# VA Leading Innovation in Medical 3D Printing

Agency thought leaders have positioned the agency to become a development hub in applying 3D printing to patient care.

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Dr. Beth Ripley and Brian Strzelecki perform a quality check on a model of a kidney with a cancerous tumor to ensure the 3D-printed model accurately represents the patient's anatomy. Photo Credit: Department of Veterans Affairs

The Department of Veterans Affairs is leveraging 3D printing toward improving patient care, a new effort for the agency launched in 2017 that has been gaining momentum across government.

The current process of X-ray technology to assess conditions like bone fractures and cancer metastasis was first conceived without an immediate eye on medical application, noted VA Senior Innovation Fellow Beth Ripley at the Aug.14 Nextgov

Emerging Tech Summit. Similar to radiology's swift adoption across the entirety of medical practice, Ripley expressed confidence that 3D printing's most promising implementation lies in patient care — and touted the VA as the organization best positioned to lead this transformation.

Discovering novel uses for already established technologies is an often revolutionary enterprise, especially when applying them in large-scale industrial or medical capacities, Ripley said. With 3.6 billion diagnostic X-rays performed annually, using 3D printing for patient care "may be as common as X-Rays" within the next 10 years.

The VA's proactive focus on 3D printing innovation ties into its broader mission of overhauling patient care with a special eye on improving patient outcomes.

"This is the difference between invention and innovation," Ripley said.

The agency launched the effort in January 2017 at its Puget Sound Healthcare System. While there were only three hospitals nationwide in 2010 that used 3D printing in their treatment process, the VA now has 25 hospitals within its network alone that use 3D printing as of 2019.

The VA not only stands to benefit from innovation in 3D printing and medical care, Ripley said, but also its volume of resources and hospital network are uniquely well positioned to contribute to research into new methodologies.

The agency has already made inventive use of 3D printing in patient treatment, including an instance of difficult kidney surgery. A patient who had been born with one kidney had developed a life-threatening tumor, Ripley explained, and would have been on permanent dialysis were the organ to be removed. VA physicians developed a model of the organ through synthesizing data from a corresponding CT scan and were able to more closely examine the tumorous growth prior to surgery. This allowed them to go into the procedure with a greater depth of preparation, performing surgery quickly and cleanly in ways that enabled them to save the kidney.

This sort of pre-surgical modeling seems poised to radically improve operation prep by preventing physicians from having to repeatedly review imagining data during the procedure itself.

The technology's greatest promise seems to lie in more deeply personalizing care, allowing unprecedented attention to the specific medical needs of individual patients.

The VA’s has an inherent focus on “getting our innovations rapidly to front-line staff,” Ripley said. The agency’s focus on technical innovation has been tied to a fundamentally practical eye on improving veterans care, a pairing that seems especially well suited to propelling further advances in medical 3D printing.

"We are trying to get 3D printers into as many hospitals as possible” to encourage innovative exploration among VA staff across the country, Ripley said. This has led to advances in non-surgical methods as well, with VA staff developing processes for digitizing the models of patient-specific hand braces so as to easily replicate the devices when they wear out.

The VA is a training ground for a significant portion of America’s physicians, and expanding access to 3D printing technologies exposes tomorrow’s doctors to an especially promising area of medical innovation.

Others in government using the tech include Walter Reed National Military Medical Center at its 3-D Medical Applications Center and the National Institutes of Health for biomedical research.

3D printing has even shown potential in improving the VA’s rural care, Ripley said in outlining a case in which an older amputee living in a remote Alaska town was able to determine the safety of a particularly complex operation through 3D printing a model of the patient's hip from a prior CT scan. After close scrutiny, a specialist in Seattle, Washington, was able to determine that the procedure would be too risky to perform, Ripley explained. Prior to 3D printing, the patient would have needed to go under the knife to even determine if the operation was safe to proceed with — and would have been obligated to make multiple trips beyond Alaska for lead-up consultations as well.

Despite the technical sophistication of detailed 3D printing, its ultimate goal lies in improving the quality and personalization of patient care — and therefore aligns closely with the VA’s core goals. This focus on leveraging 3D printing in novel and innovative ways could also enable the VA to become a technological leader that spreads these new methods to both partner agencies and the private sector. This

could foster unprecedentedly sophisticated uses of 3D printing, such as leveraging the process to create synthetic organs and bone structures.

As the VA continues to adopt 3D printing within the agency itself, its foundational emphasis on improving patient care will only enable breaking advances in prosthetics and personalized medicine.

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