Observational Learning During Simulation-Based Training in Arthroscopy: Is It Useful to Novices? *

Marie-Eve LeBel, MD, MHPE, FRCSC,* John Haverstock, MD, FRCSC,*,† Sayra Cristancho, PhD,† Lucia van Eimeren, MSc,‡ and Gavin Buckingham, PhD§

*Division of Orthopaedic Surgery, Western University, London, Ontario, Canada; †Centre for Education, Research & Innovation, Western University, London, Ontario, Canada; ‡Schulich School of Medicine and Dentistry, Western University, London, Ontario, Canada; and §The Brain and Mind Institute, Western University, London, Ontario, Canada

OBJECTIVE: Observing experts constitutes an important and common learning experience for surgical residents before operating under direct guidance. However, studies suggest that exclusively observing experts may induce suboptimal motor learning, and watching errors from non-experts performing simple motor tasks may generate better performance. We investigated whether observational learning is transferrable to arthroscopy learning using virtual reality (VR) simulation.

SETTING/DESIGN: In our surgical simulation laboratory, we compared students learning basic skills on a VR arthroscopy simulator after watching an expert video demonstration of VR arthroscopy tasks or a non-expert video demonstration of the same tasks to a Control group without video demonstration. Ninety students in 3 observing groups (expert, non-expert, and Control) subsequently completed the same procedure on a VR arthroscopy simulator. We hypothesized the non-expert-watching group would outperform the expert-watching group, and both the expert/non-expert groups to outperform the Control group. We examined performance pretest, posttest, and 1 week later.

PARTICIPANTS: Participants were recruited from the final year of medical school and the very early first year of surgical residency training programs (orthopaedic surgery, urology, plastic surgery, and general surgery) at Western University (Ontario, Canada).

RESULTS: All participants improved their overall performance from pretest to retention (p < 0.001). At initial retention testing, non-expert-watching group outperformed the other groups in camera path length (p < 0.05) and time to completion, (p < 0.05), and both the expert/non-expert groups surpassed the Control group in camera path length (p < 0.05).

CONCLUSION: We suggest that error-observation may contribute to skills improvement in the non-expert-watching group. Allowing novices to observe techniques/errors of other novices may assist internalization of specific movements/skills required for effective motor performances. This study highlights the potential effect of observational learning on surgical skills acquisition and offers preliminary evidence for peer-based practice (combined non-experts and experts) as a complementary surgical motor skills training strategy. (J Surg Educ 2017; 12:1187-1193. © 2017 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY INDEXING TERMS: Observational learning, Motor learning, Surgical simulation, Arthroscopy, Orthopaedic surgery, Error observation

COMPETENCIES: Patient Care, Practice-Based Learning and Improvement

INTRODUCTION

Surgical skills training has a direct and significant effect on patients’ well-being and quality of care,1,2 as surgical
Surgical learning needs innovative techniques to meet the modern challenges of skill acquisition. Learning by observation of error-laden performances done by other novices is a novel idea that contradicts the commonly held belief that motor skills are best learned by observing and imitating experts. The purpose of this study was to examine the learning of surgical skills by measuring and comparing basic arthroscopic skills performance on a VR surgical simulator by students who observed either an expert or non-expert demonstrating the task (expert-watching or non-expert-watching), versus a control group who received no such intervention. We hypothesized enhanced learning and superior performance metrics of simulated knee arthroscopy following the observation of non-expert (high error) performance in comparison to the control group (no observation) or the observation of expert (low error) performance.

**MATERIALS AND METHODS**

**Participants**

Eligible participants were recruited from the final year of medical school and the very early first year of surgical residency training programs (orthopaedic surgery, urology, plastic surgery, and general surgery) at Western University (Ontario, Canada). All subjects were between the ages of 18 to 40, spoke English fluently and were screened to ensure that they had no prior experience with arthroscopic surgery, endoscopic surgery, or any form of surgical VR simulation. Most participants had baseline understanding of arthroscopic surgery, but had not seen or used the arthroscopic instruments or an arthroscopy simulator. The sample size was estimated from previously published study, which examined the effect of active observation on the learning of a simple motor task. After informed consent, research assistants randomly assigned subjects to either the expert-watching, or non-expert-watching groups by coin toss. A Control group was added later to account for the effect of practice alone without observational learning.

The study included 2 testing sessions (discussed in sections later). Session 1 included a pretest (Test 1), intervention/rest and posttest (Test 2). Session 2 occurred 1 week later and included a retention test (Tests 3-5). The retention test was performed three times to evaluate the maintenance and recovery of skills after a resting period.

**Simulator and Videos**

The insight ARTHRO-VR (GMV, Spain, now called ArthroMENTOR, Symbionix, Ohio) is a validated VR arthroscopy simulator that was used in the creation of the non-expert and expert instructional videos (“Novice” and “Expert” videos) and for data collection during this study. This simulator uses phantoms of a leg and a shoulder as well as a set of instruments (camera, probe, shaver, and grasper)
دریافت فوری متن کامل مقاله

امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات