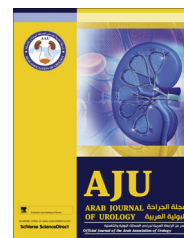




Arab Journal of Urology
(Official Journal of the Arab Association of Urology)

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REVIEW

Bringing excellence into urology: How to improve the future training of residents?



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Received 4 April 2013, Received in revised form 31 May 2013, Accepted 8 June 2013

Available online 23 July 2013

KEYWORDS

Medical education;
Residents;
Fellowship;
Dry laboratory;
Skills assessment

Abstract *The problem:* The demographic development of society leads to an increased demand for physicians. Particularly in the surgical disciplines, there is a noticeably declining interest among graduates from medical schools worldwide. For reasons discussed in detail, this applies especially to urology.

Solutions: We indicate possibilities on how to counteract this trend, by improving the training for urology residents. Whereas some major changes for the better have already been introduced into the curricula in some countries, others will have to be further specified in the future. This article gives an overview of the requirements of a specific training programme, from a planning phase to its certification. Aspects such as the selection of candidates, the goals of a good training programme, and an implementation strategy are presented. Essential elements of a urology resident programme for effective coaching, improving medical skills (e.g. in surgical laboratories), knowledge revision, progress evaluation, and retrospection are discussed critically, giving an understanding of the crucial requirements of a good and attractive education in urology.

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Peer review under responsibility of Arab Association of Urology.



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Conclusion: A structured and well organised training programme might attract additional medical students towards urology and contribute significantly to the further development of the speciality. This can be seen as an initiative to counteract the decline of urology as an attractive field of interest to upcoming generations of physicians, and therefore to ensure urological care of the highest quality that patients deserve.

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Introduction

Demographic trends show that ageing societies lead to an increased demand for physicians worldwide. A shortage of physicians is a global problem affecting all fields of medicine in many countries. This demand is equally evident in developing and industrial countries, and applies equally to primary-care physicians in rural regions and specialists at university hospitals. In addition, increasing globalisation, ongoing structural changes in healthcare systems, and the ever-continuing progress in medicine lead to changes in the qualifications required for medical professionals [1–3].

Unfortunately, in recent years there has been a declining interest in surgery and its related fields among graduates from medical schools [4]. However, there are significant differences related to the gender of the medical student, or the economic standing of a country [5]. These difference might occur for different reasons, i.e., a *de facto* increasing workload, a growing interest in achieving a more favourable work/life balance, and an increasing ‘feminisation’ in medicine [6]. Doctors in training might also be concerned about ethical and legal issues associated with conducting surgical procedures, possible unfavourable results, and issues of malpractice in surgery. In addition, the resident’s training in surgery is considered to be very challenging and time-consuming, pushing trainees to their limits. Medical professionals express a growing dissatisfaction with excessively long working hours and 48-h weekend shifts spent in the operating theatre [7].

In urology some of these issues could become even more urgent. Urology has become more complex than ever, as it comprises increasingly sophisticated medical and surgical technologies such as advanced medical tumour therapies, and endourological and laparoscopic surgical techniques [8,9].

Believing that urology has something to offer a new generation of young doctors, we must increase efforts to provide a clear picture of what urology is, and to define a clear route on how to become a dedicated and well-trained urologist.

This must obviously begin at the universities [10]. It seems obvious that medical students should make

contact with urology as early as possible. However, data reported by Kerfoot et al. [11] showed a decline in formal urological training in the USA, with only 17% of medical schools offering student courses in urology. Surprisingly, medical schools offering a clinical rotation in urology do not have a higher ratio of candidates entering the urology residency. Therefore, new strategies are needed to promote urology among medical students, e.g., local student associations providing a relevant insight into basic research and clinical practice in urology, or participation in workshops that will make students more familiar with specific surgical and urological skills, such as suturing, knot tying, basic laparoscopic skills, and endourology [12].

Becoming a good urologist requires a highly qualified education and sufficient experience. To devise a training programme of high proficiency, several important factors must be considered. In this article we give an insight into the requirements of such a resident’s training programme. The planning of a programme must comprise various important steps, including candidate selection, the setting of specific graded goals, and issues of internal or external funding. In this article we also discuss the essential elements of the programmes themselves, and illustrate their significance.

The goals of a training programme and the requirements at the training institutions should be balanced with the personal expectations of the residents and adapted to their individual performances [13].

Professionals in urology assigned to conduct a resident’s training programme must be continuously motivated and trained themselves to guarantee a high standard, well-organised and structured education for the residents.

The requirements for good training in urology

The prerequisites for the programme are:

- The selection of candidates;
- The goals of the programme;
- Supplementary training and international exchange;
- Implementation strategy;
- Environmental considerations.

Selection of candidates

One of the greatest challenges of any resident's training programme is to select the right candidates. Obviously, the success of the programme largely depends on the contributions that potential candidates can provide. The candidates should show a very high motivation for theoretical learning and practical training, to acquire a deep understanding of the various subjects and the necessary professional skills in urology. It will be increasingly important to gain international working experience and to cross-link to adjacent fields, such as basic sciences, medical engineering or social medicine. The access to any specific training programme must be restricted by an entrance examination, to evaluate applying candidates on their individual knowledge and specific skills. Selecting a medical student for a urology residency programme is a challenging task. However, faculty interviews and letters of recommendation were found to be the most predictive of a future superior clinical performance of residents. Furthermore, the United States Medical Licensing Examination part I results and in-service examination correlated positively with the selection of excellent urology residents [14].

Goals of the programme

The planning of a training programme essentially needs clear and unambiguous definitions of specific programme goals. It is these goals that provide the required information to adequately address the structure and requirements of a programme. A good medical training programme must fulfil the following criteria:

- Does it meet the future medical and personal demands of the trainee?
- Does it provide a motivating environment?
- Does the training provide enough flexibility for the resident, permitting an individualised personal development?
- Is the education and training of urologists up-to-date and is it kept at an internationally competitive level?

Devising a high-quality training programme for residents in urology clearly needs the formation of a mixed group of experts, including not only highly experienced urologists but also experts in medical didactics and learning theories.

An excellent residency in urology must provide the opportunity of a structured and standardised education. In Germany, the 'Junior Academy for Young Urologists' has been established to assure the highest quality of urology training. The practical implementation is based on a ternary cooperation between the German Association of Urology, an expert panel and a group of young residents. A 5-year programme provides a framework for the clinical work and educational requirements, information on training opportunities and subspecialties. In addition, the programme includes

modular courses covering the most important fields of urology. Furthermore, courses on ethics and psychosomatics, as well as others on personal development and leadership, are offered. A modular system allows the participants to finish all the required parts, to be completed within 5 years. During the first year the trainee will take part in one of five academy courses, will attend the national urology congress, will be instructed in urological ultrasonography, take part in special meetings for urology residents, and complete a suturing and knot-tying seminar. During the entire residency the candidate is supposed to read the German Urology Journal and a comprehensive handbook covering all required knowledge needed for the final certification examination. In the second and third year, the trainee concentrates on paediatric urology, functional urology, neuro-urology, and endoscopic and laparoscopic techniques (with attendance on courses and workshops). During the final training period (fourth and fifth year) the residents deepen their knowledge of uro-oncology and andrology. Clinical and surgical education is structured by a log-book, dependent on the progress of the resident, and is based on three modules. In the first year, with assistance at various urological and surgical procedures, urological imaging (including invasive and non-invasive fluoroscopy, abdominal and transrectal ultrasonography, and small interventions such as a biopsies of the prostate or percutaneous cystostomy), in the second and third years by surgery on external genitalia, urodynamic examination, cystoscopy and JJ stenting, extracorporeal shock-wave therapy, and in the last two years by gross surgical training (nephrectomy, laparotomy, transurethral resection of the prostate and bladder, ureteroscopy and percutaneous nephrolithotomy, paediatric procedures, kidney transplantation, laparoscopic procedures and tumour drug therapy) [15]. Residents interested in an academic career are offered a certain period (e.g., 1 year) to conduct a scientific project.

Supplementary training and international exchange

Many urological societies and associated organisations offer opportunities for a clinical or scientific exchange with foreign countries. It seems obvious that a true and sustained progress in urology can only be achieved by sharing knowledge and experience beyond boundaries and across cultures, and a scholarship at an international centre of excellence appears to be essential for an excellent training programme [16]. Coordinators and mentors should encourage residents to participate in programmes like those offered by the European Association of Urology (<http://www.endourology.org/fellowship/fellowship.php>), Société Internationale d'Urologie (<http://www.siu-urology.org/training-scholarships.aspx>), or the Endourological Society (<http://www.endourology.org/fellowship/fellowship.php>).

Implementation strategy

A well-structured training programme needs the implementation of a programme plan, including fixed times for lectures, clinical parts and a (self)-monitoring system. The last is needed to assess the achievement of important and well-defined milestones of the programme, to both the trainee and the mentor, at all stages. Trainees and their mentors should also ensure a continuous circle of feedback and correction.

A high-quality training programme should always be designed not only to impart professional knowledge and skills, but also to promote the development of a young physicians' personality. Only a reasonable, transparent and efficient programme will meet the demands of a new generation of urologists.

Apart from the presented systematic modular-based resident's training programme, the medical education of a trainee urologist should be extended by attendance at specialised meetings and conferences, training courses, seminars, workshops and internships, giving the opportunity to develop a personal clinical profile within urology.

Environmental considerations

As was noted in the introduction, urology must face new challenges concerning the increasing demand for a better work-life balance. In addition, a growing percentage of students are female (in Germany, $\approx 70\%$ in 2011) [17]. In the USA the proportion of female medical students has increased from 18% to 44% during the last three decades. Although being ambitious in their professional career, new generations of doctors will increasingly demand a better compatibility of family and profession. A modern residency programme must be adapted to these needs, allowing for flexible working hours and periods [18,19].

New concepts of learning contributing to a successful programme

The following additional educational aspects seem to be essential to establish a successful training programme:

- 'E-learning';
- Effective coaching;
- Improving medical skills in surgical laboratories;
- Knowledge revision and evaluation;
- Retrospection.

E-learning

The acquisition of basic theoretical (core) knowledge and the subsequent development of individual interests within a speciality might be supported by the use of

modern computer-based learning technologies [20]. E-learning offers a new approach, making the learning process more flexible and individualised. Careful and frequent (self)-evaluation allows for a continuous process of uncovering errors and immediate correction. E-learning supports both learning and teaching through the use of digital media and tools. The use of modern information and communication technologies in medical training offers students and residents the opportunity to learn, independent of space and time, and to work at their own pace. An e-learning platform should offer different learning levels for all possible branches of specialisation [21]. As presented by Marks et al. [22], electronic learning can be successfully implemented in urology, e.g. exposure to computer-based learning modules showed a significantly improved assessment of hydronephrosis grades in new-born children and the performance of paediatric orchidopexy [23].

Effective coaching and mentoring

Mentoring promotes the transfer of knowledge from experienced to less experienced personnel. In operative medicine professional expertise is based mainly on experience as a surgeon. As a mentor, the surgeon's task is to implement a structured learning programme that guides the trainee from one surgical step to the next. However, it is also important that any individualised training programme be integrated into the demands of a clinical department. A cost-effective strategy for staff development that integrates the residents in an efficient yet transparent way is essential.

Not only the selection of training candidates but also the selection of teaching professionals plays a vital role [24]. In Germany a mentoring programme for urology residents is offered by the national urological association. The programme was first launched in November 2006. Due to the overwhelmingly positive response, a decision was made to continue this initiative, which is currently in its fifth year. In this programme, young trainees are supervised and coached by leading experts in their respective fields [24,25].

Improving medical skills in surgical laboratories

Surgical skills not only include technical expertise with the equipment, but also interpersonal and personal skills to deal with practical problems. The clinical environment should allow the trainees to become familiar with everyday clinical routine and to develop their overall personality in their professional relationship with patients. However, it is a central purpose of resident's training to provide a structured programme to develop a trainee's practical skills. A surgical laboratory offers perfect conditions to learn and practice, using true or

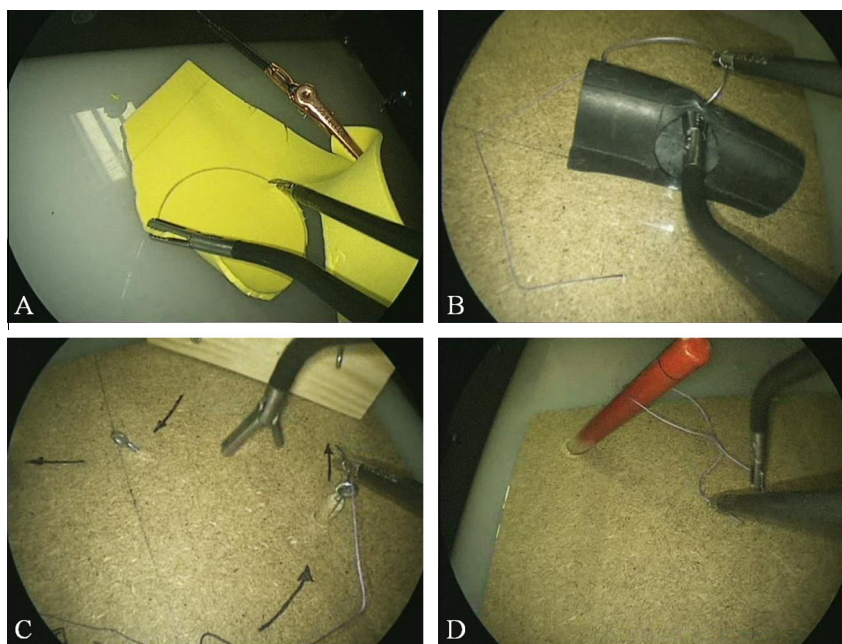


Figure 1 Training on single-port surgery in a ‘dry laboratory’ at Freiburg School of Videosurgery: A, pattern cutting; B, suturing; C, threading the needle; D, a ligating loop.

computer-animated simulators without the pressures of a clinical setting (Fig. 1).

Unlike in a clinical scenario, skill laboratories do not require the completion of full procedures, but provide training for selected steps of surgical procedures. The trainees are assisted by experienced tutors [26], who are able to support them with their professional ‘real life’ knowledge [27]. Several studies have shown a highly positive effect of simulator training on future surgical performance [28–30].

It would be desirable if simulators with the latest technology (e.g. robotics) could be made available to all residents in training [31]. Depending on the resources of healthcare systems in different countries, this will not always be possible. However, it has been shown that these systems might be cost-effective [32].

Knowledge revision and evaluation

A residency programme should provide the opportunity for the candidates to visit conferences and attend workshops, seminars or medical presentations, to constantly update themselves on the latest developments and technological advances in the field. The participants should be offered the possibility to develop areas of personal interest and to pursue those. The attendees should then be asked to provide detailed reports of their experiences. Parts of a programme might be optional, whereas other must be mandatory, to adequately train and evaluate the participants [16]. Continuous evaluation of each participant’s performance is essential. Frequent meetings of the trainees and their tutors are necessary to recognise any undesirable developments at an early stage and to

be able to correct them [26]. A structured documentation of all learning steps is mandatory for all participants. These detailed reports should provide all necessary information that might be used in a later certification [33].

Retrospection

Any urology training programme should be conceived as an open system with a positive attitude towards change. Intermittent feedback sessions between supervisors and participants will allow for short-term adaptations to the needs of the trainees. A retrospective discussion between educators and trainees after the termination of a residency term will give valuable information to further improve the programme [8,28].

Conclusions

Urology as a surgical discipline must meet specific challenges in the future. A new generation of students and residents in the speciality will ask for new answers about their education and their future professional life. Only a well-structured residency programme conducted by well-educated mentors will be able to attract enough enthusiastic young individuals to urology. This includes not only considerations of the subject matter of a training programme, but also the quality of life of the trainees and the compatibility of family and professional life. Many of these aspects that determine a high-quality training programme have already been implemented or might find their way into future programmes to help maintain excellence in urology.

Conflict of interest

None.

Funding

This study was conducted by the authors as part of their clinical work (departmental funding). No other financial support was received.

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