Costs and Cost-Effectiveness of Robotic-Assisted Surgery in Korea: A Systematic Review and Meta-Analysis

Young Eun Hong [1], Hana Shim [1], Minkyung Shin [1],
[1] Intuitive Surgical Korea, Seoul, South Korea Contact information: Minkyung.shin@intusurg.com

OBJECTIVE

- In this study, we conducted a systematic review of cost and cost-effectiveness studies on robotic-assisted surgery (RAS) in Korea, published over the two decades since RAS was introduced.
- Our objective is to provide relevant stakeholders with the most updated RAS economic evidence to highlight key knowledge gaps, and identify priority areas for future efforts, including real-world data collection methodological improvements, and policy engagements.

METHODS

1. Search Strategy

- We searched Pubmed, Embase and Scopus to identify cost or cost-effectiveness literature of RAS in Korea. The search period spanned from January 1, 2007, to May 8, 2025.
- The search terms we applied for the three databases were: "cost* OR economic* OR financial* OR pric* OR charge* OR billing*) AND (Korea) AND ("robot surgery" OR "robot-assisted*" OR "robotic surgery" OR "robotic-assisted*")".

2. Study selection (PICOs)

- Participants: Patients who had benign or malignant tumors
- Intervention: Robotic-assisted surgery
- Comparators: Open surgery or laparoscopic surgery or endoscopic surgery or video-assisted thoracotomy (VATS)
- Outcomes: Economic outcomes (i.e. total hospitalization cost, operation cost or patient out-of-pocket payment);
- Study design: Observational, cohort or randomized trials

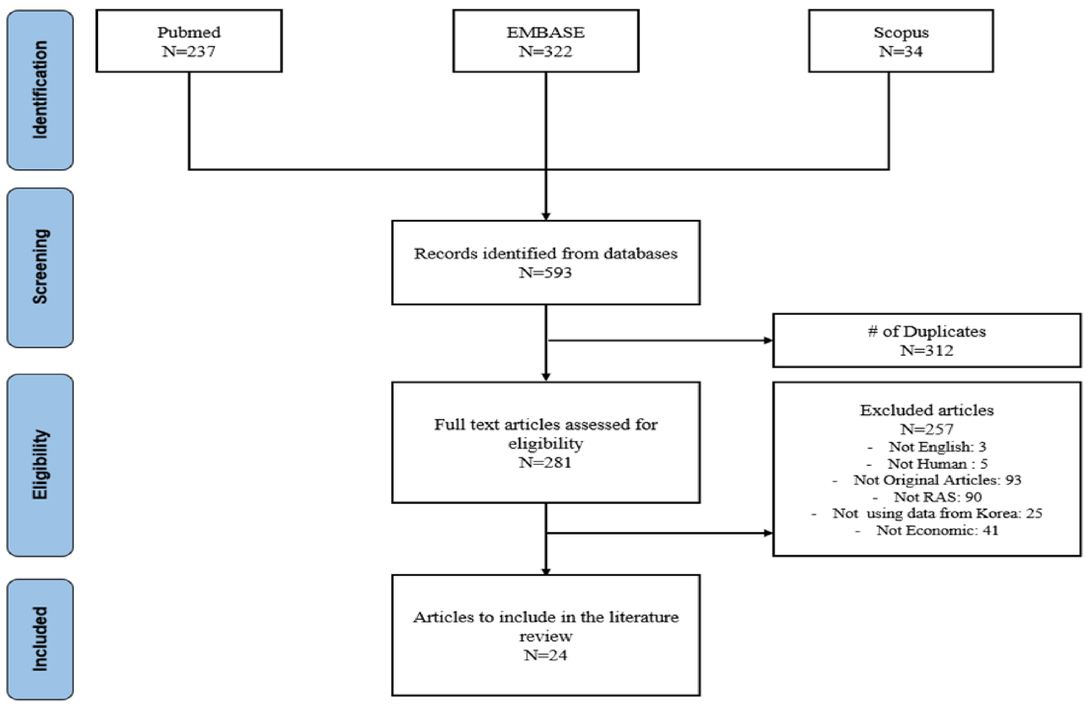
3. Statistical Analysis

- Meta analysis was conducted using Restricted Maximum-Likelihood (REML) random effect model. The analysis was performed with Review Manager (Revman). To assess potential publication bias, funnel plots were generated, and Egger's regression test was conducted.

RESULTS

- A total of 593 publications were identified in the initial search. After removing 312 duplicates and 257 articles that didn't meet PICO criteria, 24 publications were included in this review.

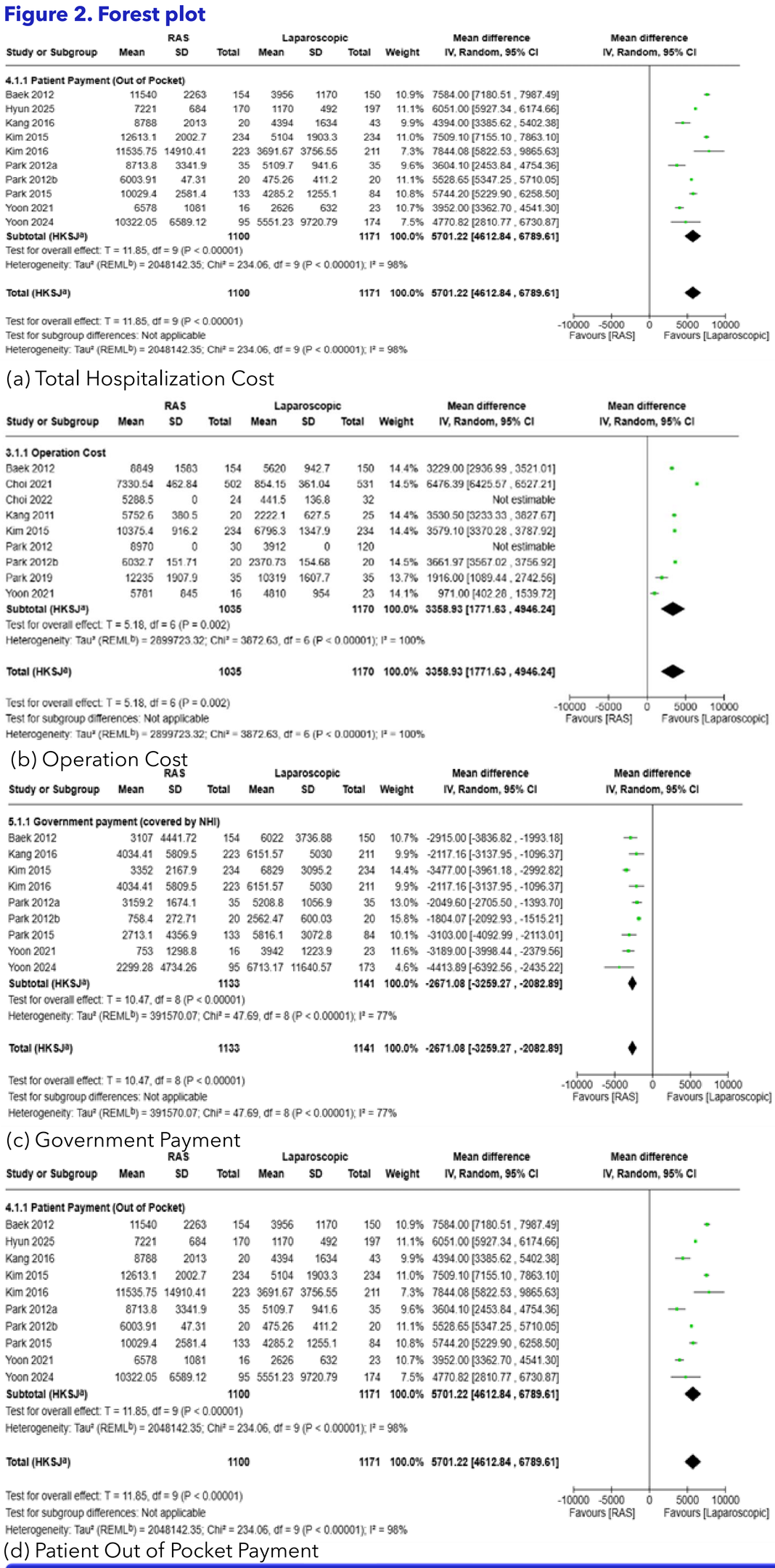
Figure 1. PRISMA Flow Chart



- A total of 7 different surgical specialties were covered. The most frequently represented specialty was colorectal surgery (N=6) followed by Hepato-Biliary Pancreatic (HBP) surgery (N=5), gynecology (N=4), endocrine surgery (N=3), urology (N=3), gastrointestinal surgery (N=2) and thoracic surgery (N=1)

- The pooled mean differences in total hospitalization cost and operation cost were $3,279 [CI $2,414-4,145], and $3,359 [CI $1,771-4,946],respectively, higher for RAS compared to other Minimally Invasive Surgeries (MIS).
- The pooled analysis shows that OOP for RAS was $5,701[CI $4,613-$6,790] higher, while the government payment was $2,671[CI $2,083-$3,259] lower compared to other MIS.

Figure 2. Forest plot



(a) Total Hospitalization Cost

(b) Operation Cost

(c) Government Payment

(d) Patient Out of Pocket Payment

CONCLUSIONS

- This is the first systematic review and meta-analysis to evaluate the economic implications of RAS in Korea.
- Our findings indicate that RAS is associated with higher costs compared with other surgical approaches, yet robust evidence of its long-term cost-effectiveness remains limited.
- As the adoption of RAS continues to expand, generating high-quality real-world data will be essential to inform equitable and evidence-based reimbursement decisions.

INTUITIVE