

Background

- Robotic-assisted surgery (RAS) is praised as a replacement open surgery (OS) & laparoscopic surgery (LS).
- The value of RAS is uncertain. Many studies describe outcomes, little evidence on cost-effectiveness.
- RAS is difficult to assess, issues include: learning curve, organizational impact, dynamic pricing, incremental innovation etc.
- Aim:** explore economic evaluation methods of RAS, with a focus on addressing particular challenges.



Method

- Databases:** PubMed, Cochrane Library, Embase, Ovid MEDLINE
- Search period:** 2015 to 2022
- Inclusion:** all economic evaluations comparing RAS versus LS or OS.
- Extraction:** Consolidated Health Economic Evaluation Reporting Standards (CHEERS) guidelines.

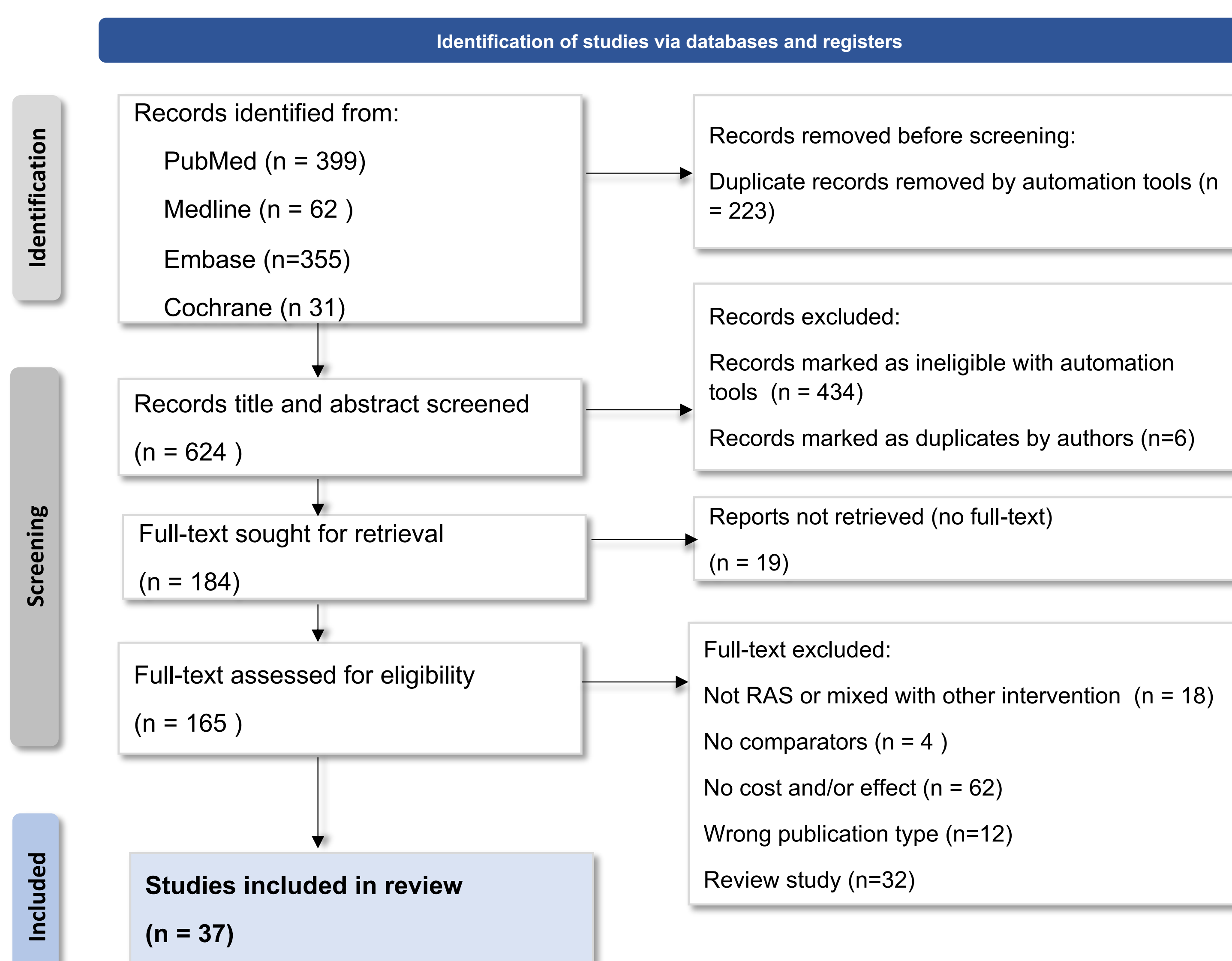


Fig. 1 PRISMA 2020 flow diagram

Result

- 37 studies addressing the economic analysis of RAS were included.

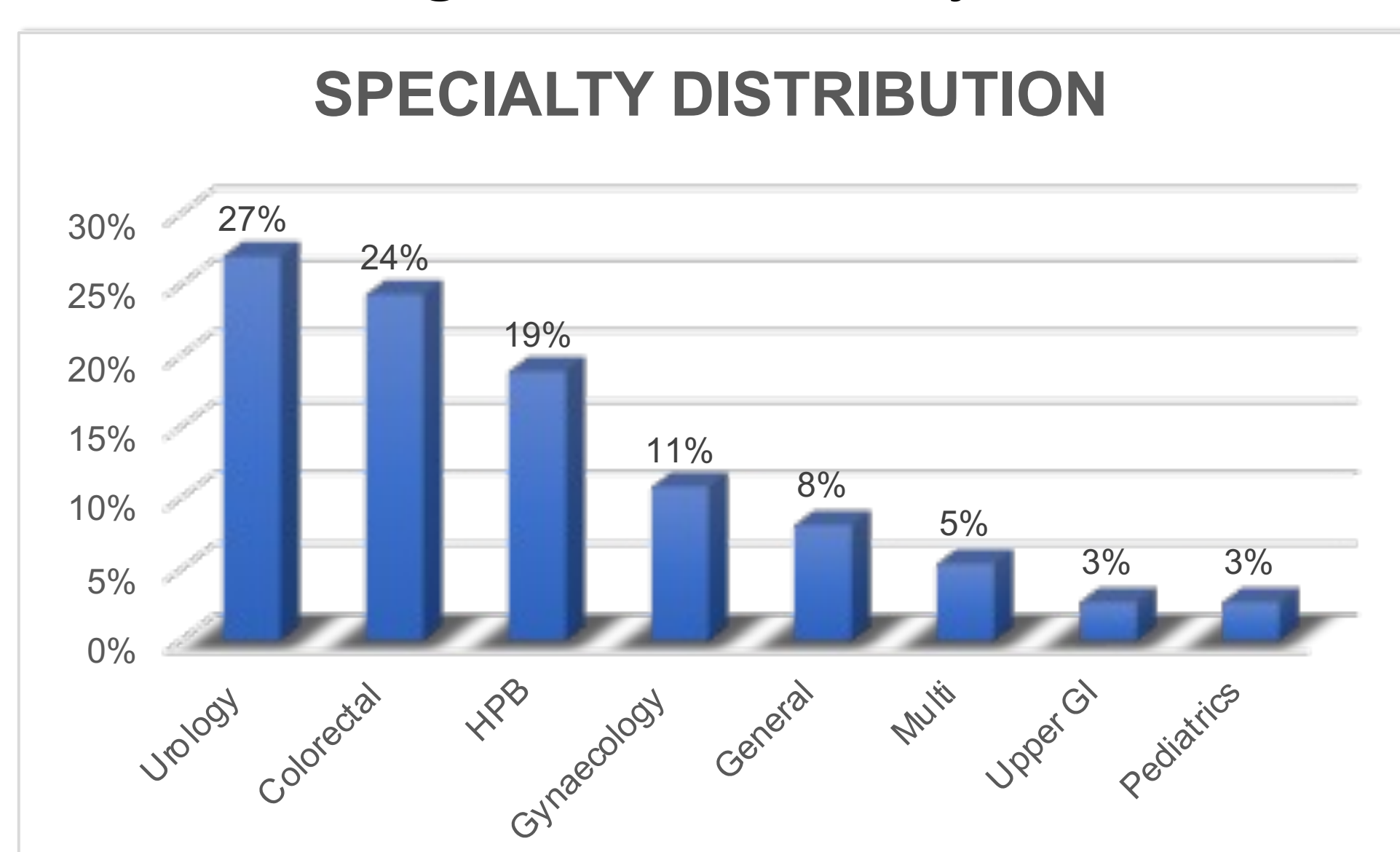


Fig. 2 The use of RAS across different specialties

- Most studies (41%) compared RAS with both LS and with open surgery, followed by comparing with LS (32%) and comparing with open surgery (27%).
- Challenges related to the assessment of RAS were incorporated in some studies.

ECONOMIC EVALUATION METHODS

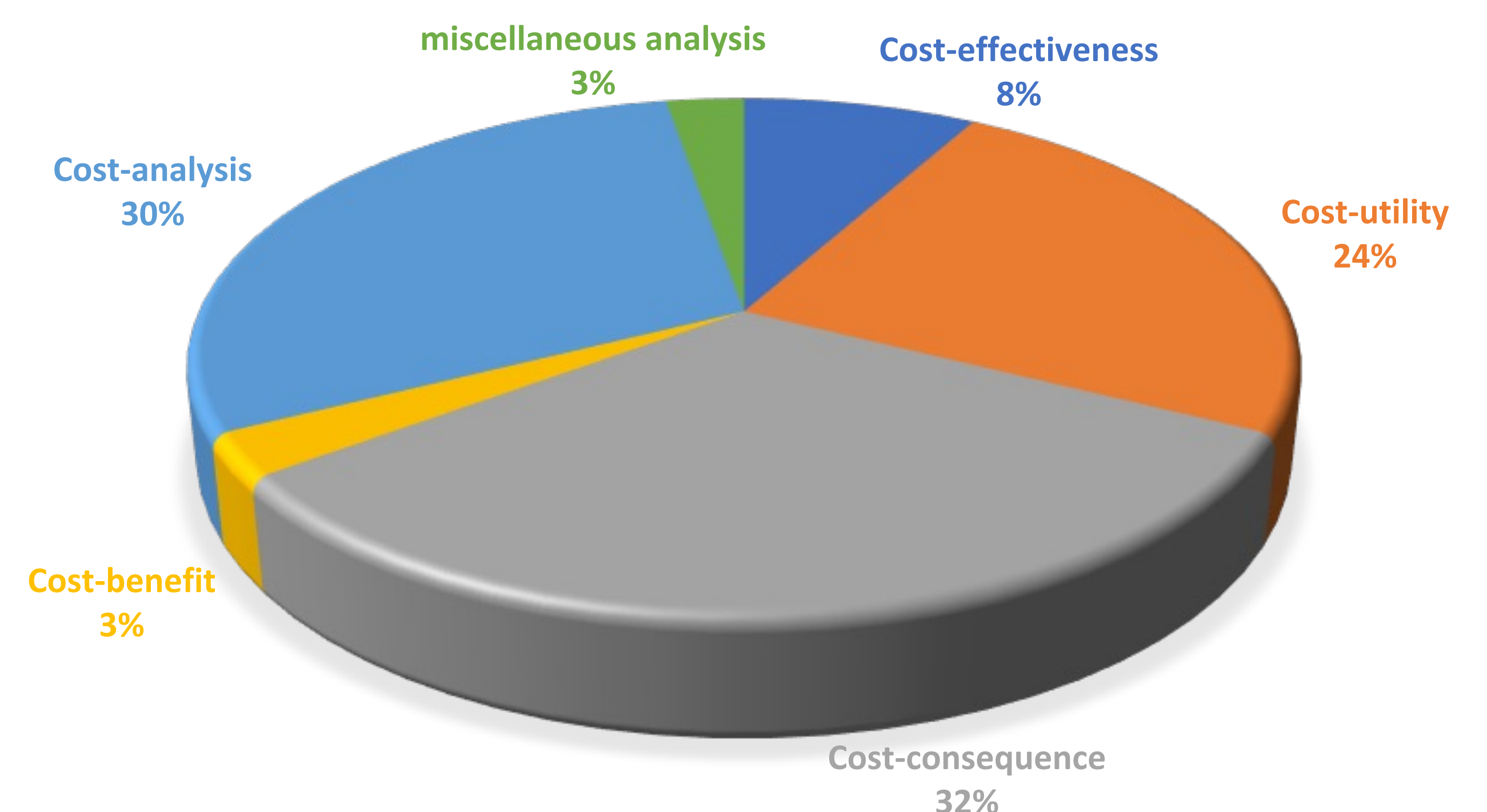
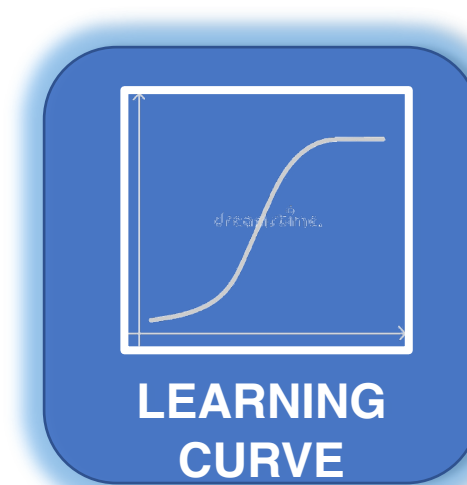


Fig. 3 The economic evaluation methods used on RAS



- 7 studies mention learning curve, only 2 include it. Scenario analyses: different surgical volumes as a proxy



- Such as capital investment in the robotic platform and procedure volume per system, were mentioned in most studies but only 4 studies incorporated it with sensitivity analysis.



- 2 studies: impact of uncertain equipment or instrument prices in sensitivity analyses.



- 1 study: product innovation by using the latest prices for different generations of the surgical system

- CCA was the most commonly applied methodology. This may because of its ability to incorporate multiple outcomes, beyond only cost and QALYs, which are particularly useful for RAS technologies
- 8 CUA/CEA studies: RAS versus surgical methods - RAS cost-effective.
 - 2 did not include the cost of acquisition or maintenance of RAS
 - 3 demonstrated RAS is cost-effective over longer time horizons.

Discussion

- Determining the cost-effectiveness of RAS is challenging due to its application in different specialties, variations in CE thresholds across settings, and the influence of factors like capital costs, choice of comparators, and time horizons
- A predominant focus on specific procedure comparisons within RAS studies was observed.
- Although certain studies incorporated the characteristics associated with RAS, the evaluation rarely accounted for RAS as a platform technology spanning multiple specialties.
- Economic evaluation of RAS should consider the robotic ecosystem on an (established) multi-therapeutic area basis, reflecting the procedural capabilities of the platform.
- Thus, there remains a need to consider this aspect when conducting economic evaluations in order to have more realistic evaluations and comprehensively address the optimal utilization of RAS.