

Supplementary Figure 1. Trends in publications and citations of AI in anesthesiology (2004–2024). (A) Annual publication and citation trends in the field of AI in anesthesiology from 2004 to 2024. The number of publications (bars, left axis) and total citations (line, right axis) show a significant rise over the past five years, with a sharp increase in 2024. (B) Polynomial regression modeling based on annual publication data from 2004 to 2023 predicts a sustained growth trajectory. The exponential model fitted to the complete 2024 dataset (orange dashed line) further supports this trend, showing a steeper curve consistent with accelerating research momentum in the field.



Supplementary Figure 2. Annual publication trends (2004–2024) in the field of AI in anesthesiology by country. The United States shows a consistently dominant growth trajectory, followed by China and South Korea. Other countries, including England, Germany, Japan, and Canada, display moderate but steadily increasing publication activity over the past decade.



Supplementary Figure 3. Journal-based keyword clustering analysis of AI research in anesthesiology. (A) Distribution of 658 articles by journal domain: 452 (68.7%) were published in anesthesiology/pain medicine journals, 82 (12.5%) in engineering/AI journals, and 124 (18.8%) in other specialties such as surgery and pediatrics.

(B) Keyword clustering from anesthesiology/pain journals revealed six major themes: robotic-assisted surgery (dark blue), perioperative management (light blue), regional anesthesia (red), pain management (green), cardiothoracic anesthesia (brown), and neuroanesthesia (mint green). These clusters reflect alignment with real-world clinical challenges in anesthesia.

(C) Keyword clustering from engineering/AI journals highlighted four dominant themes: perioperative hypotension (light blue), AI-driven electroencephalogram (EEG) analysis (green), perioperative airway management (red), and pharmacological management (dark blue), emphasizing methodological innovation and predictive modeling in anesthetic care.

