Governo del percorso chirurgico: sfide e prospettive

INTELLIGENZA ARTIFICIALE NEL PERCORSO CHIRURGICO A CICLO BREVE

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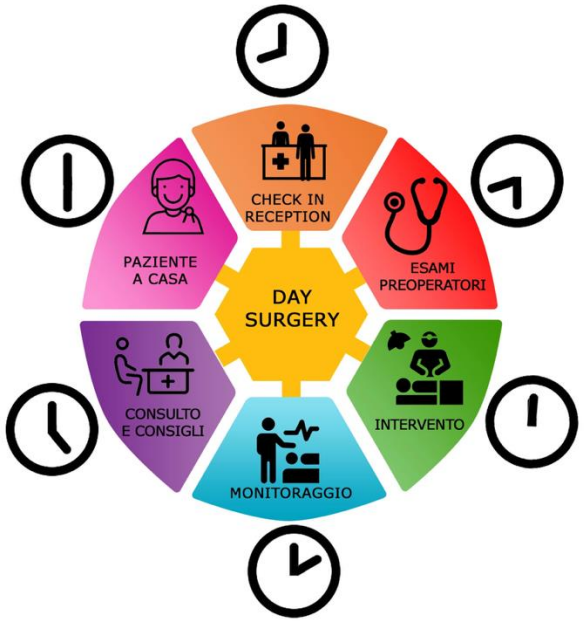
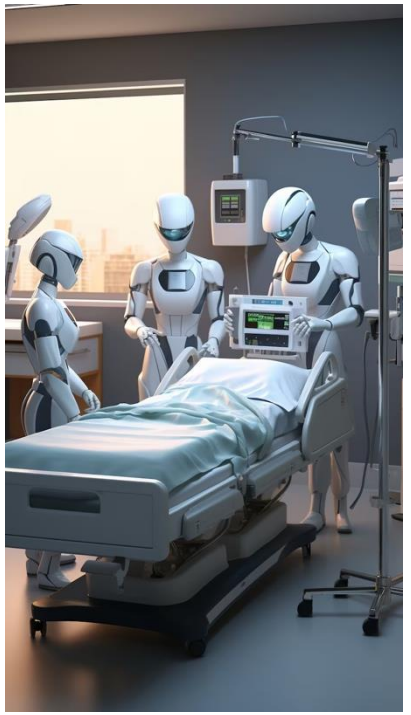


improve patient outcomes

enhance precision,

Artificial intelligence



optimize perioperative management

intraoperative monitoring

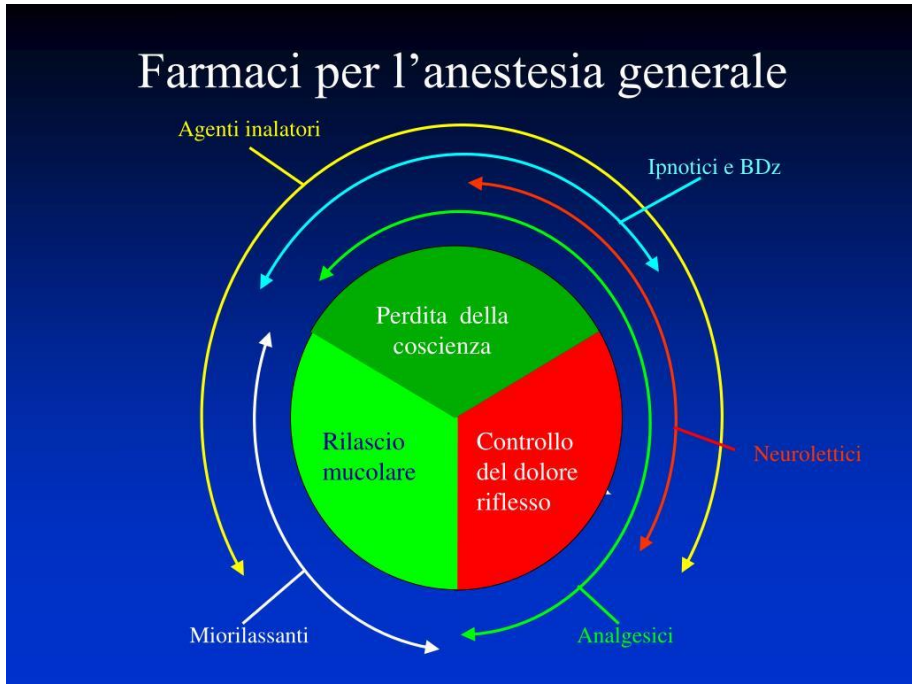
HOW ??

integrating preoperative risk assessment

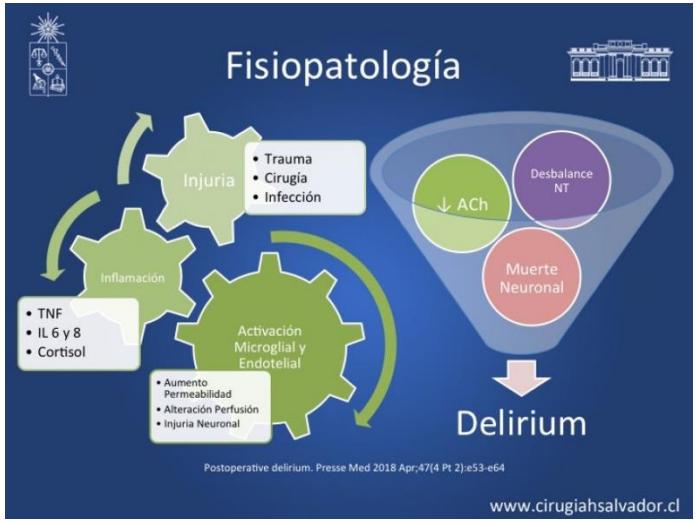
postoperative rehabilitation

supports decision-making by **predicting complications**, suggesting personalized anesthetic plans, and enabling real-time monitoring and **alerts during surgery**

AI fosters synergy between surgical and anesthetic teams by tracking surgical progress and anticipating physiological responses, which can streamline workflow and **reduce stress for clinicians**.



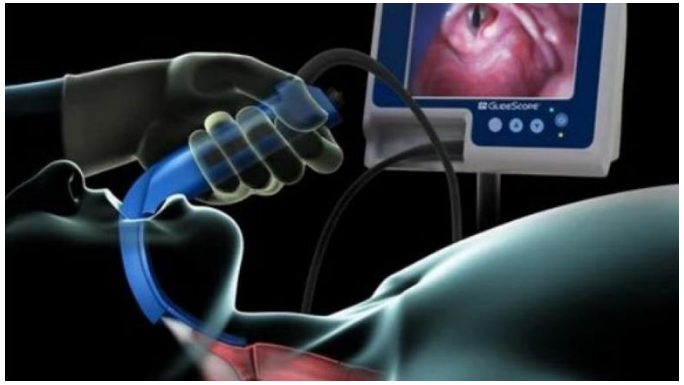
Key AI use cases for improving perioperative anesthesia efficiency focus on *enhancing risk assessment*, *intraoperative management*, and *postoperative care*.

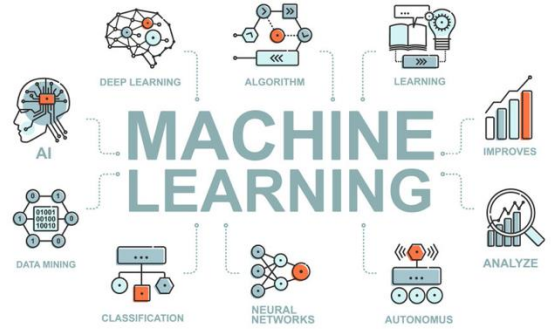


Preoperative Efficiency

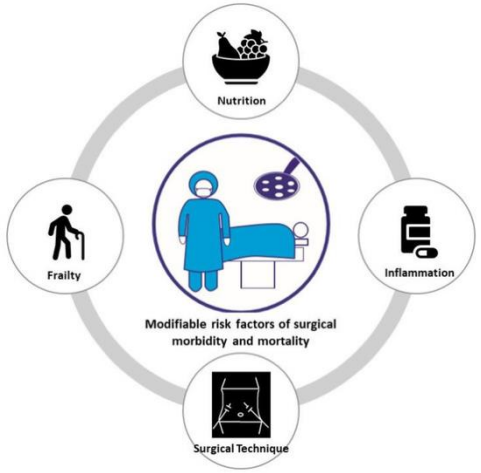
AI analyzes **electronic health records** and imaging to accurately ***predict*** complications such as postoperative nausea, delirium, and acute kidney injury.

Automated airway assessment using deep learning models helps identify difficult intubation risks quickly and objectively.





AI-enabled risk stratification tools like POTTER and MySurgeryRisk assist clinicians in personalized anesthetic planning and informed decision-making.

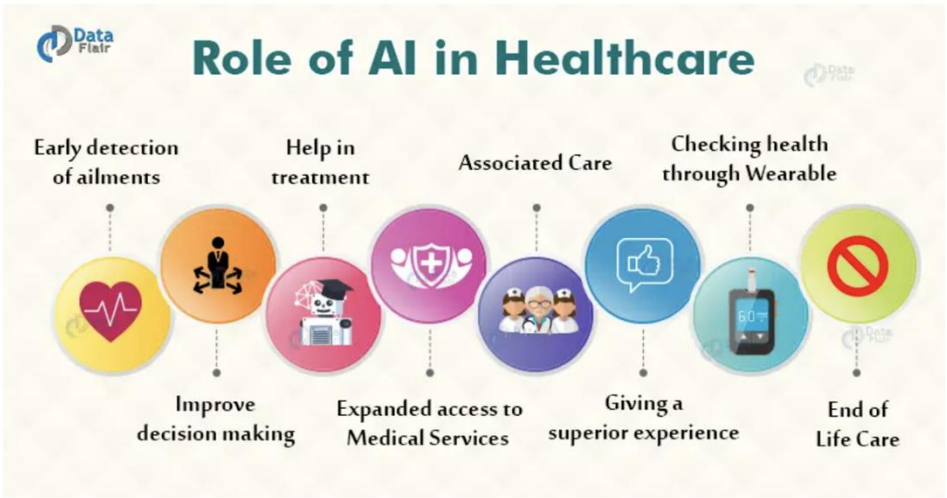


Intraoperative Efficiency

AI-powered closed-loop systems automate drug delivery, adjusting anesthetic dosing dynamically through reinforcement learning and recurrent neural networks, maintaining hemodynamic stability better than manual control.

Real-time physiological signal analysis provides early warning of adverse events such as hypotension.

Computer vision tracks surgical progress, anticipates high-stimulation events, and alerts anesthesiologists to prepare accordingly, improving teamwork and intraoperative response.



Postoperative Efficiency

Predictive algorithms identify patients at high risk of complications like respiratory depression or infection, enabling targeted interventions.

AI-integrated wearable sensors allow continuous remote monitoring post-discharge, facilitating early detection of deteriorations and reducing preventable readmissions.

AI aids in optimizing pain management and patient rehabilitation through natural language processing and outcome prediction models.

Summary of Benefits

Personalized anesthetic care through data-driven risk prediction

Automation and ***fine-tuning*** of anesthetic administration

Enhanced ***communication*** and anticipation between surgical and anesthetic teams

Early identification and management of postoperative risks

Integration with smart monitoring devices for ***continuous patient oversight***

Impact on Workflow and Outcomes

AI reduces cognitive load and stress for surgical teams by providing decision support.

It shortens hospital stays and accelerates patient recovery by minimizing intraoperative trauma through precise interventions.

Educational applications include personalized training and feedback for surgical and anesthetic skill improvements.

Primary KPIs Reflecting Patient Safety

Complication Rates:
Tracking postoperative complications such as respiratory depression, nausea and vomiting, and hypoxemia provides direct measures of safety improvements. AI systems that reduce these rates demonstrate enhanced patient safety.

Intraoperative Hemodynamic Stability:
Monitoring the percentage of time patients remain within targeted blood pressure and oxygenation ranges offers insight into the effectiveness of AI-driven real-time management systems like closed-loop drug delivery and physiologic monitoring.

Adverse Event Incidence:
Frequencies of intraoperative events such as hypotension, excessive blood loss, or airway complications serve as critical safety KPIs influenced by AI alert systems and predictive analytics.

Postoperative Morbidity and Mortality:
Measuring changes in morbidity (e.g., infection, organ dysfunction) and mortality rates enables assessment of long-term safety benefits associated with AI-guided perioperative care pathways.

Patient Satisfaction Scores:
Patient-reported outcomes, including experience and comfort, can indirectly reflect safety improvements, especially when AI helps reduce complications like nausea, pain, or delayed recovery.

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