Surgeon Q&A: Surgical Simulation Training

The Maryland Advanced Simulation, Training, Research and Innovation (MASTRI) Center *[1] opened December 6, 2006 and provides world-class simulation and training in a cross-disciplinary setting to a diverse constituency, providing innovation and research in regard to simulation, training and practice. The center if housed within the University of Maryland's Department of Surgery.*

Adrian Park, MD, FACS, FRCS (C) is currently the Executive Director of the MASTRI Center. He is also a Campbell and Jeanette Plugge Professor of Surgery, Vice Chair of the Department of Surgery, Head of General Surgery and Director of the Minimally Invasive Therapy Center at the University of Maryland Medical Center.

***Surgical Products*: Can you begin by discussing the importance of simulation technology in training surgeons?**

Dr. Park: Surgeons have kind of been a bit late to the game to bringing simulation to bear upon training. And when I say late to the game, I mean compared to our colleagues in the aerospace industry. They've been using simulation for a whole lot longer than we have. Now, there's a whole lot of difference between the types of simulators and what they can do. Business and the military have all used simulators before we have. Now, we are very aware that even if simulators are not as refined and sophisticated as they are going to be or as we ultimately need them to be, we cannot just keep waiting on that before we start using them.

So, there's been a fairly significant change in our thinking over the last 2 to 3 years with regards to simulation and now, all bodies involved—surgical residency, training curriculum, development or oversight or regulation to some degree or another come to a strong position that simulation must be available and must be used through the course of surgical training.

It's not at this point very prescriptive in terms of exactly how that's to be—which simulators and how often, but as kind of a "foot in the door", it's very clear from anybody who's involved in training surgeons now that there is a clear step toward this simulation wherever and whenever possible.

***Surgical Products*: How have advances in minimally invasive surgery**

driven the necessity for surgical simulation training?

Dr. Park: That, in some ways, has been the most obvious example, but there are many. The pace at which technology advances and new techniques are being developed and can be simulated into broader care. We know that residency cannot cover everything so there's going to have to be the ability to train and learn new techniques and learn how to learn that technology your whole practicing life.

MIS has been the most obvious one because the vast bulk of practicing surgeons never go to train during their residency and so they have to learn after their residency and so all manner of minimally invasive surgical trainers and simulators came along. But, interventional radiologic simulators or interventional vascular simulators, they are also in development and playing a very large role in the surgeons in practice ascending learning curves and adopting techniques and technologies without practicing on patients first.

***Surgical Products*: How does simulation technology enhance patient care?**

Dr. Park: The idea with simulation in general is to be able to train out the learning curve to be able to take a surgeon from being introduced to a new technique to being able to practice and essentially "work the bugs out" where there's no patient. Or even an animal if you can't avoid that risk through the course of the learning curve. So if you can train out the learning curve so that when a surgeon first does a procedure on a patient, even if they haven't done a ton of them, they've done enough simulated procedures that the learning curve has already been ascended.

***Surgical Products*: In terms of the surgical simulation technology available—how realistic is simulation technology compared to operating on a real patient?**

Dr. Park: There are two questions. First how realistic could it have been? Two, how realistic does it need to be?

The example that I would use is when we look at, say, military aviation and significant those simulators are now. Thousands and thousands of working parts that go into a fighter jet, heck, there may be a million parts at this point. But, as incredibly sophisticated as the simulators are for a space shuttle or a fighter jet, to try to model one simple organ like the pancreas, I would estimate the ordinance of magnitude more complex than designing the state-of-the-art, high-fidelity, highly-realistic fighter trainer simulator. Because to create a high-fidelity—a highly-representative, highly-realistic, anatomic model—the about of specification, the amount of detail in that is just so overwhelming. We can't set the bar at that.

So the question is, how realistic? If we are trying to operate on a stomach, does the stomach have to have every single physiologic and anatomic characteristic of human stomach? The answer is that for novice learners—probably not. You can deal with much more crude simulators. An expert and master surgeon, whether they are trying to really hone their technique and they've got a lot of experience, then the realism or the fidelity has to be a lot greater and that's where it's a real challenge.

You can have these incredibly sophisticated simulators for fighter pilots or a space shuttle, and they take a lot of programming and a long time to build, but to try and just truly simulate an organ or an organ system, it’s just an overwhelmingly daunting task to make them as real as they are in reality.

We have to accept that we’re not going to do that right now. But, there are aspects of simulation we can still train on very effectively without that entirely realistic simulator. They are getting better. Part of it is how they look but more importantly is how they respond. How the simulated anatomy responds compared to real anatomy and physiology.

***Surgical Products*: What is some of the highlighted technology used at the MASTRI Center that has proven to be effective in training?**

Dr. Park: We have the full spectrum here: mechanical, hybrid and completely VR (virtual reality).

Mechanical models are where you are using regular instruments and maybe simulated orgasm, or foam. Everything else is what you use to some degree in the OR, but the realism isn’t really there.

Then you have this interim technology called hybrid where you have aspects of the mechanical trainer as well as aspects of virtual reality trainer. There’s not as many of those, but we’re working with groups that are developing those and they’re going to have a role.

At the high-end, you have the virtual reality trainers where the entire environment is virtual. Your instrument tips are virtual. You have hand-pieces that you use but they’re not directly connected to the instrument tips.

One of the things that we do is a lot of research on what combinations of simulators is most effective and how best to use the various technologies. These can be very expensive and no one has a lot of money to through around these days. The VR systems can be very expensive, so how to get the most bang-for-your-buck and how to do more with mechanical is important to know.

We have the full-range of part-task trainers—trainers that are all about learning how to cross stitch, or put in an IV or central line, all the way out to the entirely virtual reality colonoscopy or endoscopy trainers, or to perform a laparoscopic cholecystectomy entirely in a virtual reality space. So full-task and part-task trainers and mechanical and VR, we’ve got the whole spectrum.

We have technology for training with mannequins that are very sophisticated in terms of clinical care scenarios around them and trauma and we do that on a regular basis, too.

***Surgical Products*: What do you see for the future in terms of surgical simulation and training?**

Dr. Park: I think we need to develop a more standardized curricula; we need to have a better idea of what we're after, where the most effective transfer of training happens. So, if you spend a lot of time with the simulator, is it going to translate into much more refined skills in the operating room? Where that doesn't happen, what combinations of simulation involvement is going to make simulation use optimal.

Part of it is just good old research, and the other part, of course, would be to refine the simulators themselves and the fidelity and the realism, not just in the looks but in the response, the anatomy and physiology.

***Surgical Products* is conducting a brief, one-question survey about healthcare insurance coverage.** Click here to answer the question. **[2] Thank you!**

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