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# Ethical issues in Surgical Practice in 2030: A Peep into the Future

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## Abstract

Most surgical specialties are growing exponentially with radical transformations. Information overload is resulting in the public becoming aware of surgical issues. Concerns include use of Artificial Intelligence (AI), robots, Augmented Reality (AR), Augmented Virtual Reality (AVR), tele mentored surgery, telesurgery and augmentative surgery. The practice of surgery and surgical decision making in the next decade could be totally different. New codes of conduct need to be evolved. Ethical issues in surgical practice will have to be viewed differently. An AI influenced Hippocratic Oath in the next decade may well be called “The Robocratic Oath”. When AI-driven machines and robots start making critical treatment decisions or operating autonomously, who is responsible for errors, complications or patient death? A change in mindset, from *shifting* responsibility to *sharing* responsibility, would be essential. This article will give an overview of the above

and discuss what can be expected for surgeons in the coming decade, particularly in the area of ethics. Special attention will be paid to ethical issues due to possible introduction of international licenses, and enforcement of global standards. Changes in Informed Consent documents and the increasing influence of technology and regulatory and legal concerns will be touched upon.

**Key words:** Futurology, Surgical ethical issues AND 2030, AI AND Surgery

## Introduction

Looking into the future, a variety of different trends could lead to ethical problems or the requirement of new regulations. Easily accessible information, resulting in public awareness of surgical issues, patient’s advocate groups/ media, organizational and financial changes could create new ethical problems. Availability or non-availability of international licensure to practice or opine on surgical

issues could lead to medico legal, regulatory and ethical issues. Enforcement of global standards ensuring adherence and compliance, to achieve uniform competency in a heterogenous surgical group worldwide, could cause ethical challenges. A well-trained algorithm recommending the best clinical solution should ideally give adequate weight to patient and family preferences. AI supplemented digital health divide, between haves and have nots could create ethical issues.

Enforcing and implementing culture sensitive ethical values is what distinguishes the professional, proficient surgeon – not just being a super craftsman with “gifted hands”. The patient’s interest should be the prime concern. The patient’s capacity for self-determination and ability to make independent decisions, based on personal values and beliefs, should be acknowledged. Benefits and risks of the proposed surgical treatment should be elaborated.<sup>1</sup> Though legally a surgeon-patient relationship is contractual, this contract is based on trust, confidentiality, clear understanding of the consent, avoiding conflict of interests and empathy. Informed Consent should include social, cultural and financial aspects. In a dire emergency, when there is no relative to give consent, the system trusts the surgeon, his/her competency and altruistic approach empowering a decision.<sup>2</sup> Occasionally medical institutions have financial problems resulting in a conflict of interest between surgeons and patients.<sup>3</sup>

Surgeons should be extra competent when carrying out a new procedure. Double-blinded randomized control trials to evaluate new surgical procedures and sham surgery raise many ethical concerns and one often has to compromise.<sup>4</sup> Prioritizing patient interest is not easy with limited financial resources. Serious health consequences may result for a larger group of patients as well as monetary repercussions for surgeons.<sup>5</sup> Surgeons have multiple professional roles clinician, educator, investigator, organizational leader, and consultant and non-professional roles such as spouse, parent and community member. The complexity of these roles with potential for conflict, require surgeons to be skilled in unravelling ethical challenges.<sup>6</sup> Good and evil are two sides of the same coin. One size does not fit all. Standard operating procedures cannot *ipso facto* be applied to culture sensitive, constantly evolving new ethical issues. Advanced technologies, economic burdens, honesty and integrity, mutual goals, respect, trust, empathy, relevance and integrity form the *sine qua non* of ethical issues in surgery.<sup>7</sup>

## **Influence of the pandemic on Surgical Ethics**

During the pandemic, individual ethical decisions often transformed into public health ethical decisions. Surgeons had to reduce or curtail elective surgery to make hospital beds available for COVID-19 patients. Personal Protective Equipment (PPE) had to be rationed Surgeons had to prioritize operations. Being asked to stay at home often upset surgeons.<sup>8</sup> Benevolent public health efforts led to delays in surgery for individuals. Delaying surgical treatment led to backlogs of postponed surgical procedures. Surgeons were re-deployed to support overstretched critical care services. They often became ill and even died while delivering emergency surgical care.<sup>9</sup> During the pandemic, new technical procedures had to be performed with insufficient training or experience. This put patients at risk, again raising ethical problems of adhering to competency guidelines.<sup>10</sup>

## **Technology and current ethical issues**

Ethical issues have compounded for all players in the healthcare ecosystem due to growth in scientific knowledge, technology, availability of new diagnostic equipment and new treatment opportunities. Decisions are more difficult in older patients with multiple and more serious diseases. Organizational and financial constraints in hospitals create new ethical problems, particularly for surgeons, and when patient interest is given priority.<sup>11</sup> Patients’ rights to privacy may lead to questioning the presence of physical and virtual observers during a procedure, even if they are trainees or industrial representatives providing technical assistance. Live video broadcasting of surgical procedures through closed social media groups could compromise confidentiality. Corporate Hospitals often measure efficiency by numbers.<sup>12</sup> With improved socio-economic status, utilisation of cosmetic surgery is increasing. Improving one’s physical appearance is becoming a priority. Cosmetic surgeons do not treat or cure disease. They reshape and reform the human body to improve appearance and increase self-esteem. Opportunity for financial gain could result in compromising on indications, resulting in unethical surgical behavior.<sup>13</sup>

The ability of the surgeon to explore the pros and cons in deploying AI and robotics in the OT with patients depends on information made available to the surgeon. This, in turn, is related to aggressive marketing by the manufacturers. The whole area is therefore grey and the purist will find it difficult to draw clear lines of when and where ethics are being transgressed.<sup>14</sup>

Truth-telling is vital in maintaining the surgeon-patient relationship. Individual judgement is often a by-product of the cultural environment. In the United States, full disclosure to the patient, even in critical illnesses is now the norm.<sup>15</sup> The Supreme Court of India however has opined that it is not obligatory for a doctor to always disclose the “rarest of the rare” possible complications when discussing treatment options. It was felt that many patients who would have benefitted may not have given consent. The surgeon is expected and authorised to use his/ her judgement, at that time, for that particular patient – an illustration of ethical practice at its best. Ethical issues due to Internet of Things (IoT) technology is increasing. Wearable devices collect body data in real time. There is a real risk that hackers could invade a wearable device system to obtain data. Surgeons could also be involved as some wearables need invasive implantation. Strong social networks make privacy even more challenging. Laws and regulations in these new areas are yet to be developed. It is also unlikely that these rules would ever keep pace with evolving technology.<sup>16</sup> Robotic surgery may not become the required standard of care. However, deployment of AI and robotics presupposes that the patient and his family are adequately informed. Multiple emerging areas need to be discussed. Patients generally want the least invasive and most modern technology. However, it could be the surgeon’s preference, robotic skill development or comfort of the surgeon. The true reason for use of robotics must be discussed.<sup>18</sup>

The phenomenal advances in sciences and technology, questioning of fundamentals in human biology, a new innovation culture, eagerness among patients to get the “latest and the best” are leading to new ethical issues. All these could result in a new Informed consent. This is also necessary before innovative procedures. Protection against possible medico legal and regulatory issues, has led to more stringent Informed Consents. Formation of new surgical innovation committees and establishing national registries supplement informed consents.<sup>17</sup>

### **Artificial Intelligence and Surgery: Ethical Dilemmas**

AI applications to support surgical decision-making processes are raising concerns. Long-standing concerns involving ethical surgical care are now being viewed differently. Accountability for errors, technical robustness, privacy and data governance, transparency, diversity, non-discrimination and fairness are some examples. A multidisciplinary focus on implementation science and

digital health education is necessary. A well-trained algorithm should ideally recommend the best clinical solution, also giving appropriate weight to the patient’s occupation, desires and socioeconomic status. A senior, experienced, culture-sensitive surgeon factors in effortlessly, in real time, these and a host of other intangible variables. Patient-surgeon synergies and shared-decision making, can be more challenging when machine interaction is involved.<sup>19</sup> Innovative surgical practice requires more regulations. If Machine Learning (ML) based algorithms are to be accountable and trustworthy, medical ethics and humane values have to be factored in. The development process must be aligned with data privacy, transparency requirements and minimal data bias.<sup>20</sup> Machines, like humans, are prone to committing errors. It is not clear how responsibility will be assigned to the various groups who have, in different proportions, contributed to the machine error. Individuals involved include software developers, instrument engineers and surgeons. The impact of shared responsibility on medical litigation cases remains unclear. Biased or skewed data used to create algorithms will result in AI that is biased. However, we need to remember that biased data (and surgeon bias) affected surgery long before AI/robotics came into the picture, e.g., suboptimal care for female or non-white patients. Protecting data and patient privacy is important. However, AI cannot exist without data. This creates a paradox. Data ownership is as important an issue as data privacy.<sup>21</sup> An AI platform could override patient autonomy in decision-making. Healthcare professionals and AI developers must work with ethicists and philosophers to develop an ethical code of conduct, guaranteeing preservation of human rights, dignity, and justice through the use of AI.<sup>22</sup>

Surgical decision-making through hypothetical-deductive reasoning, individual judgment, and heuristics can still lead to bias, error and preventable harm. Traditional predictive analytics and clinical decision-support systems pre-supposes time-consuming manual data management and suboptimal accuracy. Automated AI models are updated by livestreaming electronic health record data with mobile device outputs.<sup>23</sup> This approach would require data standardization, advances in model interpretability and careful implementation and monitoring. Attention to ethical challenges involving algorithm bias and accountability for errors is essential. In addition, preservation of bedside assessment and human intuition in the decision-making process is required. Integration of AI with surgical

decision-making has potential to improve care. This includes augmenting decision to operate and postoperative management, supplementing the informed consent process, identification and mitigation of modifiable risk factors. Acute and chronic sleep deprivation, occurring in nearly two-thirds of all acute care surgeons, contributes to human errors. Automated production of prognostic data from AI models could improve efficiency in a busy surgical practice. Obviating manual data acquisition could enhance face-to-face patient-surgeon interactions. Surgical decision-making is impaired by time constraints, uncertainty, complexity and decision fatigue.<sup>24</sup>

### **AI in Healthcare: Ethical Issues Consequent to Regulatory and Legal Concerns**

Regulatory and Legal concerns regarding deployment of AI, autonomous Clinical Decision-Making Systems and robots in healthcare will be a very real-world problem to contend with by the end of this decade.<sup>25</sup> Ever-changing, futuristic, user friendly, uncomplicated regulatory requirements promoting compliance and adherence are needed. Regulators need to understand that software itself could be used as a medical device (SaMD). Regulations should distinguish between diagnostic errors, malfunction of technology, or errors due to initial use of inaccurate/inappropriate data as training data sets.

Product liability is ascribed to defective equipment and medical devices. However, Watson, the AI-enabled supercomputer, is treated as a consulting physician and not categorised as a product. Ultimately, the law is interpreted contextually and perceptions could be different among patients, clinicians and the legal system.

Trust is the key word for both surgeons and patients. An educated informed consent needs to be given by the patient and caregiver prior to the surgeon using AI, until AI is accepted as the 'standard of care.' Standards need to be created and met. Limitations on use of AI should also be emphasized. Can a surgeon overrule a machine's diagnosis or decision and vice versa? Who is responsible for preventing malicious attacks on algorithms? AI systems are becoming more autonomous resulting in a greater degree of direct-to-patient advice, bypassing human intervention. The surgeon's role in maintaining quality, safety, patient education, and holistic support therefore becomes even more necessary. Utilization of AI would have a psychological impact on both patients and doctors, changing the doctor-patient relationship. Could AI 'replacing' a doctor's

advice diminish the value of clinicians, reducing trust? If the surgeon disagrees with the AI decision, who will be perceived as 'right'? The degree of relative trust held in technology compared to health care professionals may differ between individuals, generations and at different times. Autopilots on planes have improved airline safety without compromising training of pilots. There could be similar models of 'peaceful co-existence' in healthcare.

It should not be assumed that the surgeon and AI will always be at odds. AI could just be another tool the surgeon uses to devise the best patient care plan, especially as AI uses a data bank much larger than that available from a single surgeon's experience (including second opinions).

The greatest challenge to AI in healthcare domains is ensuring their adoption in daily clinical practice. U.S. Food and Drug Administration (FDA) has asserted its ability and intent to regulate AI in the healthcare system. The FDA launched a digital health division in 2019 with new regulatory standards for AI based technologies. The International Medical Device Regulators Forum (IMDRF) defines 'Software as a Medical Device (SaMD)' as software intended to be used for one or more medical purposes, without being part of a hardware medical device. From a legal perspective, the decision to rely on AI will itself be a human medical judgment, like any other judgement. 'Automated decision-making,' for example, is a decision that is made without any human involvement, solely by automated means. In the real world, terms do not always have such an unambiguous, explicit meaning. AI systems need to develop 'moral' and 'ethical' behaviour patterns aligned with human interests. Adapting existing principles and precedents to the imminent problems of whether a robot can be sued for malpractice will not solve the problem. Standards need to be defined for robots also. Vicarious responsibility could extend to the human surgeon overseeing the robot, the company manufacturing the robot and the engineer who designed it.

One wonders how Sir William Osler, who in 1890 opined that medicine is a science of uncertainty and an art of probability, would have reacted to the introduction of AI in healthcare. For centuries, practicing medicine involved acquiring as much data about the patient's health or disease as possible and taking decisions. Wisdom presupposed experience, judgement, and problem-solving skills using rudimentary tools

and limited resources. AI will and should never replace a commiserating surgeon. Hopefully, the AI-enabled surgeon will now spend more time empathizing with his patient rather than getting drowned in voluminous data. The surgeon will no longer be spending time extracting meaningful data. Time will be spent productively managing data extracted by AI.

### ChatGPT and Ethical Issues

ChatGPT (Chat Generative Pre-Trained Transformer) is an AI chatbot developed by OpenAI and launched on November 30, 2022. There is no escaping from the fact that in 2030 the then version of ChatGPT would be a major integral component of a surgeon's training and armamentarium. Today, a surgeon's concerns in readily adopting ChatGPT are the limitations in real time and lack of continuous retraining. This implies a need to be updated with accurate, reliable, unbiased data from the real world of surgical care.<sup>26</sup> The ability of ChatGPT to think, analyse and behave like a surgeon in 2030 would certainly be much more related to the *then* real world. The complex relationships between different clinical conditions and management strategies also need to be weighed against the patient's desires and possibly the socio-economic status as well.<sup>27</sup> In a publication, "When Doctors Use a Chatbot to Improve Their Bedside Manner," the authors point out that doctors were asking ChatGPT to help them communicate with patients in a more compassionate way. In fact, an emotional letter generated by ChatGPT made an insurance provider reconsider the original decision of denying benefits<sup>28</sup> after the insurance company rejected the claim based on the first letter received from the surgeon in charge! Users may also blindly trust ChatGPT due to its incredible capabilities. There is, however, still a role for human rechecking.<sup>29</sup> The potential for bias and discrimination in training materials used may generate outputs that reflect and perpetuate these biases. This could lead to unfair treatment or negative consequences for specific groups. Regular audits, ongoing monitoring, and adopting fairness-aware Machine Learning techniques are necessary measures. The focus should be on retraining and upskilling employees whose roles may be affected by AI adoption.<sup>30</sup> ChatGPT unfortunately may have the potential to propagate misinformation and hate. Training data is essentially from pre-2021, not representative of the considerable progress made since then. Ethically, even the predominantly white ethnic constitution of the OpenAI team has been questioned.<sup>31</sup> Meticulous attention to data privacy,

quality and quantity, security, regulations, integration with existing systems and ensuring constant human oversight are illustrations of ethical reflections. Advancements in Natural Language Processing (NLP) will only compound these issues in the coming decade. Though ChatGPT can generate human-like text, at present it does not have the ability to think, reason, or understand the context of the information generated.<sup>32</sup> ChatGPT adheres to EU's AI ethical guidelines, concentrating on human oversight, technical robustness and safety, privacy and data governance, transparency, diversity and non-discrimination, societal and environmental well-being, and accountability. However, these limitations apply to all applications of ChatGPT usage and is not confined to surgery alone.

### Illustrations of ChatGPT Applications in Healthcare<sup>33-36</sup>

- Multi lingual capabilities (50 languages)
- Identifying potential research topics
- Acting as Virtual Assistants (will Physician Assistants become an endangered species?)
- Faster, easier, more reliable identification of futile projects
- AI enabled Clinical decision support systems
- Mental health support
- Increase clinician's efficacy by redistributing workload and optimizing performance
- Dictating notes ChatGPT will extract symptoms, diagnoses, treatments etc. from patient records. Medical record keeping will be more efficient. Medical translation.
- Facilitating clinical and laboratory diagnosis
- Medical writing (ethical, legal concerns), copyright infringement bypassing traditional plagiarism detection methods and even 65% of AI output checkers.
- Medication compliance- reminders, dosage instructions, information about potential side effects, drug interactions and new developments
- Clinical trials
- Remote patient monitoring.

### Extra-terrestrial surgery

With 620 individuals already having gone into space in the last 57 years and space tourism having started, extra-terrestrial healthcare is now a reality. 3D printing of living tissue in outer space could address shortage of cadaveric organs for transplant. Bio-print facilities to produce functional complex human tissues in a mi-

crogravity milieu during Low Earth Orbit flights, is in the offing. Ventricular Assist Device, a life-saving heart pump for patients awaiting heart transplants was designed by combining supercomputer simulation of fluid flow through rocket engines. Programmable pacemakers, micro-transmitters used in fetal monitoring, laser angioplasty and light-emitting diodes (LEDs) used in neurosurgery are all modifications from space technology. The sky will no longer be the limit for terrestrial problems. As early as 2012 articles had appeared on “Surgery in Space: Where are we now?”<sup>37</sup> The author expects that during his life time, the first extra-terrestrial surgery in microgravity settings will take place.<sup>38</sup> The ethical implications are mind boggling.

### The Future

The need to regulate AI enabled automated health-care decisions and ensure that no harm is done to human beings is now a reality. As an illustration, indications for DBS (deep brain stimulation) are increasing and more chips will soon be implanted into the brain.<sup>39</sup> Augmentative neurosurgery could be a reality. There would certainly be ethical issues in proposing surgical management for diabetes, hypertension, obsessive compulsive neurosis, depression, impotence and a myriad of similar “disorders” or “aberrations” and addictions including smoking. Hackers could reset implanted chips.

### Conclusions

Since the dawn of modern surgery, never has there been such a radical transformation in all aspects of surgery, in every single subspeciality. Robotic surgery, telesurgery, surgery on the unborn, and augmentative restorative surgery are the present buzz words. Surgeons of today need to understand that the future is always ahead of schedule. As one trained in the BC era in the 20th century, I often feel that though familiar with ChatGPT and Google Bard, I belong to Jurassic Park. We, as a generation, are becoming an endangered species. Surgeons in the coming decades need to continue to practice ethical surgery, though new standards will have to be set up for what is “ethical”. The *raison d’être* for our existence is to provide TLC (Tender Loving Care) to all those who have entrusted their lives to us. Reminding ourselves that surgeons need to ensure that ethics is an integral part of our armamentarium inside and outside the OT is the first step. Hopefully this communication is a first baby step.

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