psychomotor assessments of fundamental ability are associated with the future operative performance of surgical trainees

Conor Toale, Donncha M Ryan, Eva Doherty, Oscar J Traynor, Marie Morris, Dara O Kavanagh
Department of Surgical Affairs, Royal College of Surgeons in Ireland

Introduction: Assessments of visuospatial, psychomotor and perceptual ability correlate with simulated operative performance. This study investigates the association between fundamental technical ability and future operative performance as measured through both in-theatre and simulation-based assessments.

Methods: Core surgical trainees in the Republic of Ireland recruited from 2016–2019 participated in validated assessments of fundamental technical ability; Pictorial Surface Orientation (PicSOR) testing of
perceptual ability, ‘paper-based’ visuospatial aptitude assessments, and psychomotor testing using a grooved pegboard. Operative performance was assessed using the in-theatre Supervised Structured Assessment of Operative Performance (SSAOP) tool, and Operative Surgical Skill (OSS) assessments (multi-station simulation-based assessments) performed over a 2-year core training period. SSAOP assessments were scored using a 15-point checklist and a global 5-point Operative Performance score. Univariate (Pearson) correlations and multiple linear regression were used to explore the association between fundamental ability and operative performance, controlled for both operative experience and centile scores from the trainee’s undergraduate medical degree.

**Results:** Aggregated fundamental ability scores strongly correlated with performance in all submitted SSAOP assessments using the Total Checklist score \( (B = 0.75, t(168) = 3.17, p = 0.002) \) and weakly correlated with Overall Performance scores \( (B = 0.04, t(168) = 3.16, p = 0.002) \), independent of operative experience and centile scores. Fundamental ability scores were also predictive of OSS assessment scores on multivariate analysis \( (B = 0.219, t(168) = 2.22, p = 0.03) \).

**Conclusion:** Fundamental technical ability is predictive of future performance in both in-theatre workplace-based assessments of operative skill and simulation-based assessments of operative performance.