



Current State of Urologic Medical School Education: A Scoping Review

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OBJECTIVE	To review current literature pertaining to the availability and implementation of urology-focused curricula, in an effort to highlight current approaches to urologic education at the medical school level.
METHODS	A medical librarian searched PubMed, EMBASE, the Cochrane Library, ERIC, and Scopus for articles focused on undergraduate urology education. Two reviewers adjudicated all retrieved titles. Only those describing interventions in undergraduate medical urology education were included in the review. Data extracted from each article included, but were not limited to: sample size, instructional aim, type of intervention, outcome measurement, significance of results, and strength of evidence.
RESULTS	After removal of 1478 duplicate search results, 2425 unique titles remained for adjudication. Title and abstract screening excluded 2311. The remaining 114 articles met inclusion criteria. The articles focused on knowledge-based education (43), urologic curricula (22), clinical skills education (19), surgical skills training (15), and survey of student experiences in urology (15). 73 had been published since January 1, 2010.
CONCLUSION	Analysis of the published literature reveals a paucity of articles investigating implementation and outcomes of formal urologic curricula. Most of the literature focuses on acquisition of knowledge concerning narrow urology-related topics. Physicians often receive minimal exposure to formal urologic curricula during their undergraduate years. Appropriate interventions aimed at increasing undergraduate student familiarity with common urologic scenarios are warranted. The results of this study can inform the efforts of urology programs seeking to expand their educational opportunities. UROLOGY 123: 59–63, 2019. © 2018 Elsevier Inc.

Urologic disease is increasing due to the aging of the United States population. For example, between 1998 and 2007, the age-adjusted prevalence of BPH among hospitalized patients in the US nearly doubled and in 2000 alone, BPH accounted for 4.4 million office visits in the U.S.¹ Because of this demographic shift, primary care physicians and other nonurologic specialties, will continue to encounter an increasing number of urology-based chief complaints and disease. This trend makes early exposure to basic urologic education more important than ever for physicians in training. Although a significant proportion of primary care visits are related to urologic problems, urology-focused education has been reduced in most medical school curricula.³ The majority of medical students in the U.S. do not have didactic or clinical exposure to urology.³ It is critical for

students to have experience with diagnosis and management of common urologic problems, prior to graduation from medical school.

Urologic medical education at the professional school level varies greatly between institutions. Universities use didactic, clinical, or a combination of both approaches to teach urology. Data collected from 2014 shows that in 48% of schools surveyed, there were no urology lectures or coursework required prior to the third year clinical rotations, and only 5% had a mandatory urology clinical clerkship.² In an additional study, urology program directors surveyed from 41 schools, reported that medical student exposure to urology was about the same or has decreased from a decade ago.⁴ According to the American Urologic Association (AUA), “15 years ago, virtually all medical students in the United States received didactic training in urology, currently only 17% of medical students do so.”⁵

The purpose of this study is to review the current literature pertaining to the availability and implementation of urology-focused curricula, in an effort to highlight current approaches to urologic education at the professional school level. Although medical schools are working to find ways teach urology to their students, the proportion of education related to the field is minimal. The results of

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this study will hopefully encourage U.S. medical schools to work to improve and implement innovative urologic assessments in their curriculum.

METHODS

“Scoping studies aim to map the key concepts underpinning a research area and the main sources and types of evidence available, and can be undertaken as a stand-alone project in its own right, especially where an area is complex or has not been reviewed comprehensively before,” according to Arksey and O’Malley.⁶ For this scoping study, the UNMC medical librarian search PubMed, EMBASE, the Cochrane Library, ERIC, and Scopus for articles focused on urology education at the medical school level. The articles were divided between a pair of reviewers. The titles and abstracts generated in the various database search results were reviewed, and sorted according to their relevance to the topic. Only those describing assessments in medical school urology education were included in the review. The articles were subdivided into categories by the type of educational assessment and included: knowledge-based education, urologic curricula, clinical skills education, surgical skills training, and survey of student experiences in urology. Data extracted from each article included, but was not limited to: sample size, instructional aim, type of assessment, outcome measurement, significance of results, strength of evidence, control groups used, and randomization of assessment.

RESULTS

After removal of 1478 duplicate search results, 2425 unique titles remained for adjudication. Title and abstract screening excluded 2311. The remaining 114 articles met inclusion criteria. The articles focused on knowledge-based education (43, 37.7%), urologic curricula (22, 19.3%), clinical skills education (19, 16.6%), surgical skills training (15, 13.2%), and survey of student experiences in urology (15, 13.2%) (Table 1). Sixty-four percent of the articles have been published since January 1, 2010. The types of assessments included: clinical skills training (25, 22%), lectures (24, 21%), questionnaires (23, 20%), modules (22, 19%), technical surgical skills (12, 11%), videos (2, 2%), problem-based learning (1, 1%), mentorships (1, 1%), simulations (1, 1%), 3D models (1, 1%), and curriculum changes (1, 1%) (Fig. 1). The types of measurements of effectiveness of assessments included: satisfaction surveys (27, 30%), pre/post-test (21, 23%), post-test only (21, 23%), questionnaires (14, 16%), survey of own skills (5, 6%), improvement in grades (1, 1%), and objective clinical skills (1, 1%) (Fig. 2). Control groups were used in 31 articles (27.2%) and 83 did not use control groups or did not report (72.8%)

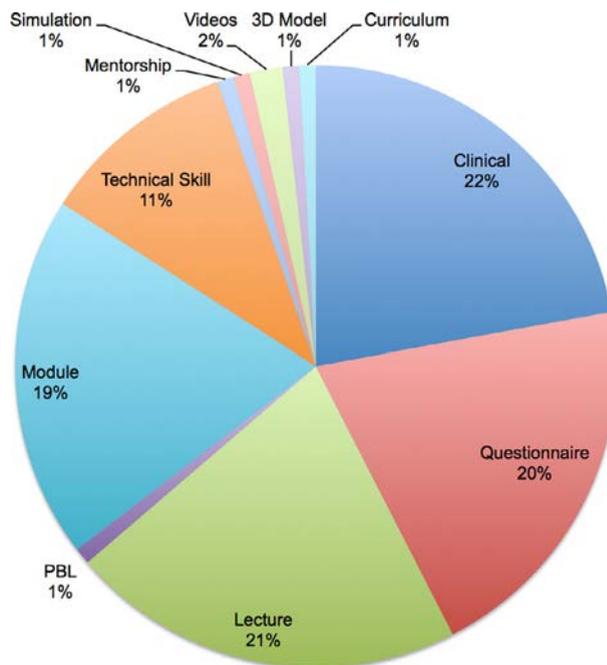


Figure 1. Types of Assessment. This figure represents the percentage of the different types of medical school educational assessments that were found in our scoping review. (Color version available online.)

(Table 2). 42 of the articles had randomized assessments (37.8%) and 69 did not have randomized assessments or did not report (62.2%) (Table 2). 35 of the articles had a statistically significant result (31.5%), 76 did not have a significant result or did not report data (68.5%) (Table 2). There were a total of 12,489 learners with a range of 6-1859 learners per study and an average of 186 learners per study (Table 1). There were a total of 363 institutions represented by 61 articles from a single institution, 12 articles published as a collaboration of multiple institutions and 41 studies did not report the number of institutions in their study (Table 1).

DISCUSSION

These results suggest that the current emphasis on early exposure to urologic education in medical school is limited. This is important because graduating students, especially those pursuing primary care-based specialties, will encounter increasing numbers of urologic complaints due to projected demographic changes. Physicians with basic knowledge of common urologic conditions can act as the

Table 1. Predominant domains, number of learners and institutions. This table describes the percentage of articles which fit into the separate type of learning domains. This table also describes the number of learners and institutions that were included in the study

	Knowledge-Based Education	Urologic Curricula	Clinical Skills Education	Surgical Skills Training	Survey of Student Experiences
Predominant Domain	43 (37.7%)	22 (19.3%)	19 (16.6%)	15 (13.2%)	15 (13.2%)
Number of learners	Total 12,489	Range 6-1859	Average of Reported 186	Not Reported 29	
Number of institutions	Total of Reported 363	Single 61	Multiple 12	Not Reported 34	

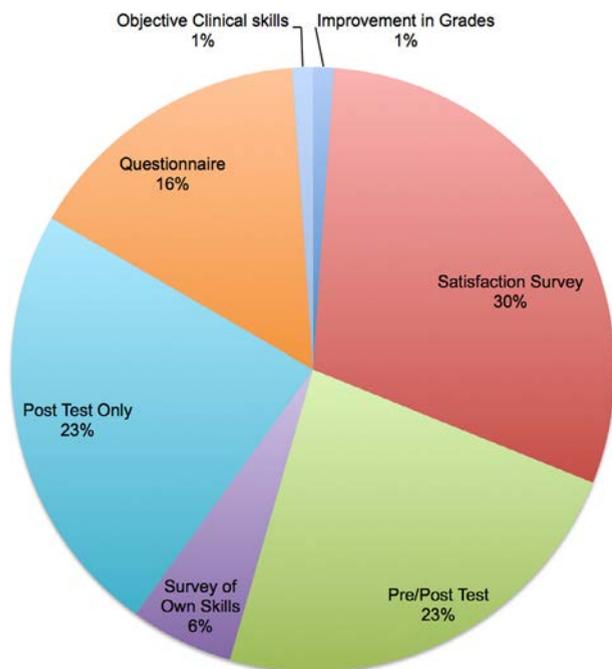


Figure 2. Type of measurement of effectiveness. This figure represents the percentage of the different types of measurements of effectiveness for medical school educational assessments that were found in our scoping review. (Color version available online.)

first line of diagnosis and treatment for many of their communities. Earlier exposure and structured, urology-based curriculum in medical schools could lead to an improved efficiency of the delivery of healthcare, and possibly even help to decrease costs associated with patient care by avoiding specialty referrals. This review of articles showed that there was a greater focus on knowledge related to a particular urologic subject matter, and less of an emphasis on clinical skills education and proficiency. This may result in graduating physicians that will not be adequately trained to handle clinical situations involving common presentations of urologic disease. Only 22% of the educational assessments were focused on clinical skills training. While there are effective educational mediums, including lectures and modules, there is room for more clinical skills training in medical school curricula. One particular survey of medical students showed that students believe they learn to manage urologic problems best by seeing patients

Table 2. Control groups, randomization and statistical significance. This table describes the percentage of articles which used control groups, the percentage of articles which used randomization and the percentage of articles which had a statistical significance in their study

Control Group Used	
Yes 31 (28.2%)	No/Not Reported 80 (71.8%)
Randomized	
Yes 42 (37.8%)	No/Not Reported 69 (62.2%)
Statistical Significance	
Yes 35 (31.5%)	No/Not Reported 76 (68.5%)

and performing physical examinations while in clinic.⁷ Thus it may be most beneficial to focus on clinical skills training. The majority of the studies' measurement of effectiveness focused on satisfaction surveys with secondary emphasis on pretest knowledge compared with post-test results. The pre-test and post-test data are objective measurements that gauge whether students are gaining knowledge from the assessments. Satisfaction surveys give another potential data point for examination, but the variability of results and the student's self-perception of skill may lead to misleading, or difficult to verify information. Although the studies had assessments which included clinical skills training, the amount of time dedicated to these experiences appears minimal.

Medical schools need to continue to improve their urologic curriculum. If schools continue to teach the same concepts in the same way without any advancement, it will be detrimental to the medical student's education. A study done by the University of Wisconsin School of Medicine in 2009 showed that students who participated in a new curriculum with core learning objectives had objectively higher test scores than students in the traditional curriculum.⁸ Therefore, additional urologic resources alone may be inadequate, and more defined goals and objectives regarding the curriculum in place could help direct students' attention to important aspects of urologic education. Urology is a field that continues to expand and developments occur each year that could be incorporated into medical schools urologic curriculum. Another trend becoming more prevalent in medical schools across the country is less of an emphasis on required urologic education replaced with an opportunity to gain experience in this field as an elective. In a survey, 97% of medical schools offer an elective clinical rotation in urology, but only 17% have required clinical rotations in urology.¹⁰ While having the option of a rotation is important, the content of the available urologic curriculum is fundamental to the education of medical students. Surveys of medical school directors revealed that only 31% of schools base their curriculum on the AUA medical student core curriculum.² Although the study surveyed a limited number of schools, this percentage indicates an easy opportunity for improvement. Having an available urologic clinical elective is important to the education of medical students, but they should still be taught urology separately based on core concepts as listed by the AUA. The AUA has long worked to develop a focused urologic education medical students should master before graduating. If medical schools don't teach the core concepts enumerated by the AUA, this can lead to inconsistency in concepts that are taught across the country and a varied urologic education that will be problematic for the future practicing physicians.

The limits of this scoping review include having to rely on articles that were not explicitly researching each individual urology-education based assessment implemented at various institutions. Although this review attempted to relay the results of the available studies appropriately, some assumptions were made.

We assumed that the survey and questionnaires we looked at were told truthfully and pertained to urology education specifically. In addition, we assumed that the studies had taught urology appropriately and with the same type of education concepts the AUA directs. These assumptions could be over inferred and diverge from the original author's purpose. However, our findings were still consistent with previous studies published, which illustrate that while the need for urologic education continues to increase, the amount of medical school assessments in urology continues to decline.^{2,3,9} Future research in the field can be done by surveying academic urologists and reviewing their curriculum to find out what type of assessments are currently being implemented. In addition, we could survey students to find out what type of urologic education they are taught and test their ability to handle different urologic patients.

There are areas for improvement within urology medical school education. It should first focus on teaching core concepts as this method has proven to be the superior approach for educating students.⁸ The core concepts can be framed from the AUA's medical student core curriculum as this is what graduating medical students should be familiar with according to extensive research done by the AUA.⁵ The Association of American Medical College currently does not have a urologic curriculum listed on their website. We can work with the Association of American Medical College to create a core curriculum that is based off of the AUA's, which may encourage medical schools to implement a urologic curriculum leading to increased exposure in the field. A combination of interactive lectures and modules can be used to teach these core competency subjects while at the same time involving students in clinical practice so that they can experience firsthand what they learn. Surveys from students also reported that they believe patient interaction in the clinic is the most effective way that they are learning.⁷ Being able to talk to patients and actively think about the management of their own patient's urologic problems will help solidify the core concepts. A required urologic rotation would be beneficial to students, even for a short period of time of 1-2 weeks. This of course competes with the many clinical opportunities and requirements in the clinical years of medical school. The trend of offering urology rotation as an elective limits the medical students' exposure and education to a key area of medical education that will likely be part of their future practice, especially if they go into primary care.

CONCLUSION

Analysis of the published literature reveals a paucity of articles investigating implementation and outcomes of formal urologic curricula to medical students. Most of the literature focuses on acquisition of knowledge concerning narrow urology-related topics. Primary care physicians and urologists often receive minimal exposure to formal urologic curricula during their medical school years. In

addition, medical students are reporting few available or encouraged experiences in urology education.¹¹ Implementation and innovation based on available curricula, including the American Urological Association curriculum, and appropriate assessments aimed at increasing medical student familiarity with common urologic scenarios is warranted. The results of this study can inform the efforts of medical schools and urology programs seeking to expand their educational opportunities.

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SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.urology.2018.07.044](https://doi.org/10.1016/j.urology.2018.07.044).

References

1. Patel ND, Parsons JK. Epidemiology and etiology of benign prostatic hyperplasia and bladder outlet obstruction; *Indian J Urol.* 2014;30:170–176. <http://doi.org/10.4103/0970-1591.126900>.
2. Slaughenhaupt B, Ogunyemi O, Giannopoulos M, Sauder C, Levenson G. An update on the current status of medical student urology education in the United States. *Urology.* 2014;84 (Oct):743–747.
3. Teichman JM, Weiss BD, Solomon D. Urological needs assessment for primary care practice: implications for undergraduate medical education. *J Urol.* 1999;161:1282–1285.
4. Loughlin KR. The current status of medical student urological education in the United States. *J Urol.* 2008;179:1087, 90; discussion 1090-1.
5. American Urological Association. Education for medical students; 2017. Available from; 2017. <http://www.auanet.org/education/auauuniversity/medical-student-education>. (accessed January 1, 2018).
6. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol.* 2005;8(1):19–32.
7. Teichman JMH, Monga M, Littlefield JH, Huang WJ. Re: third year medical student attitudes toward learning urology [6]. *J Urol.* 2001;166:1011.
8. Slaughenhaupt BL, Lester RA, Rowe JM, Wollack JA. Design, implementation and evaluation of a new core learning objectives curriculum for a urology clerkship. *J Urol.* 2011;186:1417–1421.
9. Kan KM, Jayadevan R, Rodriguez N, Weissbart S, Stock JA. The current state of urological education for medical students. *Urol Pract.* 2017;4:71–75.
10. Kerfoot BP, Baker H, Volkan K, et al. Development and initial evaluation of a novel urology curriculum for medical students. *J Urol.* 2004;172:278–281.
11. Derbyshire LF, O'Flynn KJ. Medical students' exposure to urology in the undergraduate curriculum, a web based survey. *Br J Med Surg Urol.* 2012;5:4–10.

EDITORIAL COMMENT



Urologic disease is a major contributor to morbidity and health care costs in the United States. A recent National Health and Nutrition Examination Survey indicates the prevalence of kidney stones among US adults has risen to 10%, and it is estimated that some degree of urinary incontinence affects 30% of the

population.¹ According to Surveillance, Epidemiology, and End Results estimates 11.2% of US adults will be diagnosed with prostate cancer, 2.3% with bladder cancer, and 1.7% with kidney cancer over their lifetime.²

Despite the prevalence of these and other urologic conditions, medical schools continue to provide sparse urologic educational opportunities. As noted by the AUA website, "Fifty years ago, virtually all medical students in the United States received didactic training in urology. Currently, only 17% of medical students do so." Shockingly, it seems that 48% of schools surveyed had no urology lectures or coursework required prior to the third year clinical rotations, and only 5% had a mandatory urology clinical clerkship.³

In his 1940 *A Surgeon's Autobiography*, Hugh Hampton Young wrote:

With the rapid development of medical science and art in every direction the undergraduate student has been veritably swamped by the learning to be acquired. Here we make no effort to give detailed instruction to undergraduate medical students, nor to make them expert in urologic technique. If we can sufficiently instruct them in the fundamentals that are of utmost importance to good knowledge of medicine and surgery, we have accomplished enough. If at the same time we can inspire them with the importance and the beauty of the subject, some will be likely to return, demanding to be initiated into the intricacies of the art.⁴

Urology education in medical schools has failed to meet this standard. The cause for these educational deficits is multifactorial, and includes medical school curricula, insufficient Association of American Medical Colleges guidelines, and the relatively small footprint of most urology departments as compared to larger specialties. However it is incumbent on urologists to take

responsibility for advocating for education in our specialty. We agree with Sam et al, that our professional organizations should continue to lobby consistently for mandatory urology rotations for all medical students, particularly as many schools move to increase the time for clinical rotations at the expense of lectures. Every medical student should be cognizant of basic urologic core subjects.

The article by Sam et al may also garner some soul searching from urologists individually. How many of us have reached out to our medical school colleagues and offered to teach? Urologists are busy surgeons, and urology has been a popular field among medical students, perhaps leading to a sense of complacency in our approach to undergraduate medical education. The long-term benefits of being proactive in this regard will be evident in the caliber of our trainees and our colleagues in other specialties.

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References

1. Centers for Disease Control and Prevention (CDC). *National Center for Health Statistics (NCHS). National Health and Nutrition Examination Survey Data*. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2013–2014. Accessed July 20, 2018.
2. Surveillance, epidemiology, and end results (SEER) program (<http://www.seer.cancer.gov>). Accessed July 20, 2018.
3. Sam P, Heermans J, Schmidt CM, Deibert C. Current state of urologic medical school education: a scoping review. *Urology*. 2018;117.
4. Young HH. *Hugh Young: A Surgeon's Autobiography*. New York: Harcourt, Brace and Company; 1940.

<https://doi.org/10.1016/j.urology.2018.07.045>

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