

News and Perspectives

# AI in the OR: Ethics and the Evolving Role of Surgeons

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## Abstract

AI is rapidly entering the operating room, both as a clinical tool and as increasingly autonomous systems. In this *News and Perspectives* article, JMIR Correspondent and intensive care unit nurse Jenna Congdon reports on the ethical implications and evolving role of human surgeons.

### Key Takeaways:

- AI is increasingly integrated into surgical planning, navigation, decision support, and robotic-assisted procedures, with potential to improve precision, consistency, and outcomes.
- Surgeons must remain the final decision-makers, as concerns persist regarding governance, liability, skill maintenance, and professional autonomy.
- Ethical implementation requires informed consent, bias mitigation, equitable data representation, patient safety protections, and clear regulatory oversight.

*While Ehsan Jazini, MD, uses AI tools in his clinical practice, he disclosed no financial or commercial relationships with these products.*

In recent years, AI has found its way into nearly every facet of life, from our homes to our work to much of what's on our screens. Increasingly, it's also finding its way into the operating room (OR).

The use of both AI-driven robotics and autonomous AI surgical systems has [increased dramatically in a short period](#), with autonomous robotic surgery emerging as a [new but promising frontier](#) in surgical medicine.

Given the rapid integration of AI and machine learning in the OR, it's crucial to discuss the ethical, legal, and clinical considerations—who oversees the use of AI in surgery, and where does the final responsibility for its governance fall?

## Current Use of AI in Surgery

AI assists with [many critical steps in the surgical process](#): it can support surgical planning and imaging analysis, drive intraoperative navigation systems, and enhance clinical decision-making with real-time decision support. It can also help to train new surgeons, track pre- and postoperative data, and assist the surgeon in providing personalized medical care tailored to each unique patient.

Commonly used AI-assisted tools in the OR currently include a variety of sophisticated systems. These technologies are increasingly integrated with preoperative imaging, allowing surgeons to overlay detailed anatomical data directly onto the surgical field, while also supporting clinical workflows through automated measurement, surgical planning, and postoperative data analysis. [Semiautonomous systems are slowly gaining traction](#), providing essential navigation

assistance and situational awareness that help maintain surgical precision and consistency during complex procedures.

[Ehsan Jazini](#), MD, is a spinal surgery specialist at the [Virginia Spine Institute](#)—he uses AI in surgery in a number of ways: “We use AI to help automate and make more precise measurements...AI is now integrated with some preoperative imaging, so that you can take the real life data that you had beforehand...and translate that information when you're actually physically trying to do that surgery. And then, in terms of looking at the outcomes of our patients, AI is very helpful to be able to get vast amounts of data to better perfect our profession.”

## Clinical and Legal Implications

AI-driven surgical techniques offer a long list of potential benefits: shortened operating times, improved accuracy, reduced technical variability, and decreased numbers of surgical complications. With these tools becoming rapidly more sophisticated and more entwined in the surgical process, medical providers must ask themselves: what is the role of the human surgeon in the legal governance and clinical use of AI-assisted tools pre-, post-, and intraoperatively?

[A 2026 article from JAMA](#) sums up the issue at hand: “At present, surgeon engagement in governance [of AI-assisted surgical tools] is scattered, leaving a consequential governance gap...many surgical societies lack standing regulatory liaisons, while technology developers and health system administrators maintain constant presence.”

Governing bodies such as the US Food and Drug Administration (FDA) are working to regulate the use of AI-driven tools in the medical field. Nonetheless, the human surgeon standing in the OR should likely be the final decision-maker

for what does or doesn't take place during a procedure—after all, as one surgeon noted in a [recent focus group study](#), “the responsibility at the end of the day falls on the shoulders...of the surgeon...”

Liability poses a sticky issue: if an autonomous system fails, is the surgeon at fault? The company that manufactured the device? The recent [recall of the TrueDi Navigation System](#), used for complex ear, nose, and throat procedures, is an example. Currently, [the issue of where liability lies remains unresolved](#).

## Ethical Concerns Surrounding Surgical AI

Patients deserve to be fully informed of the use of AI in their surgical planning and execution, as well as in their pre- and postoperative care. Jazini states, “If I’m doing robotic surgery, I have an extensive discussion. I show examples of what that looks like. I’m having a discussion with my patients, to make sure that they’re informed, they understand why we’re doing it, what are the potential benefits, what are the potential risks involved...ultimately, it’s their decision.”

Jazini’s practice echoes what many [insist must become standard process](#): fully informed consent for patients receiving surgery using AI-supported tools, data and privacy protection, and consistent regulatory standards surrounding clinician and manufacturer liability.

The issues of bias and equity also warrant consideration. AI algorithms and machine learning models trained on data skewed toward one majority group may make clinical suggestions or perform autonomous actions that are not fitting for those whose data were not equitably represented during the training process. [Diversity must be appropriately represented within these datasets](#) to best support equitable care and patient outcomes.

## The Evolving Role of the Surgeon

AI holds enormous promise for surgical advancement. “It can help improve the lives of a lot more people,” says Jazini. He recalls, for example, a patient who required a complicated surgery. AI was used both during planning and to support the robotics in real-time during the surgery, which was ultimately successful. Fifteen or 20 years prior, he shared, the risks of

this particular case might have otherwise prevented offering surgery at all.

“The technology is really going to enable surgeons to take care of more individuals more safely, with better quality, with better reproducibility...[but] it has to be done with guardrails,” he says.

Some worry that the overreliance on AI tools in the OR may lead to [skill degradation](#) in surgeons, especially those newer to the field. Jazini says, “a major concern for a lot of training programs is to make sure how you still teach those basic tools that you certainly should have with so much more technology available.”

[Other concerns](#) include the potential for erosion of surgical professional agency as hospitals attempt to standardize the training and use of autonomous surgical systems, prioritizing patient throughput rather than allowing surgeons to use their clinical judgment to perform procedures as they best see fit.

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Ehsan Jazini, MD

As AI continues to reshape the surgical landscape, the path forward must be defined by the deliberate balancing of rapid innovation with rigorous oversight. [Current consensus](#) across studies suggests that this must begin with defining appropriate boundaries, ensuring that the technology serves as a tool for precision rather than a replacement for human judgment.

Advances in autonomous capabilities must be matched by the development of ethical frameworks that prioritize patient safety and equitable care, using standardized models for human-AI collaboration that maintain surgeons’ professional agency. With these priorities in place, the integration of AI may continue to markedly improve surgical standards.

**Keywords:** artificial intelligence; machine learning; robotics; surgical procedures, operative; clinical decision support systems; informed consent; ethics, medical; liability, legal; patient safety; health equity

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