



From the dry lab to the operating room: the first transferability study of hysteroscopic skills

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Abstract

Objective The aim of this study is to prove that a short dry lab training prior to the surgery is efficient to acquire basic hysteroscopic skills and that these skills are transferable directly to the operation theater.

Methods Thirty-nine gynecologists who never attended a training course or practiced hysteroscopy before were evaluated. Participants were randomly divided into trainees ($n=21$) and control ($n=18$). Trainees attended a short time dry lab prior to the exposure to the OR. The controls went directly to the OR. Participants were asked to identify the different landmarks of the uterine cavity and to perform a punch biopsy under the supervision of a gynecologist expert in hysteroscopy. A video recording for all the exercises was done, and showed independently to two expert surgeons in hysteroscopy for evaluation. The experts were also asked to distinguish between the trainees and the control.

Results For both experts, the trainees' performance was statistically better than that of the controls ($p < 0.001$) for the identification of the uterus land marks and the punch biopsy. The two experts identified 80.9 and 85.7%, respectively, of the trainees. The participants' subgroup ID and the experts' identification were statistically correlated ($p < 0.001$).

Conclusion A short time dry lab is efficient to acquire basic hysteroscopic skills and these skills are transferable directly to the OR.

Keywords Hysteroscopy · Basic psychomotor skills · Hysteroscopic training · OR training

Hysteroscopy is a common gynecological surgical procedure that has been recently approved for multiple diagnostic and therapeutic purposes [1, 2]. It is not a simple procedure as it requires training for a specific set of advanced psychomotor skills. It is fundamental for gynecologists to flawlessly manipulate the hardware available and manage eventual complications [3].

In developed countries, gynecologists receive adequate hands-on training prior to their surgical interventions [4–6].

In developing countries, the lack of training programs remains the major handicap in performing mini-invasive surgeries. Furthermore, physicians do not have the opportunity to travel abroad for fellowships due to the political situation of some countries. Therefore, physicians of developing countries train with experts in hysteroscopy during training workshops conducted in their home countries.

Many studies have showed the importance of simulation techniques of both the dry lab and animal lab training in the acquisition of endoscopic skills [3, 6]. Unfortunately, the reports that confirm a transferability of such training to the operating theater are sparse. Therefore, we have used a validated home trainer with basic training materials that simulate the uterine cavity to test this theory [7]. We hypothesized that a short training on a dry lab is sufficient to acquire basic hysteroscopic skills that would be transferable to the operation theater.

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Materials and methods

Participants' characteristics

The eligibility criteria for this study enrolled post-graduate practicing gynecologists without prior experience with hysteroscopy. This study included 39 gynecologists from 3 different Iraqi cities. Participants were randomly assigned either to the trainee or control group. In the first, participants ($n=21$) attended a prior training before performing hysteroscopy. In the second, participants ($n=18$) directly performed the hysteroscopy.

Description of the training in the dry lab

The training consisted in using a homemade box trainer to perform specific procedures on a green pepper that simulated the uterine cavity (Fig. 1). A 5-mm Bettocchi hysteroscope, a 2.9 mm/30° Hopkins II lens, and a TELE PACK X LED system were used for the training exercises. In the first



Fig. 1 The homemade trainer with the green pepper simulation model

exercise, the trainees manipulated a 30° camera and identified the different corners and walls of the green pepper by holding the camera with the non-dominant hand and rotating the light cable and the scope with the dominant hand. The second exercise simulates the excision of a small polyp and the punch biopsy from the endometrium. All trainees were asked to introduce a 5-French semi-flexible grasper in the working channel of the hysteroscope and to extract a white grain from the inside of the pepper (Fig. 2). An average time of 10 min was needed until the participants acquire the requested tasks. During this period, the trainees could repeat the exercises many times then performed the real-life procedure upon completion of their training.

Description of the hysteroscopy in the operating room

During the real-life hysteroscopy, the same expert surgeon used a vaginoscopic approach and introduced the hysteroscope without dilatation. Participants had to perform two manipulations each allocated 2 min. They had to identify the right and left ostia as well as the anterior, posterior, and lateral walls of the uterine cavity. Afterwards, they introduce a grasper to perform a punch biopsy.



Fig. 2 The punch biopsy simulation exercise

Scoring of the hysteroscopy in the operation room

The exercises were recorded on a video camera and exposed independently to two expert surgeons in hysteroscopy for scoring. In the first exercise, one point was allocated for the successful identification of each land mark with scores ranging from 0 to 6. In the second exercise, the expert surgeon graded the participants “poor,” “good,” “excellent,” and “failed.” The first three were subjective according to each expert physician. The participant “failed” in case of inability to perform the punch biopsy within two minutes. Thereafter, the expert surgeons were asked to distinguish between the participants that received prior training and those who did not. The expert surgeons were different from the supervising one, to avoid any potential measurement bias.

Patients and ethical considerations

Patients included in this study were adult women undergoing hysteroscopy. Women with polyps or submucosal myoma larger than 2 cm, total septum, unicornuate uterus, and Asherman syndrome were excluded from the study. All patients were initially informed that in case of eligibility, the procedure will be performed by her gynecologist and would be supervised by the expert surgeon. Each patient provided written informed consent after the procedure description and complications were explained. The study was approved by the Al Kafeel hospital Ethics committee.

Statistical analysis

Our data were analyzed using Minitab software. All results are expressed as mean \pm standard deviation (SD). Statistical analyses were done using a Mann–Whitney test, ANOVA, Kruskal–Wallis, and Pearson’s correlation tests. A 2-tailed p value < 0.05 was considered statistically significant.

Results

Overall, the characteristics of the participants in each group were similar in regard to age (42.1 vs 40.9 years; $p = 0.652$) and years of experience (12.1 vs 11.9 years; $p = 0.839$).

Identification of different landmarks of the uterine cavity

The average scores of the identification of different landmarks of the uterine cavity are reported in Table 1. Statistical analysis showed no significant difference between the scoring of the two experts for neither the trainees ($p = 0.204$)

Table 1 Identification of different landmarks of the uterine cavity scores (mean \pm standard deviation)

	Trainees	Control	p value*
Expert 1 score	5.1 \pm 0.7	3.6 \pm 0.8	< 0.001
Expert 2 score	5.4 \pm 0.6	3.5 \pm 0.7	< 0.001
p^*	0.204	0.874	

* $p < 0.05$ is considered statistically significant

nor the controls ($p = 0.874$). For both experts, the average identification score was significantly higher for the trainees than that for the controls ($p < 0.001$).

Punch biopsy evaluation

For both experts, none of the trainees failed to achieve a punch biopsy, whereas more than 50% of the control did. Also, the majority of the trainees were rated good (54%) and excellent (41%) while only 5.5% of the control were rated good and none was excellent. Both experts rated the punch biopsy of the trainees higher than that for the control ($p < 0.001$).

Distinction of the attendees

The two experts correctly identified almost 82% of the trainees. The correlation between the participants’ group and the experts’ identification was statistically significant ($p < 0.001$) for both experts. The difference between the two expert evaluations was not statistically significant ($p = 0.371$).

Discussion

It is known that dry and wet lab training are of utmost importance in the acquisition of basic and complex psychomotor skills in gynecological endoscopic surgery [4]. Individuals who attended long- or short-term training workshops performed better than individuals who did not [7, 8]. Recently, virtual reality simulators are developed and used for training in acquisition of hysteroscopic skills [9]. Additionally, there is a large impact of different training models on the knowledge and technical skills for a wide range of hysteroscopic procedures [1]. However, the clinical outcomes of simulation-based assessment programs remain unclear. In this study, we demonstrated for the first time a transferability of the basic hysteroscopic skills from the dry lab to the operating theater. Our findings support the hypothesis that a short time workshop is efficient to acquire basic skills in hysteroscopy [3]. A better clinical impact and fewer complications are expected. However, training for complex hysteroscopic procedures remains necessary for the implementation of

these techniques in the daily practice of a gynecologist [9]. Thus, further studies are needed to prove the transferability of skills not only for basic procedures but also for advanced clinical situations.

We used a cheap laparoscopic box to fix the pepper in order to reduce the total cost of the training. Nevertheless, our box was only validated for laparoscopy and a validation study for hysteroscopic skills acquisition remains necessary [7]. The green pepper model is a costless, simple, and effective tool that simulates the uterine cavity. It contains the grains that simulate polyps and the inside strips that simulate uterine septae. This model is a limited but useful simulator tool for hysteroscopic basic skills training. Our results showed that this model might develop the hand-eye coordination in trainees in view of the higher scores achieved in this subgroup. Few papers are published about low-cost training models in hysteroscopy. The female pig bladder was used to simulate clinical situations encountered during hysteroscopic surgery [11]. Despite the anatomical similarities, this model remains complex compared to ours, and there is no proof of skills acquisition and transferability. Basil et al., proved that after a training workshop, trainees approved a better knowledge in hysteroscopic techniques and they were able to apply them on cattle and bovine uteruses. Even though skills are improving on animal models, the settings of virtual reality combined to animal models are very expensive and time consuming. Furthermore, the transferability of skills to the operation theater is not proven [3].

We are aware of the limitations of our study including the small sample size and potential measurement bias. We are also aware that this model seems to be effective in the acquisition of basic hysteroscopic skills only among which the camera navigation and punch biopsy. The teaching of more complex psychomotor skills in hysteroscopy as management of the fluid distention, dilation of the cervix, vaginoscopic approach, mechanical dissection of tissue with the scissors, and use of electrical surgery requires more elaborated models and training exercises. Another limitation of the study is the long-term retention of skills. In fact, more studies are needed in order to validate the efficacy of this training on the acquisition and durability of basic hysteroscopic skills.

We conclude that a short time dry lab is efficient to acquire basic hysteroscopic skills that are transferable to the operating room. Our training model is almost costless and seems to be effective for basic hysteroscopic skills training.

Author contributions ZS: designer of the home trainer; validation study; reviewing of the manuscript. ER: validation study; writing of the manuscript; English review. VT: Laparoscopic training coordinator; validation study. AK: Laparoscopic training coordinator; validation study; writing of the manuscript.

Compliance with ethical standards

Disclosures Zaki Sleiman, Elie Rassi, Vasilios Tanos, and Aline Khazaka have no conflicts of interest or financial ties to disclose.

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