

SURGICAL SKILLS ASSESSMENT WITH A VIRTUAL REALITY SIMULATOR AFTER AN INTENSIVE LAPAROSCOPIC TRAINING COURSE FOR GENERAL SURGEONS

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Introduction: Virtual reality simulators provide objective performance data which can be used for formative assessment. Intensive training courses are one of the options for skills acquisition in a safe environment. Nevertheless, these courses must be objectively validated as useful training tools.

Aims: Our objective was to assess the surgical skills development through a basic intensive hands-on course in laparoscopic surgery for general surgeons with a virtual reality simulator.

Methods: After obtaining the ethics committee approval, ten novice general surgeons enrolled this study. They attended an intensive basic course consisting of physical simulator (1 day) and animal training (2 days). Several *in vivo* laparoscopic techniques (Nissen fundoplication, intestinal anastomosis, etc.) were practised by each surgeon. Before and after the course, all attendants performed the following two tasks on LAPMentor™ virtual reality simulator: hand-hand coordination and a cholecystectomy task, consisting of clipping and cutting cystic artery and duct. Different metrics were registered in order to assess their skills: time, number of movements, path length and speed of movements. Measurements were statistically analysed using the Wilcoxon test, due to the non-parametric nature of the data.

Results: After the course, surgeons performed both tasks in LAPMentor™ faster (hand-hand coordination, $p=0.000$; cholecystectomy, $p=0.008$). Number of movements was significantly reduced in hand-hand coordination task (right instrument, $p=0.003$; left instrument, $p=0.003$) and cholecystectomy task (right instrument, $p=0.025$). On the other hand, speed of movements was increased in hand-hand coordination task (right instrument, $p=0.007$; left instrument, $p=0.003$) and cholecystectomy task (right instrument, $p=0.004$). Finally, significant differences were observed for path length in the hand-hand coordination task (right instrument, $p=0.029$; left instrument, $p=0.007$) and cholecystectomy task (right instrument, $p=0.037$).

Conclusions: Intensive hands-on training courses on laparoscopic surgery produce a significant improvement in surgical skills, which can be measured by virtual reality simulator LAPMentor™. This kind of simulation provides training feedback and acquisition of skills satisfactorily.

