RGCIRC
Ethics, Empathy & Excellence

NEWSLETTER

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EDITORIAL

FROM 'GUT FEELING' TO 'DATA DRIVEN' ANAESTHESIA THE AI REVOLUTION IN ANAESTHESIOLOGY

"The only constant in life is change": (Heraclitus, Greek Philosopher)

Since 16th October 1846 when first public demonstration of Ether Anaesthesia by WTG Morton was done, the practice of anaesthesia over the years has evolved from a single agent, simple mask inhalation technique to a complex, technology-driven balanced anaesthesia technique. Today's practice rarely relies on a single agent. The "balanced anaesthesia" approach involves administration of a combination of intravenous and inhalation agents (in titrated doses) along with regional anaesthesia techniques to optimize patient safety and minimize side effects.

The past 180 years has transformed anaesthesia practice from an un-monitored, daring, relatively unsafe (at times dangerous), technique based on one-size-fits-all approach into a customised, technology intensive, refined, safer, precise science that manages human consciousness and physiology under anaesthesia with judicious interventions. This has been possible because of better drugs, newer closed loop drug administration devices and advanced real-time monitoring.

If one ponders about recent medical advancements that have had major impact in anaesthesia practice, Artificial Intelligence (AI), personalized anaesthesia, and digital twins form a triad that is shaping the future of anaesthesiology and critical care. These technologies have enhanced the precision and speed of clinical decision making. The newer technology is improving patient safety through early risk detection, reduced postoperative complications, and intelligent monitoring of patient status.

Artificial Intelligence (AI) is an advancement in field of computer science wherein hardware and software systems enable machines to think and act like humans. AI is known to utilize various available algorithms and computational resources to autonomously perform intelligent tasks.

Over the years AI in anaesthesia has progressed from simple monitoring rules to sophisticated autonomous systems. It can be categorised into three developmental eras: "*Tools*" (pre-computerization) era, "*Machines*" (early software) era, and "*Automation*" (modern AI) era.

Key milestones in the development of AI in anaesthesia includes the use of EEG signals to maintain anaesthetic depth (by BIS/ Entropy) and development of target-controlled infusion (TCI) pumps to provide Total Intravenous Anaesthesia (TIVA). In 2008 "McSleepy" system was amongst the first automated Closed-Loop Anaesthesia Delivery System (CLADS). Subsequently, various newer closed-loop systems have been developed that use real-time physiologic inputs (EEG patterns, blood pressure, and heart rate variability etc) to automatically guide anaesthetic drug infusion. The aim is to maintain stable anaesthetic depth with minimal fluctuation.

The recently introduced AI algorithms can now predict hemodynamic instability (hypotension) during intra-operative and post-operative period. Some newer AI models can even predict delayed emergence, postoperative pain, delirium, acute kidney injury, and blood transfusion needs.

Now, AI can also assist anaesthesiologists in airway management and ultrasound interpretation. It can highlight key anatomical structures for ultrasound-guided interventions.

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Enhanced Recovery after Surgery (ERAS) protocols are frequently being employed to reduce post-operative complications and reduce hospital stay. AI technologies are increasingly being integrated into ERAS pathways to optimize clinical outcomes. These tools promise greater precision in intraoperative management, improved postoperative pain control, and personalized patient recovery.

Thus, integration of multimodal large language models (LLMs) allows AI to process diverse data types (text, imaging, signals) for perioperative decision-making and automated, personalized care.

The diverse use of AI in Anaesthesiology is summarised below in Figure 1.

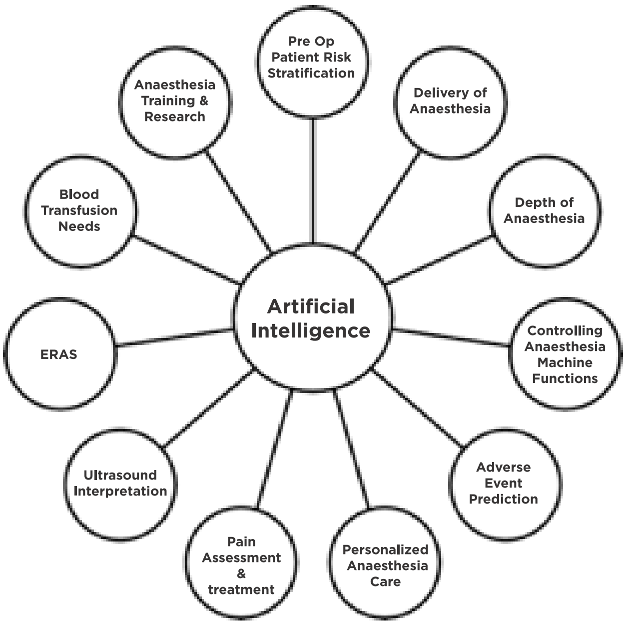

Figure 1: Diverse Applications of AI In Anaesthesiology

Precision anaesthesia is technique based on the concept that patient care can be tailored specifically depending upon individual differences of genetic makeup, physiological status, and specific health conditions. Contrary to the conventional approaches which rely on established standard protocols, precision anaesthesia seeks to individualize anaesthetic management based on comprehensive assessment of every patient. This approach aims to enhance outcomes by improving efficacy and reducing adverse effects.

Digital twins in anaesthesiology are dynamic, real-time virtual replicas of a patient's physiological state, integrating data from Electronic Health Records (EHRs), sensors, and devices. These models predict patient responses to anaesthetic agents, fluid management, and surgical stressors, enabling proactive, personalized care. They assist in simulating outcomes, optimizing drug dosages, and improving patient safety in the operating room.

AI in Anaesthesia Training Program

The newer technology is improving the knowledge and skills of the anaesthesiology trainees. AI-powered resources are available to make learning faster and more efficient. These resources not only improve knowledge but also empower to excel in real-time decision-making. AI-driven simulators can create realistic operating theatre scenarios which enables trainees to practice decision-making, crisis management, and drug dosage adjustments. The AI simulators can be used to provide not only personalized learning but also simultaneous real-time feedback.

Limitations of AI

Although AI in anaesthesia continues to advance, there are certain limitations. The AI systems rely heavily on data. Thus, if data quality is biased or inputs incomplete, then the outputs can be misleading. The AI generated results do not provide insight into reasoning. This tends to reduce trust and accountability. Perpetuation of systematic biases and discrimination towards under-represented sections of society can be the unintended consequences of AI solutions. One could have conflicts about data protection, intellectual property rights and economic gains.

If patients are uncomfortable with AI assistance or are unaware of AI involvement in their care, ethical concerns can arise.

Will AI replace the Anaesthesiologist?

With increasing automation and precision by the AI models, there is growing concern whether AI will replace anaesthesiologists? The answer is NO.

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AI can support drug titration, provide real time monitoring and anticipate complications. However, quite often the anaesthesiologist role requires complex, real-time judgement, human empathy, and adaptability to unpredictable emergencies. The AI algorithms cannot replicate these situations. AI systems would require an anaesthesiologist to interpret data generated and validate recommendations.

In field of anaesthesiology training, while a trainee well versed in AI is likely to be better skilled, it's the added attributes of nontechnical skills – communication skills, empathy, ethics that would require human interaction which would make training complete and successful.

So, AI is not replacing anaesthesiologists. AI is shifting the role of anaesthesiologists towards system oversight and high-level decision-making. Once there are proper validation and training, AI will make anaesthesia more safe, efficient, and personalized.

Conclusion:

"To exist is to change, to change is to mature, to mature is to go on creating oneself endlessly."

Today it's difficult to predict where the anaesthesiology as a specialty is headed for. However, one can definitely conclude that we have reached a stage where AI into anaesthesiology is an inevitable necessity. With AI revolution, the practice of anaesthesia is changing at a rapid pace. Now, it's the key responsibility of the new generation anaesthesiologists to keep pace with this change and ensure that this change is driven by an unwavering focus on patient safety and well-being.

Guest Editor - Dr. Rajiv Chawla
Director - Anaesthesiology
RGCIRC, Delhi

CME WITH IMA SHAHJAHANPUR, UP

RGCIRC organized an Oncology CME program in association with IMA Shahjahanpur, UP on Saturday, 17th January 2026 at The Grand Arc Hotel & Convention Centre, Shahjahanpur, UP.

The session featured eminent speakers from RGCIRC who shared valuable insights on recent developments in oncology: Dr. A. K. Dewan, Director, Surgical Oncology delivered lecture on "**Palliative Surgery**". Dr. Sumit Goyal, Associate Director, Medical Oncology, presented on "**Approach to a Patient with Suspected Cancer**".

The audience gave a warm welcome to the team from RGCIRC and promised to continue their support to RGCIRC, highlighting the significance of collaboration and cooperation in advancing the field of oncology. Overall, the event was a great success, providing a platform for the dissemination of knowledge and the exchange of ideas in the field of oncology.

CME PROGRAM WITH IMA JODHPUR, RAJASTHAN

RGCIRC organized an Oncology CME program in association with IMA Jodhpur, Rajasthan on Saturday, 31st January 2026 at Novotel, ITI Circle, Jodhpur, Rajasthan.

Dr. Rajeev Kumar, Sr. Consultant & Chief of Breast Onco Surgery (Unit-I) delivered lecture on **"Hereditary Breast Cancer"** and Dr. Narendra Agrawal, Unit Head & Sr. Consultant, Hemato-Oncology, Leukemia and BMT spoke on **"CAR-T Cell Therapy"**. Overall, the event was a great success, providing a platform for the dissemination of knowledge and the exchange of ideas in the field of oncology.


44TH ANNUAL CONVENTION OF IMA SOUTH DELHI

RGCIRC participated in the **44th Annual Convention of IMA South Delhi** being organized by IMA South Delhi Branch on Sunday, 25th January 2026 at The Suryaa, New Friends Colony, New Delhi. The theme of this convention was "**Empowering the Physicians**".

Dr. Gauri Kapoor, Medical Director, RGCIRC, Niti Bagh and Director – Pediatric Hematology Oncology & BMT delivered a lecture on **Early Diagnose of Cancer** and Dr. Sunny Malik, Consultant In Charge, Dept. of Oncoanaesthesia, Pain and Palliative Medicine, RGCIRC, Niti Bagh, South Delhi spoke on **Palliative Care: Is It Just End of the Road**.

The convention brought together distinguished medical professionals and healthcare experts to deliberate on key issues in contemporary medical practice.

Rohini Centre:
A Unit of Indraprastha Cancer Society and Research Centre
D - 18, Sector - 5, Rohini, Delhi - 110085 I E-mail: info@rgcirc.org

Niti Bagh, South Delhi Centre:
A Venture with National Chest Institute
Mahendra Kumar Jain Marg, Niti Bagh, South Delhi - 110049
Email: infosouthdelhi@rgcirc.org

Website: www.rgcirc.org

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