3D printers in the OR
By Tarun Kunwar

Technology is complementary to the world of healthcare. As new technologies continue to permeate the world of medicine, healthcare professionals should be cognizant of emerging devices and trends. To keep up with the ever-evolving technological advances in the OR, we present Technically Speaking, a new department that will cover the latest innovations affecting your world. The first discussion of our new column will cover 3D printers and their practical implementation in the OR.

What is 3D printing?
3D printing uses a 3D model or electronic data source (via magnetic resonance imaging [MRI] or computed tomography [CT] scan) of an object and maps/prints its cross-sectional layers to form a physical replica of the original—all with working parts. Materials used to create the desired replica include: acrylonitrile butadiene styrene plastic, polylactic acid, polyamide (nylon), glass-filled polyamide, stereolithography materials (epoxy resins), silver, titanium, steel, wax, photopolymers, and polycarbonate. Although still in their infancy in terms of practical medical application, 3D printers have already helped surgeons take new, breakthrough approaches in certain procedures, providing an overall improved patient experience.

Surgical dress rehearsal
OR teams are now able to conduct “trial runs” for a procedure, allowing them to create a detailed surgical strategy specific to an individual patient prior to performing the surgery. For example, surgeons can print a model of a patient’s heart, identify and assess any troubling areas, and develop a plan to approach the surgery with added efficiency. The opportunity to study an exact 3D-printed model of an individual patient’s heart gives the OR team a tangible advantage compared to an MRI or CT scan.

While the above mentioned replicas are currently only used for studying and strategic purposes, scientists believe that fully implantable replica hearts, known as “bioficial hearts,” will be manufactured within the next 10 years.

3D-printed prosthetics
Traditional prosthetics can cost amputees tens of thousands of dollars per limb while offering limited mobility. 3D-printed prosthetics, however, are expected to offer durability and an increased range of motion at a substantially reduced cost. Community-based groups, such as e-Nabiling the Future, have developed a way for anyone to create and/or redesign 3D-printed limbs via open-source software (www.enablingthefuture.org). Open-source software can be freely used, changed, and shared [in modified or unmodified form] by anyone. The limited production value of these prosthetics is intended to help serve patients across the globe, especially those in underprivileged areas.
3D printing and the FDA
Numerous hospitals have already begun implementing 3D-printed tools and 3D-printed injection molding. The FDA confirms the validity of each product to be used. According to FDA spokesperson Susan Laine, “The FDA evaluates all devices, including any that utilize 3D printing technology, for safety, effectiveness, and appropriate benefit and risk determination—regardless of the manufacturing technologies used.”

The future is now
The use of 3D printers in the OR has already been fruitful. As research teams further develop new or existing processes and new quality standards are achieved, 3D printers could very well change the landscape of healthcare and the OR. These new technologies will facilitate previously arduous, time-consuming tasks, leading to increased overall efficiency.

What are your thoughts on 3D printers? Be sure to share your opinions with us at ORNurse@wolterskluwer.com.

REFERENCES

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