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THE RISE OF ROBOTICS: A SYSTEMATIC REVIEW OF ROBOTIC GENERAL SURGERY ADOPTION, OUTCOMES, AND INNOVATION (2016–2026)

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Robotic-assisted surgery has revolutionized general surgery during the last ten years, moving from a cutting-edge technology to a widely used method in the foregut, hepatobiliary, colorectal, abdominal wall, and pediatric surgical subspecialties. In order to capture the time of exponential worldwide adoption, the rise of domestic robotic platforms, and the integration of cutting-edge technologies like telesurgery and single-port systems, this systematic review synthesizes published research from January 2016 to March 2026.

Trends in global growth show a notable acceleration. By 2025, there were more than 8,000 surgical robots installed globally, and the number of procedures performed each year had increased by 18% since 2020. China is the fastest-growing market, with over 300 new installations in 2025, while the United States handles over 1.2 million robotic general surgery procedures annually. Currently, 40–60% of complicated minimally invasive general surgery in Europe is done robotically in France, Germany, and Italy. Belarus, which carried out its first robotic liver resection in 2026, is an interesting case study in strategic adoption. Belarus became a regional referral center as national robotic general surgery volumes increased from less than 50 cases in 2020 to over 400 in 2025, with three robotic platforms centred on Minsk.

Global adoption is accelerating, as evidenced by significant robotic milestones reached in early 2026. The first robotic hepatic artery infusion pump was installed in January at Sunnybrook Hospital in Canada. An important milestone for hepatobiliary surgery in Eastern Europe was reached in March when Belarus performed its first robotic liver resection in Minsk. Other noteworthy treatments included robotic antireflux surgeries throughout European facilities, extending telesurgery demonstrations using 5G networks for remote proctoring, and single-port robotic cholecystectomies and hernia repairs in teenage patients.

Results unique to a procedure show consistent efficacy and safety. Comparative cohorts show that robotic and laparoscopic methods for antireflux surgery provide similar 12-month symptom remission; however, robotic cases require longer operating times because of docking. Robotic hepatectomy has lower conversion rates and less blood loss than open resection in hepatobiliary surgery. Compared to laparoscopy, robotic proctectomy shows better functional results and reduced conversion rates for colorectal surgery. A systematic evaluation of more than 1,400 patients under 10 kg undergoing gastrointestinal, colorectal, and hepatobiliary procedures in paediatric general surgery revealed a conversion rate of 1.1% and a complication rate of 9.6%. Paediatric patients had single-port robotic cholecystectomy and hernia repair with mean console times < 45 minutes, no problems, and no need for narcotics.

This systematic review provides a thorough synthesis of robotic general surgery in the modern era by combining global adoption statistics with procedure-specific outcomes and technological advancements. These findings provide important insights into the clinical utility and strategic application of robotic systems in a variety of general surgical applications for surgeons, hospital managers, and health regulators.