



Artificial Intelligence and Augmented Reality in Surgery: Current Integration and Future Prospects for Surgical Education in Romania and Eastern Europe

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INTRODUCTION

Artificial Intelligence (AI) and Augmented Reality (AR) are rapidly transforming modern surgical practice. These technologies enable enhanced intraoperative visualization, improved decision-support systems, and advanced robotic integration.

CURRENT APPLICATIONS IN SURGERY

Intraoperative Assistance

- AI-based anatomical recognition
- Robotic instrument tracking
- Predictive analytics for operative planning

Augmented Visualization

- AR anatomical overlays
- Real-time navigation assistance
- Enhanced visualization in minimally invasive surgery

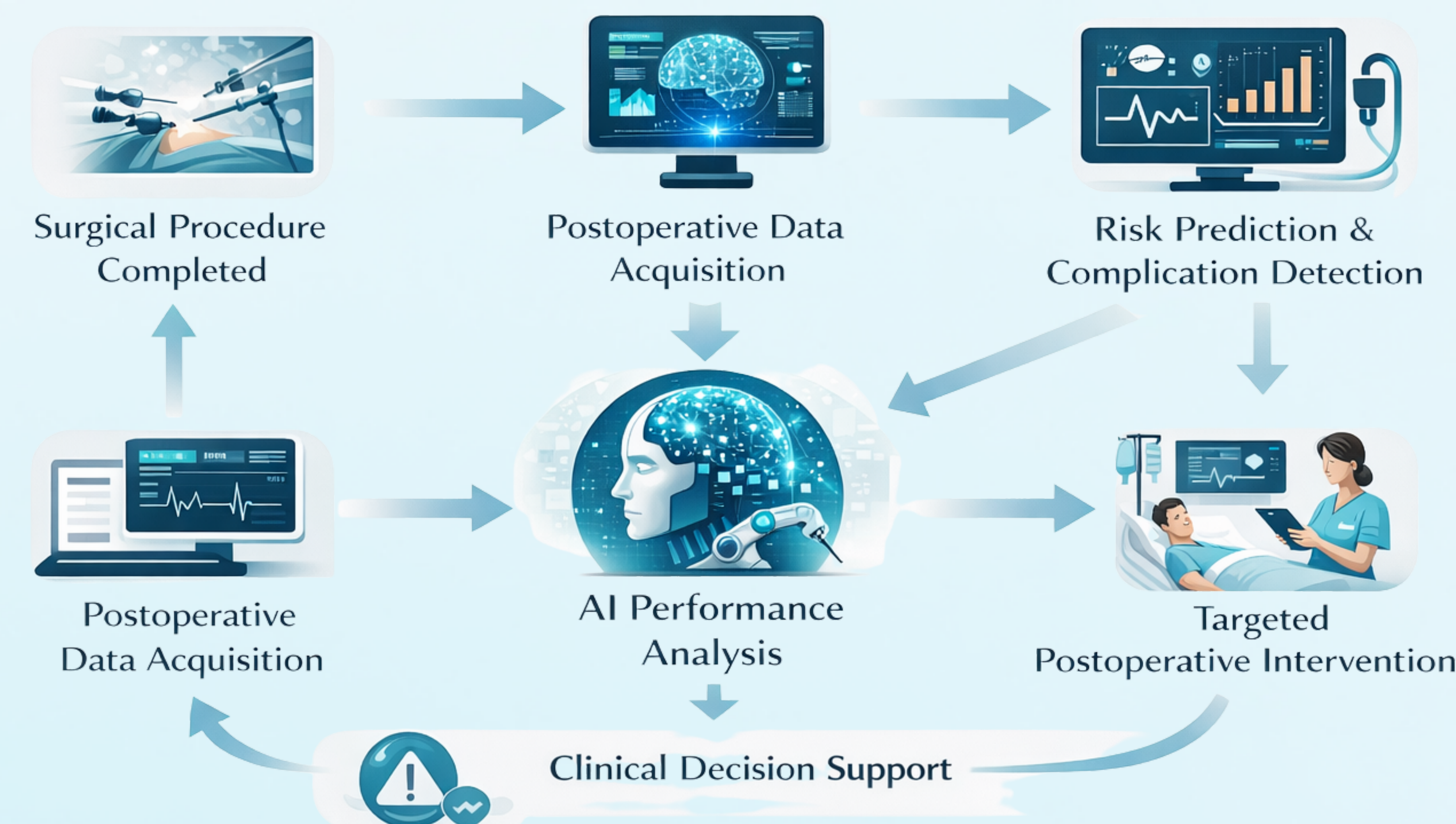
Postoperative Analytics

- Surgical performance analysis
- Complication prediction models
- Outcome optimization algorithms

IMPACT ON SURGICAL EDUCATION

- Immersive simulation-based learning
- Real-time procedural feedback
- Skill tracking and personalized training pathways
- Virtual anatomy and procedural rehearsal

AI Performance Analysis in Postoperative Surgical Care



ROMANIA AND EASTERN EUROPE

Academic centers in Bucharest, Cluj-Napoca, Oradea and Timișoara have begun exploring AR-based anatomical simulation and robotic surgical modules.

However, large-scale implementation remains limited due to:

- Limited digital infrastructure
- Funding constraints
- Fragmented medical data ecosystems
- Lack of AI-ready datasets

FUTURE PROSPECTS

EU investments in digital health and AI regulation create new opportunities.

Strategic priorities:

- Interoperable medical data systems
- AI education in medical curricula
- International research collaborations
- Regional surgical simulation centers

CONCLUSIONS

AI and AR represent transformative technologies for both surgical practice and surgical education. Coordinated investment in infrastructure, training, and research collaboration will be essential for accelerating adoption in Romania and Eastern Europe.