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Dr. Deborah J. Cook’s contributions in the field of critical care have not only impacted the intensive care unit (ICU) patients she treats and countless others worldwide but have also helped establish research programs and clinical trials as integral components of improving care and outcomes for the most seriously ill. Lara Szewczak spoke with Dr. Cook, recipient of the 2022 Canada Gairdner Wightman award, about critical care research, her reflections on the COVID-19 pandemic, and her views on mentorship. An edited version of this conversation is presented below.

Lara Szewczak: I have to confess that until I started reading about your career and the kind of work that you do, I didn’t know anything about critical care research. How would you describe the field to somebody new to it like me?

Deborah J. Cook: Critically ill patients [who] require basic or advanced life support are often cared for in the intensive care unit by a group of interprofessional clinicians. It’s a setting that is characterized by a large amount of information mastery, a lot of drugs, a lot of devices, and a team of multidisciplinary clinicians who focus—system by system—on the most seriously ill patients in the hospital. It’s a very dynamic, intense, and meaningful type of work. I was drawn to it 30 years ago when the field was relatively underdeveloped when it came to clinical research. Many of the decisions at the bedside were well informed by our knowledge of pathophysiology, animal data, and laboratory experiments. It seemed to be a field [which] was sorely in need of clinical research to better inform patient care.

LS: What kinds of questions can you ask in that setting?

DJC: There are so many questions that can be pursued to improve or inform the care of critically ill patients. These may relate to monitoring, diagnosis, prevention, therapy, or even palliation. Critically ill patients in the intensive care unit are at high risk of death, and actually they are at risk of developing complications unrelated to the reason they were admitted to the intensive care unit in the first place. The outcomes-of-interest that we try to optimize include the chances of survival, but we also try to minimize morbidity and regain function.

LS: Can you give me an example of a question that you chose to address with an evidence-based approach?

DJC: Many years ago, people were using two different drugs to try to prevent bleeding from the upper gastrointestinal tract. I was honored to lead Canada in a randomized trial to determine which of these two drugs was most beneficial to prevent bleeding. This was the first large multicenter trial in critical care in the world. We found that antacids did significantly reduce bleeding. For several decades, it became standard of care to administer an antacid to critically ill patients on a breathing machine.

Over time, the possible downsides of that approach became evident in terms of infectious complications of pneumonia and *Clostridium difficile* diarrhea. Interestingly, what we’re doing now with the broad international community is revisiting that whole topic, asking whether today, with all of the modern
“It’s not always science that most strongly influences practice.”

interventions we have in the ICU, whether it still does more good than harm to give daily antacids to all mechanically ventilated patients. So we came full circle back to that topic. This process aligns with the Declaration of Helsinki, which calls forth the moral obligation to revisit what are thought to be “best practices” to ensure they are still efficacious, safe, available, and wise to implement at the bedside.

Another question that I pursued was evaluating two different types of blood thinners to prevent potentially fatal blood clots in critically ill patients. One was the standard, frequently used type of heparin as compared to a newer heparin, that was a little bit more expensive and thought to be more efficacious. At the time, there were fears about the potency of the newer heparin and whether it would cause more bleeding. Our large international randomized trial did show that the newer, more potent heparin conferred an advantage contrasted to the standard, well-established heparin. We found that it did lower the risk of potentially fatal blood clots in the lungs and also was associated with a lower risk of a potentially fatal heparin allergy, but it did not increase the risk of bleeding. That was very informative, and we followed it with an economic evaluation, showing that despite the increased cost of this new heparin, it was actually cost effective to utilize the slightly more expensive heparin because of all the clinical advantages.

LS: How do the results then become part of accepted practice? When we think about research and basic biology, the timescale is years to decades, and the mechanisms are very long and very involved. When you have a finding like the heparin example where, for patient care, it’s more effective and economically it makes sense, how rapidly can that start having effects on patients worldwide?

DJC: The time frame between a clinical research finding and informing practice is probably a little bit shorter than the corollary from the basic or laboratory research to practice. But clinical research is critically dependent on laboratory investigations and earlier experimental work in animals and in humans, so it really is on a continuum. The guidelines that are produced these days are increasingly based on evidence with structured approaches to that evidence, but one single piece of research doesn’t get incorporated into practice quickly, of course. The way I look at it, one study is part of a great chain of evidence.

It’s not always science that most strongly influences practice. There are many other factors related to prevailing approaches or local norms, and the availability of the tests or treatments that are studied. The economics and jurisdictional health resource issues also come into play. It’s complex. Over recent years, practice guidelines have become much more sophisticated and they do incorporate values—ideally the values of patients, or families, or citizens, as well as clinical evidence and issues of access and cost.

LS: I think that’s an opportunity for us to segue into talking about the pandemic. You’ve dealt with COVID-19 in a very personal and professional way for two years. What do you take away from where we are now?

DJC: I guess speaking as a clinician, the pandemic has underscored the importance of teamwork at the bedside, looking after the most seriously ill patients on the brink of death. It’s called forth courage and compassion, and it has forged resilience, as all members of a critical care team have come together to do their best to help each patient who is infected with SARS-CoV-2 to survive and recover. We also tried to be that bridge for family members who often could not be there at the bedside, which at times was heart-wrenching. Speaking as a researcher, the pandemic really galvanized an amazing amount of directed research for one population—patients with COVID—the likes of which we’ve never seen before in the intensive care unit.

Critical care has a strong history now in international trials, and we’ve established many research consortia around the world. Canada was the first country to have such an organized infrastructure, and I’m very proud to have played an important part in that history. Multi-center studies rapidly emerged, and other countries followed suit by creating collaborative groups. In the pandemic, it was exhilarating to match our strong clinical response to the pandemic with an energized and organized, dedicated research response that was truly global. I think that was partly possible due to the ethical imperative to find effective treatments and determine what was useless or harmful, but it was also possible because of the collaborations that had already been established from coast to coast, in Canada and around the world.

LS: With so much effort at every level of science and medicine being directed at the pandemic and patients, how did you and your colleagues take in all that information?

DJC: It felt like an avalanche of information, and often misinformation coming our way, through traditional scientific avenues and social media. Clinicians worked hard to sift through the morass of information, to try to distill nuggets of truth, to distinguish hope from hype, and identify which data represented wisdom and what was ready for application. Concurrently, many scientists worked to synthesize a growing amount of information on any given intervention, to update it regularly, and share [it] as widely as possible for practical use. Systematic reviews and practice guidelines became more dynamic, living documents that continue to be updated to this day as new evidence emerges. And it’s not over.

LS: You’ve mentioned many factors that influence practice, including patient values, evidence-informed research practices, funding constraints, and access. Can you talk a little about what you saw in terms of how Canada formulated its response and developed policy, and what you’ve taken away from that about what happens when science and medicine and government interact?

DJC: The pandemic really called on everyone to bring their very best to the table. All of the sectors you mentioned—government, industry, scientists, healthcare administrators,
“Humility allows us to change our mind, avoid premature conclusions, and recognize when as scientists, we may need help, or when we should get additional training, or seek the wisdom of others.”

and of course practitioners—worked together when they could, but also with intent like never before, focused on the best response possible in our country. I had the responsibility and privilege of many roles during the pandemic, caring for patients being the most important. I’ve been proud to enroll patients in clinical trials, working on finding the best ways to treat patients with COVID. I also tried to advance science in a way that advantages patients with SARS-CoV-2 without disadvantaging patients who don’t have COVID and worked with colleagues locally to develop guidance to help inform when we should safely reintroduce research that was not about the pandemic.

Immediately after the pandemic hit, there was a freeze on a lot of clinical research and naturally a focus on studies that would help us understand, prevent, and treat COVID. One of the issues that I tried to work on was ensuring that—when it was feasible and safe and when capacity existed—other research could carry on to help advance science. It was extremely rewarding to work with local hospital administrators and local ethicists and university scholars to introduce, in a timely way, research that would also help to inform the care of Canadians without COVID.

I was privileged to serve on the prime minister’s scientific advisory panel, which was very rewarding and interesting. I also continue to serve on the data monitoring committee for the World Health Organizational RECOVERY trial. Those experiences have been truly inspiring to realize how much human energy is being brought to bear in the name of global health.

LS: Maybe we can switch gears at this point and talk about mentorship. You give a lot of credit to the mentors that you had. What’s your mentorship style? How do you lead and teach others?

DJC: I try to lead by example, maintaining a sense of humility and curiosity when pursuing science. As a mentor, I try to find a good balance between challenging and nurturing others to try to help them become their best selves as scholars. I also think it’s important to distinguish between mentorship and supervision. Mentorship is so much more multidimensional, and there are many possible roles as a mentor. In any mentoring relationship, I try to understand what is most helpful to the mentee and keep that front and center in the relationship. I also acknowledge many different mentoring models that exist and can be helpful to an individual. There’s the traditional dyadic relationship, but increasingly in today’s world, there are peer-mentoring models that are helpful, community-mentoring models that are helpful, and there’s the reverse preceptorship whereby the learnings are bidirectional. So mentorship is an extremely meaningful aspect of my work and I’ve been enormously privileged to have had dedicated world-class mentorship from Gordon Guyatt and David Sackett—both giants and legends in clinical research.

LS: What’s one thing that you want to bring out in each of your colleagues, regardless of whether they are a traditional mentee, or a peer, or even someone senior to you?

DJC: I think maintaining a sense of humility in science allows us to recognize where the holes are and encourages us to ask questions—perhaps questions about the status quo or prevailing assumptions. Humility allows us to change our mind, avoid premature conclusions, and recognize when as scientists we may need help or when we should get additional training or seek the wisdom of others. It’s also important as a scientist to be nimble to new opportunities and be able to change gears as new science emerges or to rise to the occasion when unplanned pressing issues are at hand, like the pandemic.

One important scientific strategy that I encourage in others is making a decision whether to pursue one study to answer a single question or to design a series of studies that together comprise a research program. A rigorous clinical study is a great contribution, and it can lead to new questions. However, a research program has a set of interrelated studies, using different methods, such as a systematic review of the literature, retrospective audit, clinician survey, observational study, and clinical trial. This kind of approach creates a strong foundation of knowledge on a topic, often leading in unanticipated directions. Research programs need a longer-term investment than single studies. They can foster the careers of several individuals working synergistically—especially multidisciplinary colleagues, making work more creative and cutting edge. Research programs can really advance a whole field.

LS: I listened to a talk that you gave a while ago, and one of the things you said that really stood out for me was that colleagues have an opportunity to “co-create joy” at work. What does that phrase mean for you, to co-create joy?

DJC: I think even scientists are social creatures, and in the workplace, whether it’s at the bedside or at a conference or in a research team meeting, it’s wonderful to synergize around an idea, or share an experience, or collaboratively question an issue or plan an investigation. The idea of synergizing with others toward a common goal is motivating and energizing to me. Sometimes those co-created moments of joy come up when you least expect them to.

LS: How do you create a space where those can happen?

DJC: I try to approach work with an open stance, open to new opportunities. I’ve always valued conversation and I like to listen to others—more so now than ever before. Creating the space means not always rushing to facilitate those moments of harmony when everyone is rowing in the same direction. It’s about letting the sparks of energy fly when people are discussing an idea or trying to solve a problem. Being mindful of
those potential opportunities helps to make sure they’re not missed.

**LS:** I’d like to ask you one last question. For people that are trainees in whatever field, that are looking at clinical research and thinking, “I wonder if this is for me,” what’s one thing you’d say to them? What’s one piece of advice you’d hand off?

**DJC:** I’d say try to find and fuel your passion in science, because there’s so many ups and downs on the journey of research. I often say to people that passion helps us reach a little higher, and aim a little farther, and think a little bit more clearly. And it’s passion that keeps us going when the going gets tough. Finding a problem to pursue that you’re passionate about is key. I’ve always tried to encourage people to think, even if they’ve done great work, to imagine that your best work is still ahead of you.