



Editorial

Artificial Intelligence in Paediatric Surgery: Embracing Innovation Beyond the Operating Room

Artificial intelligence (AI) is rapidly transforming healthcare, offering opportunities to improve patient care, education, and healthcare management. While much attention has been directed towards AI-assisted robotic surgery, its true potential extends far beyond the operating theatre. In paediatric surgery, where timely diagnosis, meticulous perioperative care, and long-term follow-up are essential, AI has the capacity to enhance every stage of the patient's journey.

One of the greatest strengths of AI lies in clinical decision support. By analysing large volumes of patient records, laboratory results, imaging, and published evidence, AI can assist paediatric surgeons in reaching earlier and more accurate diagnoses. Congenital anomalies often require integration of multiple clinical findings, and AI-powered systems can help identify subtle patterns that may otherwise be overlooked. Rather than replacing clinical judgement, AI serves as an intelligent assistant, enabling surgeons to make more informed decisions.

AI also has tremendous value in surgical education and training. Trainees can utilise AI-based learning platforms for personalised education, virtual case discussions, operative simulations, and performance assessment. Surgical videos can be analysed to provide objective feedback on technical skills, while AI-powered educational tools can summarise current literature and clinical guidelines

within seconds. Such technologies may help bridge disparities in surgical training, particularly in resource-limited countries where exposure to complex paediatric procedures is often limited.

Efficient management of patient records is another area where AI can make an immediate impact. Automated documentation, structured electronic medical records, and intelligent data retrieval reduce administrative workload and allow surgeons to devote more time to patient care. AI can also facilitate maintenance of congenital anomaly registries and research databases, improving data quality and supporting multicentre collaborations.

Postoperative care and long-term follow-up are particularly important in paediatric surgery, as many children require monitoring for months or even years. AI-powered digital platforms can remind caregivers about follow-up appointments, monitor symptoms through mobile applications, identify warning signs requiring urgent review, and improve communication between healthcare providers and families. Such systems may reduce unnecessary hospital visits while ensuring that complications are detected early.

Although AI-assisted robotic surgery represents an exciting frontier, its widespread adoption remains limited in many low- and middle-income countries because of the high cost and limited availability of robotic platforms. Nevertheless, the absence of surgical robots should not prevent paediatric surgeons from embracing AI. Even without robotic assistance, AI can estimate operative risk, predict postoperative complications, support perioperative planning, optimise resource allocation, and identify patients who require closer monitoring after

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surgery. These practical applications are achievable using existing digital infrastructure.

Importantly, AI also has the potential to reduce healthcare costs. Earlier diagnosis, improved risk stratification, fewer unnecessary investigations, streamlined documentation, reduced postoperative complications, and better follow-up may collectively improve efficiency while conserving valuable healthcare resources. For healthcare systems with limited manpower and increasing patient volumes, AI offers an opportunity to deliver higher-quality care at a lower overall cost.

As AI continues to evolve, paediatric surgeons should view it as a collaborative partner rather than a competitor. Successful integration will require appropriate training, ethical governance, data security, and continuous human oversight. Ultimately, the future of paediatric surgery will not be defined by whether AI replaces surgeons, but by how effectively surgeons use AI to deliver safer, smarter, and more equitable care for every child.