

The role of simulation in Microsurgical training: A review of validated assessment tools

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Aim

To comprehensively survey the available literature on validated microsurgical assessment tools and examine their objectivity as well as the complexity and fidelity of the model used.

Methods

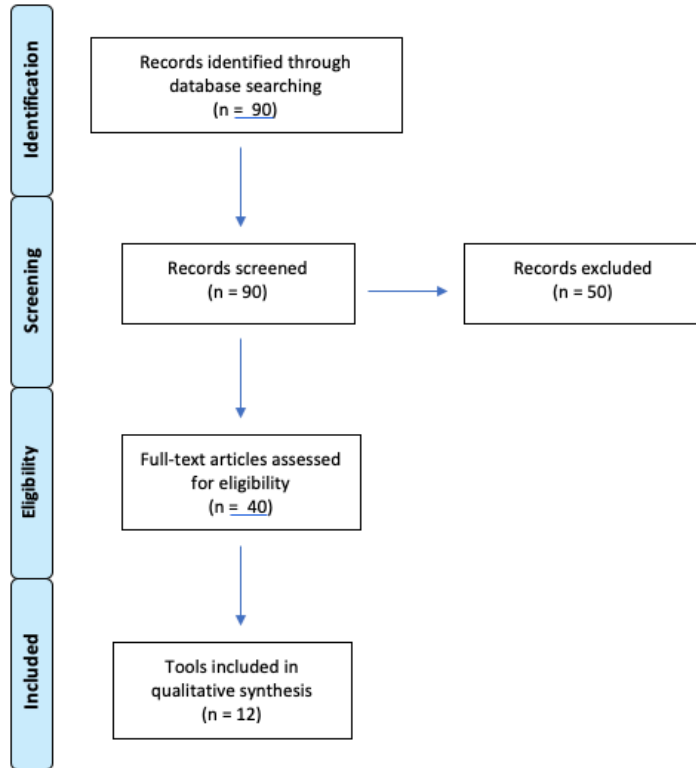
Covidence search

Keywords: 'microsurgery', 'simulation', 'assessment', 'end-product assessment', and 'competence'.

Inclusion criteria: robotic, animal, non-living and synthetic models.

Evaluated for validity, reliability, bias, and the complexity and fidelity of the model.

Methods



Tools Identified

GRS
SAMS
OSATS/Video Modified
UWOMSA
EPIA
ALI
SMaRT
ISSLA
NOMAT
Structured Assessment of Robotic
Microsurgery
ICSAD
Hand Motion Analysis

Results

Assessment Tool	Model	Fidelity	Complexity	Content Validity	Construct Validity	Face Validity	Criterion Validity	Reliability
SAMS	Living non-living	High	Complex	Yes	Yes	Yes	N/A	Interrater
ALI	Non-living Rat aorta	High	Simple	Yes	Yes	Yes	N/A	N/A
<u>UWOMSA</u>	Non-living Chicken thigh vessels	Medium	Simple	Yes	Yes	Yes	Yes	Interrater Intrarater
SMaRT	Non-living Latex glove, penrose drain, chicken foot	Low, High	Simple, Complex	Yes	Yes	Yes	N/A	Interrater
OSATS	Non-living Living	Low, High	Simple, Complex	Yes	Yes	Yes	N/A	Interrater
ICSAD	Non-living Model Eye, Penrose drain	Low	Simple	Yes	Yes	Yes	N/A	Interrater
NOMAT	Non-living Silicone tubes	Low	Simple	Yes	Yes	Yes	N/A	Interrater
EPIA	Non-living Rat aorta	High	Simple	Yes	Yes	Yes	N/A	Interrater
GRS	Non-living Bench model	Low	Simple	Yes	Yes	Yes	Yes	Interrater Intrarater
ISSLA	Non-living Not specified	N/A	Simple	N/A	Yes	N/A	N/A	N/A
Structured Assessment of Robotic Microsurgery	Non-living polyurethane <u>vessels</u>	Low	Simple	Yes	Yes	Yes	No	Interrater

Figure 1. Outline of currently available microsurgical assessment tools

Results

40 articles reviewed, 12 distinct assessment tools identified.

2 were motion tracking devices, 3 involved image analysis and 7 were modified global rating scales.

All achieved content, construct and face validity with 10 demonstrating high levels of interrater reliability.

Only UWOMSA and the GRS achieve criterion validity. These are also the only tools assessed for intrarater reliability.

Conclusions

There are currently 12 validated assessment tools validated for use in microsurgery. Reliability and validity are demonstrated for 11 of the 12 tools with the ISSLA requiring further study before validity can be claimed definitively. The End Product Intimal Assessment tool and the Imperial College of Surgical Assessment device were valid tools for objective assessment of microsurgical skill.