

Introduction

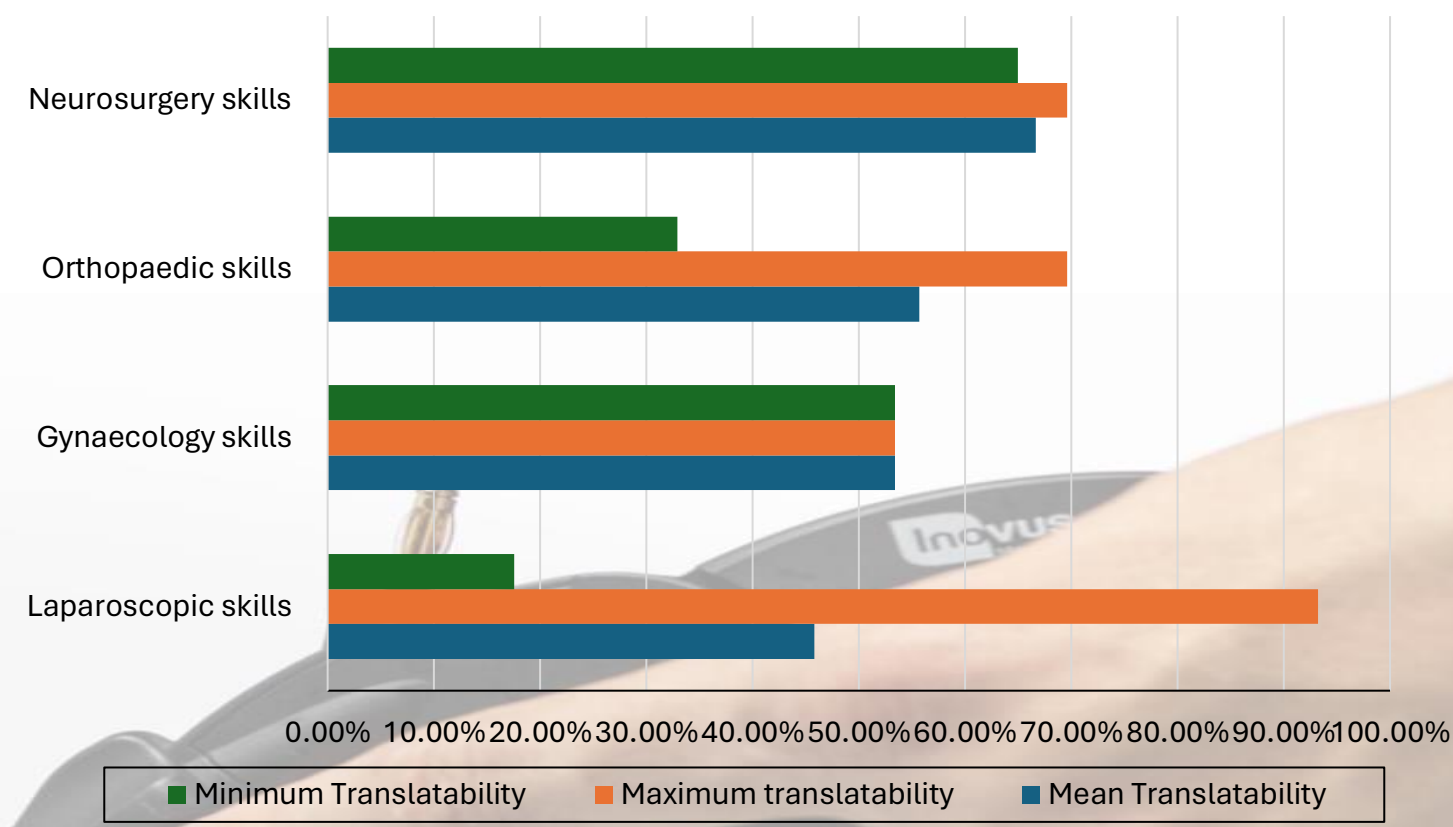
Surgical training is undergoing a revolution with the arrival of Augmented Reality (AR) and Virtual Reality (VR) technologies. These innovative tools create immersive practice environments, but a key question remains unanswered: can surgeons use the skills they learn in AR/VR during actual surgery (Level 3 of Kirkpatrick's Pyramid)?

This systematic review aims to bridge this knowledge gap by investigating the translatability of AR/VR training. By analysing translatability across diverse surgical specialties and skill sets, this study aims to estimate the translatability figures of these different skills using AR/VR-based training.

Methods

- **Systematic Review:** Conducted following PRISMA guidelines to identify relevant studies.
- **Study Selection:** Included studies published between 2010 and 2024 (RCTs, cohort studies, systematic reviews) that evaluated:
- **Skill metrics pre- and post-AR/VR training in clinical settings** (Level 3 of Kirkpatrick's Pyramid)
- **Operative assessment improvements** (e.g., GOALS, OSTAS)
- **Literature Search:** Comprehensive search across PubMed, Embase, and Scopus using pre-defined search terms related to AR/VR and surgical education.
- **Data Analysis:** Thematic analysis focused on:
 - Common surgical skills
 - Surgical specialty skill translatability
 - calculating mean translatability per skill set (Level 3)
- Kirkpatrick's Pyramid for training evaluation
- **Metrics:** Task completion time, error rate, accuracy, distance travelled, and operative assessment scores were used to assess surgical performance translatability.

Translatability of surgical skills across studies



Results



Figure 1. A Kirkpatrick Evaluation Pyramid highlighting outcome 3 satisfied throughout the study.



Notable improvements in operative assessment scores such as **GOALS** and **OSATS** post-training.

Conclusion

Our ongoing systematic review suggests that AR/VR-based surgical training programs hold significant promise. By analysing skill metrics pre- and post-training, as well as operative assessment improvements, this research indicates effective skill translation to real-world clinical practice (Level 3 of Kirkpatrick's Pyramid). These findings highlight the potential of AR/VR technology as a potential new gold standard in surgical education.