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Evaluation of a Web Course on the Basics of Gynecological Laparoscopy in Resident Training

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OBJECTIVES: Reduction in the number of gynecological operations has made resident training more difficult in gynecological surgery. We used electronic educational material to supplement traditional apprentice model in resident surgical education. Our aim was to evaluate effectiveness of a web-based course in knowledge gaining among residents with various levels of clinical experience.

DESIGN: In prospective interventional study, the level of knowledge was assessed before and after taking the course.

SETTING: All Finnish residents in obstetrics and gynecology were invited to participate.

PARTICIPANTS: Fifty-eight voluntary residents from all 5 University districts were allocated in 3 groups according to the experience.

RESULTS: Fifty-eight residents replied to the precourse questionnaire, and 33 (57%) of them filled in the postcourse questionnaire. Significant knowledge gain was detected in each experience group. In the less experienced group, the mean score (max: 110) increased from 81.9 to 89.3 ($p = 0.009$), in the middle group from 90.4 to 97.9 ($p = 0.003$), and in the most experienced group from 94.8 to 100.0 ($p = 0.017$). The participants rated the usefulness of the course as 4.8 in the Likert scale 1 to 5, and all intended to return to the course.

CONCLUSIONS: We found a significant increase in scores in every level of clinical experience. Thus, the course could be used as an educational tool. (J Surg Ed ▮:▮▮▮-▮▮▮. © 2016 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgical education, resident education, e-learning, theoretical knowledge, laparoscopy

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COMPETENCIES: Patient Care, Medical Knowledge, Practice-Based Learning and Improvement

INTRODUCTION

Gynecological surgery has changed during recent decades as laparoscopy became more popular. In addition, educational reforms and restrictions on working hours have caused a significant reduction in surgical hands-on training exposure,[1] and at the same time, the increased use of endoscopic surgery has made training even more challenging and time-demanding. The surgical caseload, especially the proportion of benign surgery in Finland (statistics of the National Institute for Health and Welfare in Finland), has also decreased. Thus, relying only on operating room experience is insufficient to fulfil current demands for surgical education and training.

The residents should have basic surgical knowledge and skills before entering the operating room to benefit most from the actual operations. This would also allow the residents to focus on the precise case, on nontechnical skills, and on teamwork. Psychomotor skills are best learned with simulators, and various methods have been implemented for training technical skills.[2-4] Theoretical knowledge has traditionally been gained from books, lectures, and courses, alongside clinical work.[5] These sources are currently being partially replaced by information technology; the new generation is more technology-oriented[6] and more motivated to seek information from electronic media.[7]

Electronic learning (e-learning) offers new possibilities for surgical education with modern methods such as blended learning, spaced education, and flipped classrooms. E-learning has many advantages compared to traditional sources. The former allows for versatile use of pictures, videos, animations, and texts. Web courses are easy to access and update, allowing personalized learning.[8] Moreover, the course material is standardized, and an instructor's attendance is not required.[9,10] Disadvantages include high initial cost, need for programming

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expertise, and the requirement of a high-speed Internet connection for the users.[8]

Many published endoscopic curricula have their own cognitive portions. Fundamentals of laparoscopic surgery in the United States is designed widely for residents in general surgery, urology, and gynecology,[2,11] and in Europe the European certification program of the European Academy of Gynecological Surgery for gynecologists.[3] As individual countries may have specific national customs in practicing medicine, it is important to have a national cognitive course. Thus, with our web-based course with online testing, covering all basic areas of laparoscopic surgery, our aim was to evaluate its effectiveness for residents at various levels of clinical experience.

MATERIALS AND METHODS

The web-based, "*Basics in Gynecological Laparoscopy*," was developed in collaboration with the Finnish Medical Society Duodecim and the Finnish Society of Gynecological Surgery. Duodecim produces clinical guidelines, as well as web-based courses, and it also evaluates continuous medical education and supports research. Development of our web-based course started in May 2010, and the course was available on the Internet[12] by February 2012. In addition to the Duodecim coordinator, our project group was composed of 7 experts in gynecological surgery. The composition of the course included both basics in gynecological laparoscopy and advanced information for specialists. The contents of the course are divided into the following 6 parts: pelvic anatomy, instrumentation, operative phases, gynecological operations, complications, and training possibilities (Table 1). The course contains abundant photos and videos in addition to written explanations. After completion of the course, there is a web-based test.

At the time the course was published, an effectiveness study was carried out: the level of knowledge was assessed before and after taking the web course. An invitation to participate was sent via e-mail in autumn 2011 to all obstetrics and gynecology (OB/GYN) residents under the Finnish Society of Obstetrics and Gynecology. The resultant list comprised 154 persons, but because in Finland the registration for specialist training is unregulated, the correct number of OB/GYN residents at a given time was not known.

Two questionnaires were made to cover the most important areas of the topic with 29 mainly multiple-choice questions (Appendices 1 and 2). Each area was graded from 0 to 6, and the total score was 110. Questions were chosen among test questions in the main web course. The first questionnaire was sent in December 2011 to voluntary participants with 2 reminders. In the e-mail there was a link to the Internet-based query, which was to be filled in as a one-time examination. The participants received another information letter at the beginning of 2012 and were instructed to complete the course after its release in February 2012. The second questionnaire as a link with one-time examination was sent in May 2012 to those who filled in the first questionnaire, again with 2 reminders. The entire study was web-based and anonymous.

In the first questionnaire, the participants were asked about demographics (sex, age, medical faculty, working history, number of laparoscopic surgeries done, and use of specific surgical simulators). In the second questionnaire, we asked if they had worked in a surgical unit during the study (due to specialization) and for how long, how they graded the course (usefulness of the course on the Likert scale 1-5), and whether they intended to repeat the course.

Equivalent difficulty of the 2 questionnaires was demonstrated by a crossover design with statistical tests: prior to the course, half of the participants received questionnaire A while the others received questionnaire B in random order. After the course, each participant received the other questionnaire than the one in the beginning. At the pretest situation, groups A and B were equal in training time in OB/GYN ($p = 0.297$), in experience in operations done ($p = 0.964$), and in questionnaire scores ($p = 0.122$). The scores in the questionnaires correlated strongly to training time in OB/GYN ($r = 0.668$, $p < 0.001$) and in surgical experience ($r = 0.557$, $p < 0.001$). The construct validity was also demonstrated in the Kruskal-Wallis test, which revealed statistical significance in scores across experience in time in OB/GYN ($p < 0.001$) and in surgical experience ($p < 0.001$).

To evaluate the interest in our web-based course more widely, number of downloads of different web course pages were obtained from Duodecim concerning the first 3-year period after the publication of the course. The number of downloads was available only if the page was among the 500 most downloaded pages of their 61 web courses.

Ethics Approval

The study plan was approved by the Helsinki University Hospital Ethics Committee (Dnro 390/13/03/03/2012).

Statistical Analysis

For the statistical analysis, the participants were allocated into 3 groups according to clinical experience, determined as training time in OB/GYN (<18 mo, 18-36 mo, or >36 mo).

Statistical analysis was done with SPSS 21.0 statistical software (Chicago, IL). To investigate the equality of questionnaires A and B, we used the Independent-samples *t*-test for parametric continuous variables and the chi-square test for independence for nonparametric categorical variables. In the construct validity study for questionnaires, we used the Pearson Correlation test for parametric and the