Negative: Autonomous Medical Procedures

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***Resolved: The United States federal government substantially reform the use of Artificial Intelligence technology***

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Negative: Ban Autonomous Medical Procedures – bad idea

TOPICALITY

1. Robotics is not AI

AI is not mechanical or predetermined responses. It requires making decisions

Darrell West and John Allen 2018. (West - Vice President and Director - [Governance Studies](https://www.brookings.edu/program/governance-studies/) Senior Fellow - [Center for Technology Innovation](https://www.brookings.edu/center/center-for-technology-innovation/). Allen -President, The Brookings Institution) 24 Apr 2018 How artificial intelligence is transforming the world <https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world/> (accessed 8 Aug 2021)

Artificial intelligence algorithms are designed to make decisions, often using real-time data. They are unlike passive machines that are capable only of mechanical or predetermined responses. Using sensors, digital data, or remote inputs, they combine information from a variety of different sources, analyze the material instantly, and act on the insights derived from those data. With massive improvements in storage systems, processing speeds, and analytic techniques, they are capable of tremendous sophistication in analysis and decision-making.

AI is not just robots

Prof. Kate Klonick 2020 (*assistant professor at St. John’s Law School, where she teaches property, internet law, and a seminar on information privacy*) 22 Feb 2020 “What Artificial Intelligence Is Not” https://blog.lareviewofbooks.org/provocations/artificial-intelligence/

Artificial intelligence is not robots. It can be robots, but it is not just robots. Robots are machines built and designed by humans that do automatic tasks. If something is automatic it means that it performs a programmed process. That programmed process implemented in a robot is written and designed by humans. Some robots today contain some aspects of artificial intelligence, but most robots are still just repeating the same immutable actions.

Most likely candidates for surgery automation are robotics, not AI. They don’t make “decisions,” just do repetitive actions

Elizabeth Svoboda 2019. (science journalist) 25 Sept 2019 NATURE “Your robot surgeon will see you now” <https://www.nature.com/articles/d41586-019-02874-0> (accessed 26 Nov 2021)

Not every surgical manoeuvre is a good candidate for robotic automation, according to Lennox Hoyte, an engineer and urogynaecological surgeon at the Pelvic Floor Institute in Tampa, Florida. Those that are, such as suturing and valve repair, tend to be the tasks that surgeons consider boring and repetitive, he says. The simpler a procedure is to break down into basic, specific commands, the easier it is for a smart robot to learn and execute. “The mindset is often more complex tools, but simpler motions,” says Pierre Dupont, an engineer in Boston Children’s Hospital’s robotic research team.

Impact: No Affirmative team means Negative ballot.

Reforming robotics is not reforming AI, so there is no one in today’s debate actually affirming the resolution. No matter who wins the round, you should cast a Negative ballot, since the resolution is being negated by both teams.

2. Non-existent reform

Link: Fully autonomous medical procedures are long term possibilities at best

*Dr. Bertalan Meskó & Dr. Pranavsingh Dhunnoo 2021. THE MEDICAL FUTURIST 23 Mar 2021* The 5 Levels Of Automation In Medicine <https://medicalfuturist.com/5-levels-of-automation-in-medicine/> *(accessed 26 Nov 2021)*

As the name suggests, full automation processes are performed by an A.I. alone and do not involve human input. For example, a Level 5 system could analyse a mammogram on its own and request for subsequent testing without consulting a human physician for this decision. Similarly, some scientists [speculate that](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7608507/) some ophthalmological surgeries can be fully automated since some are already partially automated.  Nevertheless, some researchers [believe that](https://www.thelancet.com/journals/landig/article/PIIS2589-7500(20)30187-4/fulltext) reaching Level 5 automation in any medical setting is “unlikely to be safely achieved in the near term.” So we have to think of it as a long-term eventuality, but such levels of automation fuels fears of [A.I. replacing physicians](https://medicalfuturist.com/5-reasons-artificial-intelligence-wont-replace-physicians/). However, it is more likely that such A. I. systems will excel at a specific task and healthcare professionals will increasingly interact with them. As such, it is more likely that those physicians who use and embrace A. I. will replace those that do not, rather than A.I. alone replacing physicians altogether.

Violation: Can’t reform it if it doesn’t exist

Since AI is not being used for autonomous medical procedures, there’s no way to reform it because there’s nothing to reform.

Impact: Abuse to Negative justifies a Negative ballot

Of all the many things this broad topic allowed them to reform, the Affirmative team in today’s debate chose something that doesn’t exist. This is abusive to the Negative because it greatly expands the scope of research and preparation needed to have a meaningful debate. Please teach them not to do this by awarding a Negative ballot in today’s debate. When they get enough Negative ballots, they’ll learn not to do this and start writing Affirmative cases about things that actually exist.

3. Banning isn’t reforming

Link: AFF plan bans a use of AI

That’s what they said in their Plan

Link: Definition of “Reform” means improving

Merriam Webster Online Dictionary copyright 2021 <https://www.merriam-webster.com/dictionary/reform> (accessed 28 May 2021)

**:**to put or change into an improved form or condition

Violation: “Use of AI” isn’t improved by their plan

Banning a use of AI doesn’t improve it. In fact, it does just the opposite. It STOPS AI in autonomous medical procedures from EVER BEING IMPROVED.

Impact: Negative ballot

When an Affirmative plan does the exact opposite of the resolution, enough is enough. It’s a Negative ballot, game over, that’s all, folks.

MINOR REPAIR – Set high standards of accountability, instead of banning

AI in medical care can be really good, as long as we set high standards of accountability

Dr. [Daniel A. Hashimoto](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hashimoto%20DA%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD, MS;  Dr. [Guy Rosman](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rosman%20G%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  Dr. [Daniela Rus](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rus%20D%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  and Dr. [Ozanan R. Meireles](https://www.ncbi.nlm.nih.gov/pubmed/?term=Meireles%20OR%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD 2018. Artificial Intelligence in Surgery: Promises and Perils, ANNALS OF SURGERY July 2018 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5995666/> (accessed 26 Nov 2021)

Big data could be leveraged to create a “collective surgical consciousness” that carries the entirety of the field’s knowledge, leading to technology-augmented real-time clinical decision support, such as intraoperative, GPS-like guidance. Surgeons can provide value to data scientists by imparting their understanding of the relevance and importance of the relationship between seemingly simple topics, such as anatomy and physiology, to more complex phenomena, such as a disease pathophysiology, operative course, or postoperative complications. These types of relationships are important to appropriately model and predict clinical events, and they are critical to improving the interpretability of ML approaches. Surgeons and engineers alike should demand transparency and interpretability in algorithms so that AI can be held accountable for its predictions and recommendations. With patients’ lives at stake, the surgical community should expect automated systems that augment human capabilities to provide care to at least meet, if not exceed, the standards to which clinicians and scientists are held.

Best Policy: Letting AI develop but setting high standards would bring the best outcome for patients

Dr. [Daniel A. Hashimoto](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hashimoto%20DA%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD, MS;  Dr. [Guy Rosman](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rosman%20G%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  Dr. [Daniela Rus](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rus%20D%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  and Dr. [Ozanan R. Meireles](https://www.ncbi.nlm.nih.gov/pubmed/?term=Meireles%20OR%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD 2018. Artificial Intelligence in Surgery: Promises and Perils, ANNALS OF SURGERY July 2018 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5995666/> (accessed 26 Nov 2021)

Working with patients, surgeons should develop and deliver the narrative behind optimal utilization of AI in patient care, avoiding complications that can arise when external forces (e.g. regulators, administrators) mandate implementation of new technologies without fully evaluating potential impacts on those who would use the technology most. If appropriately developed and implemented, AI has the potential to revolutionize the way surgery is taught and practiced with the promise of a future optimized for the highest quality patient care.

INHERENCY

1. Cautious use of AI in Status Quo

Limitations of AI are well recognized by the medical field. Status Quo blocks use of AI where it’s not appropriate

Dr. [Daniel A. Hashimoto](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hashimoto%20DA%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD, MS;  Dr. [Guy Rosman](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rosman%20G%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  Dr. [Daniela Rus](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rus%20D%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  and Dr. [Ozanan R. Meireles](https://www.ncbi.nlm.nih.gov/pubmed/?term=Meireles%20OR%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD 2018. Artificial Intelligence in Surgery: Promises and Perils, ANNALS OF SURGERY July 2018 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5995666/> (accessed 26 Nov 2021)

An important concern regarding AI algorithms involves their interpretability, for techniques such as neural networks are based on a “black box” design. While the automated nature of neural networks allows for detection of patterns missed by humans, human scientists are left with little ability to assess how or why such patterns were discerned by the computer. Medicine has been quick to recognize that the accountability of algorithms, the safety/verifiability of automated analyses, and the implications of these analyses on human-machine interactions can impact the utility of AI in clinical practice. Such concerns have hindered the use of AI algorithms in many applicative fields from medicine to autonomous driving and have pushed data scientists to improve the interpretability of AI analyses.

2. Already blocked

Fully automated medical procedures are already blocked by existing regulations

[Niccolo Mejia](https://emerj.com/author/niccolo-mejia/) 2019 (content writer and Junior Analyst at Emerj, an AI development company) 24 Apr 2019 Artificial Intelligence in Medical Robotics – Current Applications and Possibilities <https://emerj.com/ai-sector-overviews/artificial-intelligence-medical-robotics/> (accessed 26 Nov 2021)

Theoretically, multiple approaches to developing AI software could work for automating medical robotics. For example, one could use [machine vision](https://emerj.com/ai-sector-overviews/computer-vision-healthcare-current-applications/) to guide the robot to problem areas and make it aware of mistakes or patient bodily reactions. Currently, the medical robotics sector does not have many visible use cases in terms of fully automated surgery or other medical procedures. This is because regulations dictate that a recognized professional administer these procedures.

3. Doctors are in no hurry

Surgeons are resisting automated surgery

Andrew A. Gumbs, Isabella Frigerio , Gaya Spolverato, Roland Croner, Alfredo Illanes , Elie Chouillard and Eyad Elyan 2021 (Gumbs and Chouillard – are with Centre Hospitalier Intercommunal de POISSY/SAINT-GERMAIN-EN-LAYE, France. Frigerio – is with Department of Hepato-Pancreato-Biliary Surgery, Pederzoli Hospital, Italy. Spolverato – is with Dept of Surgical, Oncological & Gastroenterological Sciences, Univ of Padova, Italy. Croner – is with Dept of General-, Visceral-, Vascular- and Transplantation Surgery, University of Magdeburg, Germany. Illanes – is with INKA–Innovation Laboratory for Image Guided Therapy, Medical Faculty, Otto-von-Guericke University, Magdeburg, Germany. Elyan – is with School of Computing, Robert Gordon University, UK) Artificial Intelligence Surgery: How Do We Get to Autonomous Actions in Surgery? 17 Aug 2021 SENSORS <https://www.mdpi.com/1424-8220/21/16/5526/pdf> (accessed 26 Nov 2021)

Unfortunately, the reluctance of many laparoscopic surgeons to give up on haptics, or the sense of touch, is actually hindering progress in AIS because of the refusal to embrace robotic tele-manipulation technology, in effect, they are refusing to let go, something that will be needed if the dream of AIS is ever to come to pass. Unfortunately, the medical community has already been shown to be resistant to any automation of medical tasks even simple computations. It is safe to say that automation of surgical tasks will have an even more profound degree of resistance.

HARMS / SIGNIFICANCE

1. Autonomous surgery doesn’t exist

Truly autonomous robotic surgery will remain out of reach for some time

Dr. [Daniel A. Hashimoto](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hashimoto%20DA%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD, MS;  Dr. [Guy Rosman](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rosman%20G%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  Dr. [Daniela Rus](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rus%20D%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  and Dr. [Ozanan R. Meireles](https://www.ncbi.nlm.nih.gov/pubmed/?term=Meireles%20OR%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD 2018. Artificial Intelligence in Surgery: Promises and Perils, ANNALS OF SURGERY July 2018 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5995666/> (accessed 26 Nov 2021)

Early attempts at using AI for technical skills augmentation focused on small feats such as task deconstruction and autonomous performance of simple tasks (e.g. suturing, knot-tying).Such efforts have been critical to establishing a foundation of knowledge for more complex AI tasks. For example, the Smart Tissue Autonomous Robot (STAR) developed by Johns Hopkins University was equipped with algorithms that allowed it to match or outperform human surgeons in autonomous ex-vivo and in-vivo bowel anastomosis in animal models.While truly autonomous robotic surgery will remain out of reach for some time, synergy across fields will likely accelerate the capabilities of AI in augmenting surgical care.

Companies that claim to be doing autonomous medical procedures are “stretching the truth” for marketing purposes, since regulations don’t actually allow it

[Niccolo Mejia](https://emerj.com/author/niccolo-mejia/) 2019 (content writer and Junior Analyst at Emerj, an AI development company) 24 Apr 2019 Artificial Intelligence in Medical Robotics – Current Applications and Possibilities <https://emerj.com/ai-sector-overviews/artificial-intelligence-medical-robotics/> (accessed 26 Nov 2021)

A healthcare robotics company could have multiple reasons for claiming to use AI before they have actually implemented it for any of their solutions. One is that it could help the company find new clients that are eager to implement AI at their companies. Another reason may be that stretching the truth in this way leads to good press for the company, and this good press and new clientele could lead to acquiring more AI staff who can help build the company’s AI applications to better reflect public perception of the company. Once a company like this has a dedicated AI staff, it is only a matter of time before they begin to test machine learning models for automating medical robots. A company’s value proposition for their software can also illuminate the nature of how it is made and what it is used for. We focus on the system requirements to run properly and what the software does with those resources to determine if it is likely to be AI. Machine learning-based software requires large amounts of training data which is then used to determine when and how to take the next step in a procedure. If a company never states anything about needing to train the software on a corpus of related data, it is likely that it is a difficult process. AI developers face challenges in terms of the legality and logistics of installing a robotic surgical assistant. As previously stated, a big challenge for the medical robotics field is the concern surrounding fully automated surgical procedures and the resulting healthcare regulations that may prohibit it.

Fully autonomous AI medical procedures don’t exist yet, though we might be entering the stage before their existence

Andrew A. Gumbs, Isabella Frigerio , Gaya Spolverato, Roland Croner, Alfredo Illanes , Elie Chouillard and Eyad Elyan 2021 (Gumbs and Chouillard – are with Centre Hospitalier Intercommunal de POISSY/SAINT-GERMAIN-EN-LAYE, France. Frigerio – is with Department of Hepato-Pancreato-Biliary Surgery, Pederzoli Hospital, Italy. Spolverato – is with Dept of Surgical, Oncological & Gastroenterological Sciences, Univ of Padova, Italy. Croner – is with Dept of General-, Visceral-, Vascular- and Transplantation Surgery, University of Magdeburg, Germany. Illanes – is with INKA–Innovation Laboratory for Image Guided Therapy, Medical Faculty, Otto-von-Guericke University, Magdeburg, Germany. Elyan – is with School of Computing, Robert Gordon University, UK) Artificial Intelligence Surgery: How Do We Get to Autonomous Actions in Surgery? 17 Aug 2021 SENSORS <https://www.mdpi.com/1424-8220/21/16/5526/pdf> (accessed 26 Nov 2021)

In accordance with this, an international group of robotic surgical experts recently defined six levels of surgical autonomy: level 0 designates no autonomy, level 1 is defined as the tele-manipulation of a robot, level 2 corresponds to a limited autonomous action; level 3 is defined as conditional autonomy where the surgeon selects among several autonomous actions that the robot can perform; level 4 autonomous actions include automated medical decision making under a doctor’s control; and level 5 indicates full autonomy where no human control is necessary. It would appear that the complete surgical system as it is known today fits level 1, but vessel sealing devices such as the Ligasure or cautery devices would be level 2, and automatic stapling devices that have internal sensors could arguably be described as meeting the criteria of level 3. Interestingly, a team from Germany modified a previously developed robotically controlled laparoscope holder to move autonomously and improve with time, resulting in decreased laparoscopic cholecystectomy times. This device could indicate that we have already entered level 4 in humans.

SOLVENCY

1. More study needed

We don’t know enough yet about the potential benefits of AI. Surgeons need to study it more

Dr. [Daniel A. Hashimoto](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hashimoto%20DA%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD, MS;  Dr. [Guy Rosman](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rosman%20G%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  Dr. [Daniela Rus](https://www.ncbi.nlm.nih.gov/pubmed/?term=Rus%20D%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), PhD;  and Dr. [Ozanan R. Meireles](https://www.ncbi.nlm.nih.gov/pubmed/?term=Meireles%20OR%5BAuthor%5D&cauthor=true&cauthor_uid=29389679), MD 2018. Artificial Intelligence in Surgery: Promises and Perils, ANNALS OF SURGERY July 2018 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5995666/> (accessed 26 Nov 2021)

The true potential of AI remains to be seen and could be difficult to predict at this time. Synergistic reactions between different technologies can lead to unanticipated revolutionary technology; for example, recent synergistic combinations of advanced robotics, computer vision, and neural networks led to the advent of autonomous cars. Similarly, independent components within AI and other fields could combine to create a force multiplier effect with unanticipated changes to healthcare delivery. Therefore, surgeons should be engaged in assessing the quality and applicability of AI advances to ensure appropriate translation to the clinical sector.

We are years away from learning what we need to know

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As opposed to the ethical issues of AI in the collection, manipulation and interpretation of medical data, AIS has the added potential danger of real-time analysis of intra-operative issues and potential for complications. Alternatively, it could be argued that AI may result in fewer complications because of technology devised to minimize complications. Clearly, we are many years away from being able to truly study this; nonetheless, it is clear that more surgeons need to become well-versed with issues of AI so that surgeons can truly partner with engineers and computer scientists in the development of safe autonomous actions.

DISADVANTAGES

1. Lost human health benefits and cost savings

AI will bring better treatment, lessen side effects, faster healing and lower cost

Dr Sanjay Agrawal 2019 (leading pharmaceutical consultant and Editor-in-Chief of IJMToday) 14 Aug 2019 “Benefits of using AI in medical and healthcare purposes“ <http://pharmabiz.com/ArticleDetails.aspx?aid=117524&sid=9> (accessed 26 Nov 2021)

Better treatment:  It is obvious that a machine can do far precise work than manual work. Surgery is one such field that needs AI to achieve better results. Laparoscopy has already developed much in our country. Artificial intelligence will help surgeries with highest rate of risks to be done easily. For example, neurosurgeons will be benefited by developing instruments that help in surgeries of sensitive parts of brain or spinal cord.  
Cost effectiveness: Hiring manpower has become much costly and requires much efforts. Whereas, artificial intelligence can serve the purpose at a much lower rate. As it uses machine learning to take inputs from the patient, the process becomes quite easy after developing an algorithm.   
Lesser damage due to surgical procedures:  If the surgical instruments become more machine handled and smaller in size as compared to the traditional surgery, one will suffer lesser body damage and it will help regaining better health and faster recovery from the surgery.