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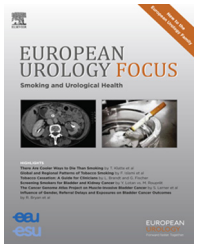


Clinical Trial Update – Education

# The European Association of Urology Robotic Training Curriculum: An Update

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The introduction of robotic surgery led to profound changes in the management of urologic diseases over the past decade. The majority of radical prostatectomies (RPs) performed in Western countries are now done robotically [1]. The widespread diffusion of this technique was related mainly to its potential benefits with regard to perioperative, oncologic, and functional results [2–6]. Nonetheless, these outcomes are dependent on surgical experience, and high numbers of cases are needed to achieve superior results compared with traditional approaches [7]. This led to a compelling need for structured training programs [8–13]. These programs, ideally, would allow for the development of both theoretical and technical knowledge [13], improving performance, shortening the learning curve, and ultimately ameliorating patient safety and outcomes [8,9]. Several attempts to develop robotic curriculums based on both theoretical and practical training have been made in recent years [8,11–18]; however, the lack of long-term results and validation studies often precluded the diffusion of these initiatives [8].

A training program focusing on robot-assisted RP (RARP) developed by the European Association of Urology (EAU) Robotic Urologic Section (ERUS) has been recently shown to represent a valid, acceptable, and effective tool for surgeons with limited robotic experience [9,10]. Fellows coming from referral institutions for robotic surgery underwent a 12-wk training program that included e-learning, theoretical lessons, a 1-wk advanced robotic skills course, and modular robotic training. The validation study included the first 10 participants and demonstrated that up to 80% were deemed able to perform a procedure independently, safely, and efficiently at the end of the program [9]. In particular, when the entire procedure was evaluated, eight fellows achieved a mean score $\geq$10, which was considered safe (Fig. 1). Of note, participants found all the parts of the training to be useful. In particular, the modules of the advanced course that included dry and wet labs were considered excellent by >70% of participants. Because the only two surgeons who did not achieve an average score that was considered safe were residents at the time of the fellowship [9], it might be hypothesized that these participants were not able to perform a sufficient number of cases during the training period. Consequently, the length of the fellowship was extended to 6 mo to allow for sufficient experience and to expose the trainees to an adequate number of cases. Of note, the encouraging results of the validation study led the EAU to endorse a structured program with the aim of providing standardized training and to certify surgeons for urologic procedures.

## 1. Robotic curriculum overview

The EAU robotic curriculum for RARP consists of 6 mo of training directed primarily toward motivated fellows who have little experience with the robotic technique and who come from host centers that fulfill selected criteria (Table 1). Participation in the training program is not

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| | Bladder detachment | Endopelvic fascia incision | Ligation of dorsal vein complex | Bladder neck incision | Dissection of vasa and seminal vesicles | Preparation and section of prostatic pedicles | Dissection of neurovascular bundles | Apical dissection | Urethrovesical anastomosis | Mean |
|---|---|---|---|---|---|---|---|---|---|---|
| Fellow A | 11.5 | 11 | 10.5 | 10.5 | 9.5 | 8.5 | 9.5 | 7 | 9.5 | 9.7 |
| Fellow B | 11 | 11 | 12 | 12 | 9.5 | 12 | 10.5 | 12 | 10 | 11.1 |
| Fellow C | 12 | 12.5 | NP | 12 | 10 | 12 | 11 | 11 | 13.5 | 11.8 |
| Fellow D | 12 | 12.5 | 8.5 | 11 | 8 | 8 | NP | 10.5 | 14.5 | 10.6 |
| Fellow E | 12 | 10 | 11 | 10 | 11 | 12 | 12 | 10 | 12.5 | 11.2 |
| Fellow F | 12 | 12 | 10 | 10 | 13.5 | 12 | 12.5 | 10 | 14 | 11.8 |
| Fellow G | NP | 10 | NP | 9.5 | 6 | 8 | 6.5 | 6 | 14.5 | 8.6 |
| Fellow H | 11.5 | 12 | 12 | 10.5 | 10.5 | 10 | 9.5 | 9 | 12 | 10.8 |
| Fellow I | 12.5 | 12.5 | 10.5 | 12 | 13.5 | 12.5 | 13 | 14 | 11 | 12.3 |
| Fellow L | 12 | 12.5 | NP | 12 | 12.5 | 10 | 14 | 10.5 | 12 | 11.9 |
| Expert A | 13.5 | 12.5 | NP | 13 | 12 | 13.5 | 13.5 | 13 | 14.5 | 13.2 |
| Expert B | NP | 12 | 15 | 14 | 14 | 13.5 | 13.5 | 14 | 15.5 | 13.9 |

NP = not performed.

**Fig. 1 – Results from blinded video-based assessment of individual procedural steps in robot-assisted radical prostatectomy performed by fellows and robotic experts during the pilot validation study of the European Association of Urology robotic training curriculum, according to a generic dedicated scoring scale from 4 to 16, with ≥10 considered safe. Reproduced with permission from Elsevier [9].**

restricted on the basis of previous experience with open, laparoscopic, and/or robotic surgery; however, a 6-mo fellowship might represent the ideal training opportunity for novice surgeons who need both theory- and practice-based learning (ie, domain and technical knowledge) for a specific surgical procedure [13,19]. In this context, it should be highlighted that most of the participants in the ERUS pilot study had minimal experience with robotic surgery at baseline, and the median time of involvement as a console surgeon was only 4 mo [9]. Nonetheless, the learning curve concept also applies to urologists who have experience with open and laparoscopic RP [13,20]. Although skilled open and laparoscopic surgeons have already acquired domain knowledge, they need practice to achieve proficiency in the use of the robotic system. The role of structured fellowships in this setting is still debated, and in some cases, mentored skills courses might represent a valid alternative [13].

The EAU robotic curriculum for RARP includes theoretical training, live case observation and tableside assistance, laboratory exercises, and modular console training (Fig. 2). Each step provides unique opportunities for improving individual skills.

### 1.1. *Theoretical training*

Accurate knowledge of the surgical anatomy and familiarity with the robotic system and surgical procedures are mandatory before starting hands-on and modular console training. E-learning courses could be used for knowledge acquisition, and online examinations could be administered.

### 1.2. *Live case observation and tableside assistance*

Live case observation provides important insight into system set-up and surgical techniques. In addition, specific training on tableside assistance might be beneficial for console surgeons [13,21]. Thiel et al [21], for example, recently demonstrated that specific training for bedside

**Table 1 – Host center criteria to be fulfilled**

| |
|---|
| Two or more robotic surgeons with extended experience (≥250 robot-assisted radical prostatectomies performed in total) and ≥100 cases in the host center during the past 12 mo |
| Five or more peer-reviewed publications in the past 5 yr from the center |
| Commitment to train properly and allow the trainee access to the robot |
| Availability of simulators and/or dry lab for training |

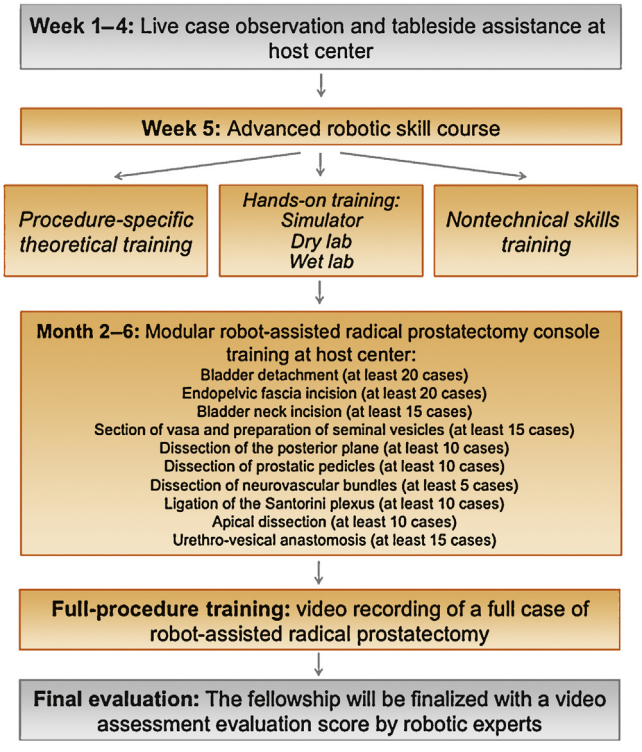


**Fig. 2 – Structure of the European Association of Urology robotic training curriculum.**