The Stanford Microsurgery and Resident Training (SMArT) Scale: Validation of an On-Line Global Rating Scale for Technical Assessment

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Introduction: Plastic surgery education has traditionally been built on the apprenticeship model, where experts teach skills to novices using real patients. While this is a well-established process, there are limitations and areas for improvement to maximize the educational benefit of residents and to optimize patient safety. We have previously reported results of our online training program, showing that residents who had access to our novel website significantly improved both their cognitive and technical skills. The second part of our study provides an objective means for expert evaluators to reliably rate trainees’ technical skills under the microscope.

Methods: “Microsurgery Essentials” (http://smartmicrosurgery.com) is our novel on-line curriculum providing basic information and training on microsurgery. The website has step-by-step instructions, as well as multiple intra-operative videos narrated by senior faculty. Residents were randomly divided into two groups: one group reviewed this online resource and the other did not. Pre- and post-tests consisted of videotaped microsurgical sessions in which the trainee performed “microsurgery” on 3 different models: latex glove, penrose drain, and the dorsal vessel of a chicken foot. The videotapes were reviewed and graded by expert senior level surgeons using our novel global rating scale. The SMArT scale consists of nine categories graded on a 5-point Likert scale. Results were analyzed with ANOVA and student’s T-test, with p<0.05 indicating statistical significance.

Results: Seventeen residents participated in the study, ranging from PGY-1 to PGY-6. The SMArT scale adequately differentiated the performance of more experienced senior residents (PGY-4 to PGY-6, total average score = 3.43) from less experienced junior residents (PGY-1 to PGY-3, total average score = 2.10, p<0.0001). This differentiation confers validity. There were no significant differences in scoring among all three evaluators (p>0.05). This consistency indicates strong inter-rater reliability. Additionally, junior residents who had access to our website showed a significant increase in their graded technical performance by 0.7 points when compared to residents who did not have access to the website who showed an improvement of only 0.03 points (p=0.01).

Conclusions: Our SMArT scale is valid and reliable in assessing the microsurgical skills of residents and other trainees. As self-directed online education becomes more and more the norm, our efficient and easy-to-use global rating scale ensures that residents are achieving appropriate technical milestones.

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