell, doc. Every time I breathe, it stabs me."

The resident hands me the sheet of inadequately charted pain relief. "His kidneys are not great, so they've gone easy on the drugs," she says.

"What's wrong with his kidneys?"

"He's been hypercalcemic for the last few days, though they gave him bisphosphonates."

"You are going to have your chest drained soon," I tell the patient, "but let me arrange for you to get some pain relief right now. Also, you need some fluids to help your kidneys."

"Thanks, doc," the patient groans before resuming his fidgeting.

"You'll be OK," I reassure him, but I'm unnerved: he looks delirious, and I have to check his chart to confirm that he's only 50. A nagging voice tells me he doesn't seem fit for surgery, but I suppress it, telling myself that a VATS is a straightforward palliative measure for patients drowning in an effusion. Outside the room, we run into the surgeon, whom I know well. He's about to meet the patient before the operation.

"We're done," I say. "By the way, he looks dry and needs better pain management, which I've attempted to fix."

I pause, hoping for a sign of a reservation granting me permission to unleash my own mounting ones. But he simply says, "I think the VATS will give the poor man relief. He's been struggling for days."

Although I know this attitude is baseless, it sits comfortably with me; my colleagues and I commonly defer to surgeons — considering them unequivocally right, unassailable, or simply not worth antagonizing. In an era when many patients have multiple reasonable treatment options, it seems more expedient to yield to the surgeon than go to bat for a patient. And that attitude is absorbed by generations of doctors who simply have to watch to learn.

In the clinic, I become enveloped in other patients' concerns. Later, when the resident tells me that the man made it through surgery, I'm relieved at not having embarrassed myself before the surgeon. I take the incident as a reminder to remain within the limits of my expertise. Of course the surgeon knew best. So the next day, when the resident points me toward the patient in the ICU, I'm stunned. "Actually, he crashed and had to be intubated."

Is this really the best we could have done? I think not. For though we probably couldn't have changed the fact of his death, we held the circumstances in our hands.

We part ways, but when he's out of earshot, I tell my resident, "I can't believe they operate on such patients; he just doesn't look right."

"I suppose surgeons are used to it," she shrugs, still convinced that we dabble in drugs whereas surgeons save lives. Seeking reassurance, I accept hers: if the surgeon admitted the patient, surely he can decide what's best. If necessary, the anesthesiologist can call off the procedure. I quickly convince myself that I'm a bit player in this patient's journey. And that if my gut instinct says "Don't operate," it's no stronger than the surgeon's instinct that says "Get it over with." The winning argument in my head is the one saying "Who are you to question a surgeon?"

The patient soon dies, as his stricken family looks on. Talking to his daughter, I'm taken aback by her understanding. "Everyone was great — what else could we have asked for? Of course, we didn't expect this, but this is the way it is."

The conversation leaves me disturbed. Is this really the best we could have done? I think not. For though we probably couldn't

have changed the fact of his death, we held the circumstances in our hands. We could have canceled the surgery, aggressively controlled his pain, and called an urgent family meeting to ascertain his wishes and be guided in shared decision making. But this model, to which we aspire, went astray, as it often does.

Days later, I speak to the surgeon. "I feel so sorry that he died," he reflects. "I thought we could help him, but he was clearly too unwell to have an operation."

We realize that, each of us unsure, we gained confidence from the perceived assurance and expertise of the other. We unearth the other specialists who participated in the patient's care. The oncologist had wanted the infected effusion drained so he could safely commence chemotherapy. The respiratory physician had recommended referral to a larger center for drainage. The infectious diseases physician had no more antibiotics to offer. The general internist bowed to the others, and the surgeon was approached as the next service provider in line. Tragically, no one person looked beyond the effusion to the whole patient. Although he saw myriad specialists in his last week of life, he died lacking holistic care.

Colleagues recall sometimes harboring misgivings about another doctor's treatment of a patient but feeling unable or reluctant to comment, even when a patient's life might be threatened — preferring to swallow their discomfort rather than challenge another physician's viewpoint.

The nagging voice returns to my head. Banking on our rapport, I say, "I keep wishing that I had mentioned my doubts to you that morning. He looked like he was dying."

Seizing on my comment, the surgeon asks, "Why didn't you tell me?" He adds, with amazing honesty, "When I walked out of his room, I wondered for a minute, but I told myself that since you had also seen him, he would be OK."

"But that's exactly what I thought," I protest. "I thought you knew best and I shouldn't interfere."

"If you had so much as mentioned your fears, I would have stopped," he assures me remorsefully.

His obituary and a thank-you note reflect the grief of a family who lost their loved one more suddenly than anticipated. So, where does the buck stop? It seems unfair to pin it on the surgeon: he was merely the last clinician in line, no more morally responsible for the patient's death than any other participant in his care.

When I ask colleagues what they would have done, each recalls sometimes harboring misgivings about another doctor's treatment of a patient but feeling unable or reluctant to comment, even when a patient's life might be threatened — preferring to swallow their discomfort rather than challenge another physician's viewpoint. Some are afraid, while others aim to "live and let live," believing that there's no such thing as constructive criticism when it comes to one's peers. When a single perceived slight can spoil relationships that take years to create, doctors understandably tiptoe around each other.

Yet we all agree that if we were inadvertently harming our patient, we would appreciate being told.

Haunted by the incident and wishing never to repeat it, the surgeon and I agree on a simple pathway for decision making. He will question other hospitals more comprehensively before assuming that patients have been thoroughly worked up. In cases that aren't clear-cut, he will ask me to independently assess the patient's robustness for surgery. If uncertainty remains, we will jointly speak to the patient about our recommendations and record our conversation in the notes. One could argue that all these things happen with modern multidisciplinary team management, but not all team members eyeball the patient, and decisions are heavily influenced by the lead clinician.

Our agreement, forged from loss, has allowed some subsequent patients to avoid invasive, painful surgery in favor of better quality of life and others to undergo successful operations. The cooperation between internist and surgeon has been a salutary lesson for junior doctors who perceive the two as inimical. Early in training, we

learn to spot the budding surgeon among internists, and it is worrisome that the main perceived point of differentiation is disparate notions of patient welfare. When internists jest about "rescuing" surgical patients, they signal to surgeons that their role is to operate, while everyone else is the supporting cast. Apart from being disingenuous, this thinking engenders more stereotypical behaviors.

In a profession abounding with experts, no one person's expertise can always count for more. Although certain technical skills may be specialty-specific, there's a much broader range of skills on which no group has a monopoly. There's no chain of command in using gut instinct, showing concern for the whole patient, avoiding harm, or curtailing futile care. We must recognize that debate is healthy and that without open communication, we fill the space by guessing at each other's motives.

Recognizing the pitfalls of blind adherence to hierarchy and broaching with a surgeon my misgivings about a patient: such an "intervention" seems deceptively simple, uncontroversial, even cheap. Yet in my years of working with surgeons, it feels like the best thing we've done together for patients.

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