ORIGINAL ARTICLE

French intensive training course in laparoscopic surgery (HUGOFirst) on live porcine models: Validation of a performance assessment scale and residents' satisfaction in a prospective study

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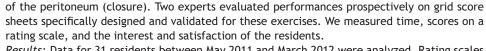
Summary

Introduction: Simulation as a method for practical teaching of surgical residents requires objective evaluation in order to measure the student's acquisition of knowledge and skills. The objectives of this article are to publish our evaluation and validation grids and also the measure of student satisfaction.

Method: A teaching platform based on practical exercises with a porcine model was created in 2009 at seven French University Hospitals. Three times a year, 31 Diplôme d'Études Spécialisées Complémentaires (DESC) surgical residents underwent timed assessment of the performance of five surgical tasks: trocar insertion (trocars) testing the convergence of instruments (convergence), intra-corporeal knot tying (knots), running of the small intestine to find a lesion (exploration), and performance of a running suture closure

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of the peritoneum (closure). Two experts evaluated performances prospectively on grid score sheets specifically designed and validated for these exercises. We measured time, scores on a rating scale, and the interest and satisfaction of the residents.

Results: Data for 31 residents between May 2011 and March 2012 were analyzed. Rating scales were statistically validated and correlated (Kappa correlation coefficient $K > 0.69$) for each task. The performance times of the most experienced residents decreased significantly for all tasks except for small bowel exploration ($P = 0.2$). After four sessions, times were significantly improved with better quality (fewer errors and higher average scores [> 88%]), regardless of the residents' experience. Of the participants, 92% were satisfied, 86% thought that the sessions improved their technical skills and 74% thought it had a favorable impact on their clinical practice.

Conclusion: This study shows that the performance of surgical techniques can be improved through simulation, that HUFEG grids are valid, and that this teaching program is popular with surgical residents.

Introduction

Surgical apprenticeship has changed significantly over the last 10 years. The traditional apprenticeship model in the operating room: ''See one'', ''Do one-under the control of a senior'', and ''Do one with complete autonomy'' is less and less applicable in current practice. It presents two potential limiting factors: it demands much time of the teacher and it decreases the efficient use and profitability of the operating room [1]. For these reasons, many surgical teaching services have adopted simulation surgery to help students acquire preclinical skills in technical areas such as laparoscopic surgery [2].

To be recognized and validated, an educational simulation method must be evaluated [3,4]. Kirkpatrick describes four levels for validation of a curriculum [5,6]:

- the first level is satisfaction of the learner, who must become engaged in the process and find an educational interest that increases his knowledge;
- the second level concerns the objective assessment of improved theoretical and technical knowledge;
- the third level determines whether the simulation results in a change in usual practices;
- the fourth level concerns the impact of such training on clinical practice with patients.

While several series in the literature [7,8] have shown that resident participation in such training is not a problem, it has been difficult to find a non-subjective assessment tool. The establishment and validation of objective rating scales, within the context of a surgical education program remains a challenge [9—11].

In 2009, we created a model for teaching basic laparoscopic surgical tasks in a porcine animal model called HUGOFirst (University Hospitals of Western France for Resident Teaching through Repetitive Training by Simulation Techniques) that meets the first two levels of Kirkpatrick's pyramid. To evaluate this, we had to design our own rating scales (HUGOFirst Evaluation Grids [HUFEG]) and a Satisfaction Questionnaire for the surgical residents.

In this study, we describe these grids and their validation, as well as the performance and satisfaction of the surgical residents.

Material and methods

In 2009, our team at Poitiers set up educational sessions where each resident performed basic laparoscopic tasks on a porcine model. Initially, only a few residents at Poitiers could participate in these daylong training sessions, which were offered six times a year. This training was quickly extended to all hospitals in the HUGO region (Hôpitaux Universitaires du Grand Ouest), namely Nantes, Angers, Tours, Rennes, Brest, and eventually Limoges. The sessions have evolved into a 2-day educational program with a prospective evaluation at each session. The evaluation grid (HUFEG) was designed specifically for this training (Fig. S1) and required the agreement of a panel of experienced surgeons from the HUGO region because, for each task, it was necessary to determine the relevance, logic and completeness required. The experts had to agree on an ''ideal'' surgical intervention, without regard for their personal preferences, but being as objective as possible. Twelve versions were tried before finalizing the HUFEG grids.

The sessions were organized in Elancourt (Yvelines, 78, France) at the Covidien® European Center, which maintains a porcine animal-model surgery center. All animals were anesthetized by a certified veterinarian and surgery was performed under ethical conditions, in accordance with French laws on animal experimentation.

The sessions began with a 30 min didactic meeting for the residents explaining the theory of the course and the different tasks to be performed. Residents were divided into two-person teams by the experts in order to combine residents with similar levels of experience from the various centers. These teams then participated in four 3 h sessions during which they performed, in turn, the various surgical tasks. Two experts who did not know the students carried out a blind evaluation. Five tasks were considered:

- the insertion of trocars (trocars);
- testing of instrument convergence (convergence);
- tying of intra-corporeal knots (knots);
- running the intestine to find a lesion (exploration);
- and performance of a running suture closure of the peritoneum (closure).

Each exercise was timed and the HUFEG grid was filled out with positive, negative or zero scores. Best possible