Analysis of evidence within the AUA's clinical practice guidelines

Samuel G. Antoine, MD, Alexander C. Small, MD, James M. McKiernan, MD, Ojas Shah, MD

Department of Urology, Columbia University Irving Medical Center, New York, New York, USA

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Introduction: *Surgical subspecialty societies release clinical practice guidelines (CPGs) to provide topic-specific recommendations to healthcare providers. We hypothesize that there may be significant differences in statement strength and evidence quality both within the American Urological Association (AUA) guidelines and compared to those published by the American Academy of Orthopedic Surgeons (AAOS) and American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS).*

Materials and methods: *CPGs issued through 2017 were extracted from the AUAnet.org. Statements were characterized by evidence basis, strength, and evidence quality. CPGs were compared among urologic subspecialties and to those from the AAOS and AAO-HNS. Analysis used Fisher's exact tests and Student's t-tests with significance $p < 0.05$.*

Results: *A total of 25 AUA CPGs (672 statements) were reviewed and 34.6% were non-evidence based with the highest proportions in pediatrics (47.5%) and sexual medicine (46.5%). The AUA has published over twice as many statements as the AAOS and quadruple that of the AAO-HNS. A smaller proportion of the AUA statements were evidence-based (65.4%) compared to the AAOS (80.5%, $p < 0.001$) and AAO-HNS (99.8%, $p < 0.001$), and fewer used "high" quality evidence (AUA 7.2% versus AAOS 21.2%, $p < 0.001$; versus AAO-HNS 16.1%, $p < 0.001$).*

Conclusions: *The AUA has published broad CPGs that far exceed those from the AAOS and AAO-HNS. The AUA has utilized extensive resources to provide guidance to help standardize care among urologists. The AAOS and AAO-HNS may not provide guidelines when evidence is limited. With the continued increase of high quality clinical trials, the AUA will be able to continue improving its robust set of evidence-based CPGs.*

Key Words: evidence-based medicine, evidence-based practice, urology, urologic diseases

Introduction

Surgical subspecialty societies release clinical practice guidelines (CPGs) to provide topic-specific, evidence-based recommendations to healthcare providers. CPGs can shape practice patterns and help define standard of care. Publication of CPGs requires significant resources and ideally should cover common conditions to attempt to standardize evaluation and treatment of these disorders.

The American Urological Association (AUA) has been releasing clinical practice guidelines since 1994. The guidelines cover a wide variety of topics across oncology, pediatrics, sexual medicine, urolithiasis, trauma/reconstruction and voiding dysfunction. Recommendations on diagnostic, therapeutic and follow up strategies are designed to aid clinicians and patients in decision-making. Multiple studies have shown that urologists tend to follow the AUA guidelines in practice with variable adherance.[1-3] Furthermore, guideline recommendations have been shown to impact national surgical practice patterns.[4]

Guidelines play an important role in surgical subspecialty practice. The Institute of Medicine mandates strict development criteria to create guidelines that clinicians can trust and implement to improve patient care. Guidelines should be based on a systematic review of the literature, assessment of quality, bias, and confounding factors in the evidence, an assessment of potential benefits and harms of the different care options, and a review by

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Address correspondence to Dr. Ojas Shah, Department of Urology, Columbia University Irving Medical Center, 161 Fort Washington Ave, 11th Floor, New York, NY 10032 USA

a panel of experts that will make a recommendation statement based on these findings.[5] The AUA and other surgical subspecialty societies like the American Academy of Orthopedic Surgeons (AAOS) and American Association of Otolaryngology-Head and Neck Surgery (AAO-HNS) guidelines have similarly been shown to influence clinical practice patterns.[6,7] Subspecialties including OB/GYN, neurosurgery, plastic surgery and ophthalmology also release their own clinical guidelines, consensus statements and opinion statements to the same effect.

Guidelines are not without controversy. The National Guideline Clearinghouse (www.guideline.gov) has a repository of over 2000 guidelines, including those from the AUA, AAOS, and AAO-HNS. It can be difficult for clinicians to navigate this complex array of recommendations. Questions as to the validity of the evidence that provides the basis for the guidelines, conflicts of interest among expert panel members, and feasibility of implementation are common concerns among clinicians.[8] It is imperative that guidelines be based on the highest quality evidence that is available.

Previous studies have compared specific AUA guidelines to other organizations' recommendations to describe differences in methodology and agreement.[9,10] There has never been a study of the AUA guidelines as a body of literature or a comparison of the urological guidelines to other surgical subspecialties. We hypothesize that there may be significant differences in the strength of statements and quality of evidence in the AUA guidelines compared to those published by the AAOS and AAO-HNS.

TABLE 1. **American Urological Association clinical practice guideline documents**

Subspecialty	Guideline document	Year published	(Reviewed or updated)	Statements
Oncology	Asymptomatic microhematuria	2012	(2016)	19
Oncology	Castrate resistant prostate cancer	2013	(2015)	22
Oncology	Detection of prostate cancer	2013	(2015)	5
Oncology	Adjuvant and salvage radiation after prostatectomy	2013		9
Oncology	Follow-up for clinically localized renal neoplasms	2013		27
Oncology	Non-muscle invasive bladder cancer	2016		38
Oncology	Muscle invasive bladder cancer	2017		35
Oncology	Prostate cancer	2017		68
Oncology	Renal mass	2017		31
Pediatrics	Vesicoureteral reflux	2010	(2017)	48
Pediatrics	Cryptorchidism	2013	(2015)	16
Sexual medicine	Priapism	2003	(2010)	17
Sexual medicine	Premature ejaculation	2004	(2010)	4
Sexual medicine	Erectile dysfunction	2005	(2011)	20
Sexual medicine	Vasectomy	2012	(2015)	15
Sexual medicine	Peyronie's disease	2015		22
Trauma/reconstruction	Urotrauma	2014		39
Trauma/reconstruction	Male urethral stricture	2016		32
Urolithiasis	Medical management of kidney stones	2014		27
Urolithiasis	Surgical management of stones	2016		56
Voiding dysfunction	Benign prostatic hyperplasia	2010	(2014)	30
Voiding dysfunction	Interstitial cystitis	2011	(2014)	26
Voiding dysfunction	Overactive bladder	2012	(2014)	23
Voiding dysfunction	Urodynamics	2012		19
Voiding dysfunction	Stress urinary incontinence	2017		24

Materials and methods

AUA clinical practice guideline documents released through May 2017 were obtained online from AUAnet.org. Guideline documents are summarized in Table 1. Documents were reviewed for year of publication, year of most recent update and category (oncology, pediatrics, sexual medicine, urolithiasis, trauma/reconstruction or voiding dysfunction). Guideline statements were extracted from each document and individually reviewed.

AUA guideline statement type (standard, recommendation, option, clinical principles, or expert opinion) and evidence grade if applicable (A, B or C) were extracted. Guideline strength nomenclature is summarized in Table 2 and evidence strength designations are summarized in Table 3a and 3b. Guidelines originally released before 2011 did not use the evidence grade system and instead designated whether statements were based on data review, data review and panel consensus, or panel consensus alone. Guidelines initially published after 2011 incorporated the use of the Quality Assessment of Diagnostic Accuracy Studies (QUADAS) tool for diagnostic statements and Grading of Recommendations, Assessment, Development and Evaluation (GRADE) framework to assess the quality of evidence. The GRADE system assigns "A," "B," "C," or non-evidence based designations.[11,12] And an expert panel assigns the overall strength of the statement. The nomenclature system was updated again in 2015 to include specific recommendation strength. Within evidence-based statements, AUA "standard" and "strong recommendations" statements were classified as "high" strength, "recommendations" and "moderate recommendations" were classified as "moderate" strength, and "options" and "weak recommendations" were classified as "low" strength. For this study, statements that were "standards," "recommendations," "options," or those based on any "data review" were defined as evidence based,

TABLE 2. **Statement evidence quality nomenclature and definitions**

	AUA	**AAOS**	**AAO-HNS**
High	GRADE A: Well conducted RCT or exceptionally strong observational studies (high certainty)	LEVEL 1: Randomized controlled trial	GRADE A/CEBM LEVEL 1: Systematic review of randomized trials GRADE B/CEBM LEVEL 2: Randomized trials or observational studies with dramatic effects or highly consistent evidence
Medium	GRADE B: RCTs with some weaknesses of procedure or generalizability or generally strong observational studies (moderate certainty)	LEVEL 2: Non-randomized controlled, prospective comparative LEVEL 3: Retrospective, case control	GRADE C/CEBM LEVEL 3-4: Nonrandomized or historically controlled studies, including case-control and observational studies
Low	GRADE C: Observational studies that are inconsistent, have small sample sizes, or have other problems that potentially confound interpretation of data (low certainty)	LEVEL 4: Case series LEVEL 5: Downgraded	GRADE D/CEBM LEVEL 5: Case reports, mechanism-based reasoning, or reasoning from first principles. Or uncertain evidence quality of herbal therapy studies

AUA = American Urological Association; AAOS = American Academy of Orthopedic Surgeons; AAO-HNS = American Academy of Otolaryngology-Head and Neck Surgery

TABLE 3a. **Statement strength nomenclature and definition**

	AUA		
	< 2011	**2011-2014**	**2015+**
Strong	STANDARD: A guideline statement is a standard if (1) the health outcomes of the alternative interventions are sufficiently well known to permit meaningful decisions, and (2) there is virtual unanimity about which intervention is preferred. [Based on panel consensus +/- review of the data]	STANDARD: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade A (high quality; high certainty) or B (moderate quality; moderate certainty) evidence.	STRONG RECOMMENDATION: Directive statements that an action should (benefits outweigh risks/burdens) or should not (risks/ burdens outweigh benefits) be undertaken because net benefit or net harm is substantial.
Moderate	RECOMMENDATION: A guideline statement is a recommendation if (1) the health outcomes of the alternative interventions are sufficiently well known to permit meaningful decisions, and (2) an appreciable, but not unanimous majority agrees on which intervention is preferred.	RECOMMENDATION: Directive statement that an action should (benefits outweigh risks/burdens) or should not (risks/burdens outweigh benefits) be taken based on Grade C (low quality; low certainty) evidence.	MODERATE RECOMMENDATION: Directive statements that an action should (benefits outweigh risks/burdens) or should not (risks/ burdens outweigh benefits) be undertaken because net benefit or net harm is moderate.
Weak	OPTION: A guideline statement is an option if (1) the health outcomes of the interventions are not unknown or equivocal.	OPTION: Non-directive statement that leaves the decision regarding an action up to the risks/burdens appears equal or appears uncertain based on Grade A (high quality; high certainty), B (moderate quality; moderate certainty), or C (low quality; low certainty) evidence.	CONDITIONAL RECOMMENDATION: Non-directive statements used when the evidence indicates risks/burden is unclear. All three statement types may be supported by any body of evidence strength grade.
Non-evidence based	"Based on panel consensus"	EXPERT OPINION: A statement, achieved by consensus of the panel, that is based on members' clinical training, experience, knowledge and judgment for which there is no evidence.	EXPERT OPINION: A statement, achieved by consensus of the panel, that is based on members' clinical training, experience, knowledge, and judgement for which there is no evidence.

whereas statements that were "expert opinions" or "based on panel consensus" alone were defined as non-evidence based. "Clinical principles" were excluded from the comparative analyses. These statements are fundamental practices defined as "component of clinical care that is widely agreed upon by urologists or other clinicians for which there may or may not be evidence in the medical literature." AUA grade "A" evidence

TABLE 3b. **Statement strength nomenclature and definition**

	AAOS	AAO-HNS
Strong	STRONG: Evidence from two or more "High" quality studies with consistent findings for recommending for or against the intervention.	STRONG RECOMMENDATION: A strong recommendation means the benefits of the recommended approach clearly exceed the harms (or that the harms clearly exceed the benefits in the case of a strong negative recommendation) and that the quality of the supporting evidence is excellent (Grade A or B). In some clearly identified circumstances, strong recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.
Moderate	MODERATE Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention.	RECOMMENDATION: A recommendation means the benefits exceed the harms (or that the harms exceed the benefits in the case of a negative recommendation), but the quality of evidence is not as strong (Grade B or C). In some clearly identified circumstances, recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits outweigh the harms.
Weak	LIMITED: Evidence from one or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for against the intervention or diagnostic or the evidence is insufficient or conflicting and does not allow a recommendation for or against the intervention.	OPTION: An option means that either the quality of evidence that exists is suspect (Grade D) or that well-done studies (Grade A, B, or C) show little clear advantage to one approach versus another
	INCONCLUSIVE: Evidence from a single low-quality study or conflicting findings that do not allow a recommendation for or against the intervention. An inconclusive recommendation means that there is a lack of compelling evidence resulting in an unclear balance between benefits and potential harm.	NO RECOMMENDATION: No recommendation means there is both a lack of pertinent evidence (Grade D) and an unclear balance between benefits and harms.
Non-evidence based	CONSENSUS: There is no supporting evidence. In the absence of reliable evidence, the guideline work group is making a recommendation based on their clinical opinion. Consensus statements are published in a separate, complimentary document.	GRADE X: Exceptional situation where validating studies cannot be performed and there is a clear preponderance of benefit over harm.

AAOS = American Academy of Orthopedic Surgeons; AAO-HNS = American Academy of Otolaryngology-Head and Neck Surgery

was classified as "high" quality, "B" was "moderate" quality, and "C" was "low" quality evidence. For the analysis of evidence quality, only guidelines published after 2011 that included letter grades were included. Guideline evidence basis, statement strength and evidence quality were compared among the different urological subspecialties.

AUA guidelines were compared to those released by the AAOS and the AAO-HNS, which were extracted from AAOS.org and ENTnet.org. Guidelines from several other surgical subspecialties including neurosurgery, plastic surgery, and OB/GYN were reviewed, but we chose to compare AUA guidelines to the AAOS and AAO-HNS because of analogous format and nomenclature allowing meaningful comparisons. As with the AUA guidelines, AAOS and AAO-HNS statements were characterized by whether or not they were evidence-based, the strength of the recommendation, and the quality of evidence included. Due to variability in nomenclature systems, guideline strength and quality were graded as "high," "moderate," and "low."

The AAOS gives each study found in the literature review either a level or quality designation based on the study design, and subsequently adjustment for biases based on standards suggested the QUADAS tool for diagnostic statements and GRADE for all other guideline statements.[12,13] The overall evidence is reviewed by an expert panel that assigns the overall strength of the recommendation as "strong," "moderate," "limited," "inconclusive," or "consensus." Evidence-based AAOS "strong" statements were classified as "high," "moderate" were classified as "moderate," and "limited" or "inconclusive" were classified as "low." AAOS inconclusive statements that were based on no evidence and consensus statements were classified as "non-evidence based." Select consensus statements that were considered common sense for any practitioner were considered "clinical principles" and were excluded from analysis. The AAOS did not give an aggregate grade for the evidence of a given statement, but based "strong" recommendations on "strong" evidence, "moderate" recommendations on "moderate" evidence, and so forth. The quality of evidence grade for AAOS statements was classified according to the strength of the recommendation for this reason.

The AAO-HNS uses the Oxford Centre for Evidence Based Medicine to assign a level (1-5) to each study included in their review, and an aggregate evidence quality grade of "A," "B," "C," "D," or "X."[11] Expert panel reviews then assign the strength of the guideline statement as "strong recommendation," "recommendation," "option," or "no recommendation." Evidence-based AAO-HNS "strong" statements were classified as "high," "recommendations" were classified as "moderate," while "option" and "no recommendation" statements were classified as "low" strength. AAO-HNS graded the aggregate evidence quality using the Oxford Centre for Evidence-Based Medicine (CEBM) or a letter grade. We classified A/CEBM 1 as "high," B or C/CEBM 2-4 as "moderate," D/CEBM 3-5 as "low." One statement cited "uncertain" evidence, which was classified as "low" quality, and grade X evidence was considered non-evidence based.

Comparisons between evidence and non-evidence based, statement strength, and evidence quality were performed with Fisher's exact test with $p < 0.05$. Number of statements per guideline was compared using the Student's t test. All analysis was performed using Microsoft Excel 2013 and R version 3.3.3 statistical computing program.

Results

AUA guidelines

A total of 25 AUA CPG documents, including 672 statements, were reviewed. Documents contained a mean of 26.9 ± 14.9 statements (median 24). The most guidelines/statements have been issued for oncology topics (9 guidelines/254 statements) and voiding dysfunction (5/122) and the fewest have been issued for pediatrics (2/64) and trauma/reconstruction (2/71). The least number of statements in a document was 4 for premature ejaculation and the most was 68 for prostate cancer. All guidelines were either written after or have been reviewed/updated since 2010.

Figure 1 summarizes the evidence within the AUA guidelines. There were 106 clinical principle statements excluded from the analysis. Of the remaining 566 statements, 34.6% (n = 196) were non-evidence based expert opinion or panel consensus statements. The other 65.4% (n = 370) were evidence-based statements. Evidence letter grade was designated in 307 of those statements including 7.2% (n = 22) grade "A," 33.6% (n = 103) grade "B," and 59.3% (n = 182) grade "C."

Figure 2 shows the breakdown of statement type within each urologic subspecialty and Table 4a and 4b summarizes the strength of recommendation and quality of evidence. Significantly higher proportions of non-evidence based statements were identified in pediatrics (47.5%, $p = 0.032$) and sexual medicine (46.5%, $p = 0.0323$). Urolithiasis guidelines had the highest proportion of "strong" statements (63.5%, $p < 0.001$) and voiding dysfunction had the highest proportion of "weak" statements (45.3%, $p = 0.004$).

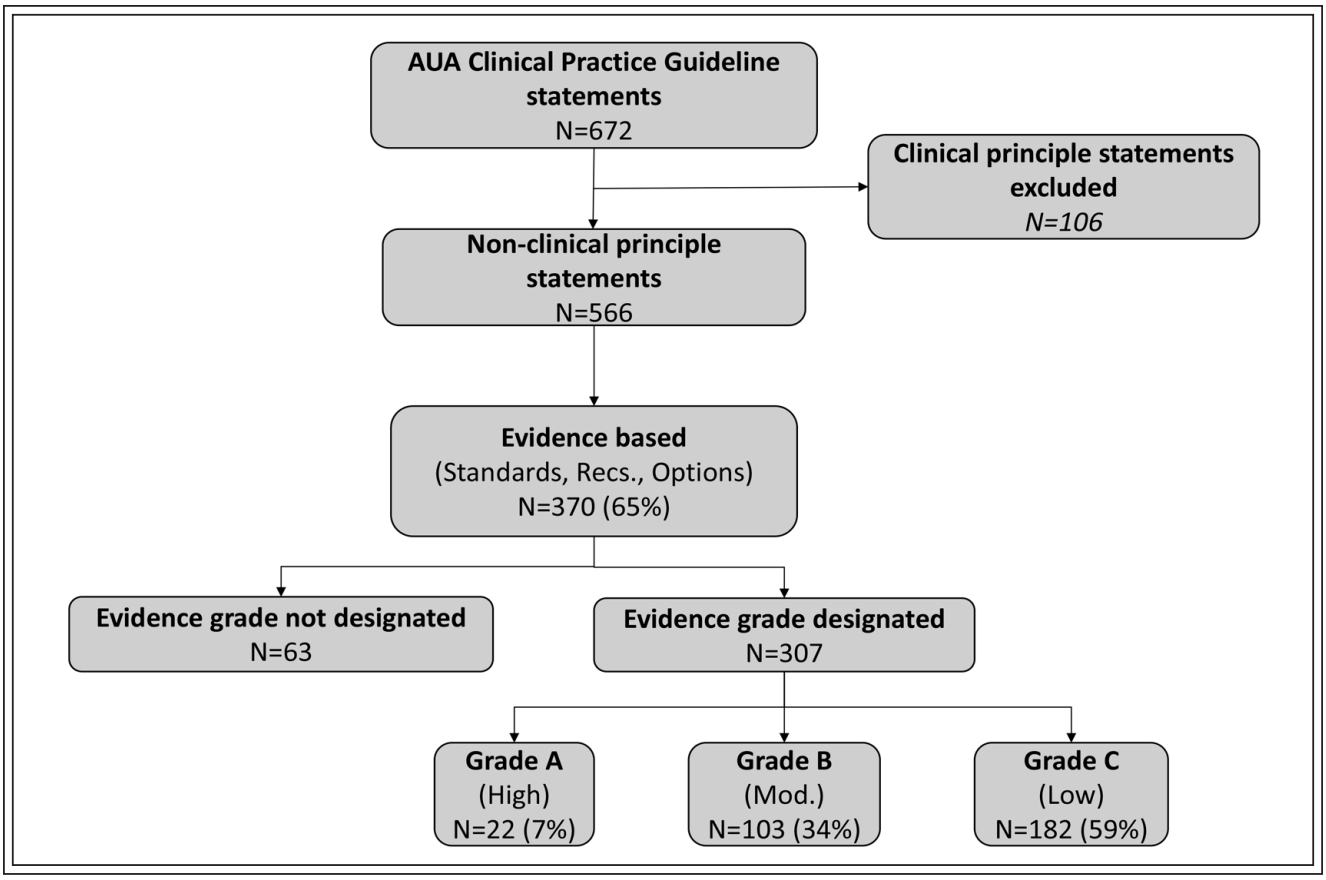

Figure 1. American Urological Association (AUA) guideline statement type and evidence grade overview.

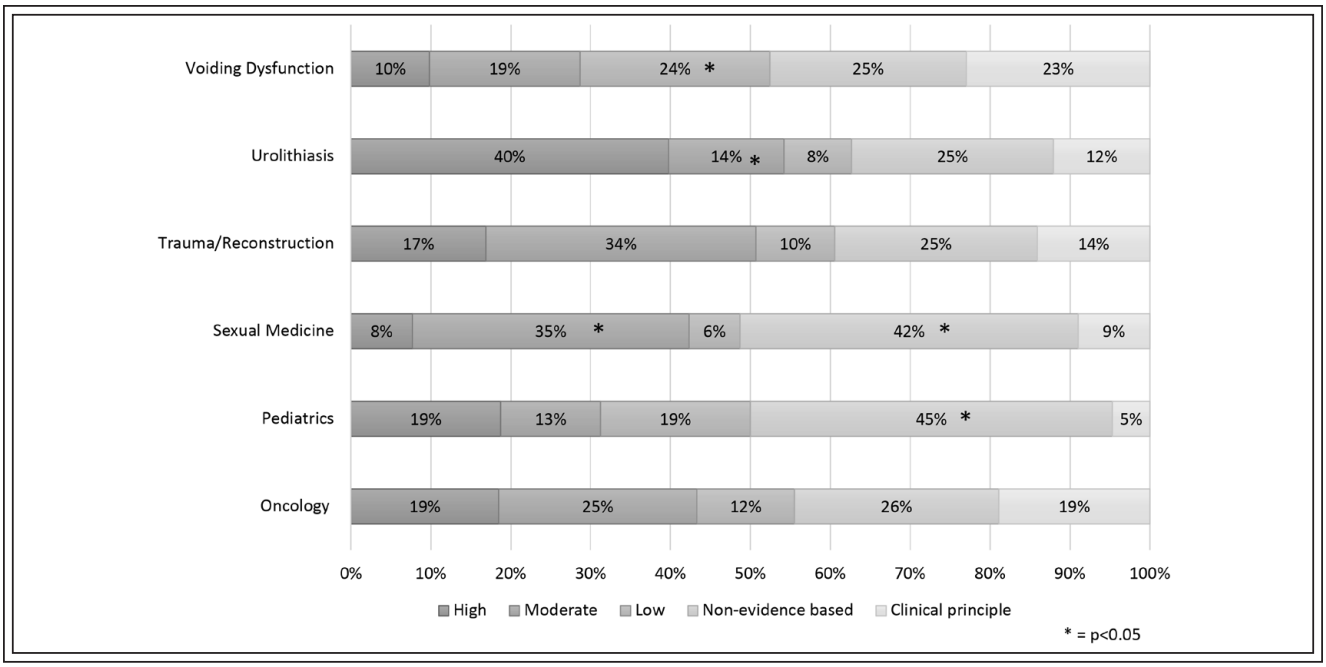

Figure 2. Statement strength among subspecialties in the American Urological Association (AUA) guidelines.

TABLE 4a. **Characteristics, statement strength and evidence quality among subspecialties in the American Urological Association (AUA) guidelines**

	Oncology			Pediatrics			Sexual medicine		
	n	%	p	n	%	p	n	%	p
Baseline characteristics									
Total guideline documents	9			2			5		
Total statements	254			64			78		
Statements/guideline (mean)	28.2			32			15.6		
Clinical principles	48	18.9%	0.101	3	4.7%	0.007	7	9.0%	0.097
Total non-clinical principle statements	206	81.1%		61	95.3%		71	91.0%	
Evidence based statements	141	68.4%	0.271	32	52.5%	0.032	38	53.5%	0.032
Non-evidence based statements	65	31.6%		29	47.5%		33	46.5%	
Statement strength									
Total with statement strength designation	141	100%		32	100%		38	100%	
High	47	33.3%	0.268	12	37.5%	0.306	6	15.8%	0.123
Moderate	63	44.7%	0.919	8	25.0%	0.259	27	71.1%	0.003
Low	31	22.0%	0.351	12	37.5%	0.212	5	13.2%	0.078
Evidence quality									
Total with evidence quality designation	141	100%		13	100%		19	100%	
High	16	11.3%	0.275	1	7.7%	1	0	0.0%	0.376
Moderate	39	27.7%	0.567	10	76.9%	0.001	6	31.6%	1
Low	86	61.0%	0.915	2	15.4%	0.002	13	68.4%	0.631

Among statements with evidence quality designation, high quality evidence ranged from 0% (sexual medicine and trauma/reconstruction) to 11.3% (oncology), but no significant differences were identified. The vast majority of the high-quality evidence came from oncology guidelines (69.6% or 16 of 23 statements based on high quality evidence).

Other surgical subspecialty guidelines

Comparison of the AUA guidelines to orthopedic and otolaryngology professional society guidelines is summarized in Table 5. The AUA has published over double the statements as the AAOS (n = 330) and quadruple that of the AAO-HNS (n = 163). Of note, neither the AAOS nor the AAO-HNS surgical subspecialties published any guidelines regarding oncologic conditions during this time frame. The AUA guidelines contained the most statements per document (AUA 22.6 ± 13.0 versus AAOS 17.9 ± 9.2, p = 0.191; and versus AAO-HNS 12.5 ± 3.3, p = 0.009). The AAOS guidelines contained seven "clinical principle" statements that were excluded from the quality analysis.

Significantly fewer of the AUA statements were evidence-based (65.4%) compared to the AAOS (80.5%, $p < 0.001$) or AAO-HNS (99.8%, $p < 0.001$). Despite the lower level of evidence, the AUA had the highest proportion of "strong" statements (AUA 33.0% versus AAOS 21.2%, p = 0.001; versus AAO-HNS 18.0%, $p < 0.001$). 7.2% (n = 22) of the AUA statements were based on "high" quality evidence, compared to the AAOS (21.2%, $p < 0.001$) and AAO-HNS (16.1%, p = 0.004) guidelines. Likewise, 59.3%% of AUA guidelines were based on "low" quality evidence compared to AAOS (46.9%%, $p < 0.001$) and AAO-HNS (2.5%, $p < 0.001$).

Discussion

CPGs can improve quality of care, influence policies and drive trends in healthcare delivery. The AUA has published an extensive body of CPGs across a wide range of subspecialty topics that far exceed the guidelines of other surgical subspecialties including more than double the number of statements as orthopedics and quadruple otolaryngology. The absolute number of evidence based statements

TABLE 4b. **Characteristics, statement strength and evidence quality among subspecialties in the American Urological Association (AUA) guidelines**

	Trauma/ reconstruction			Urolithiasis			Voiding dysfunction		
	n	%	p	n	%	p	n	%	p
Baseline characteristics									
Total guideline documents	2			2			5		
Total statements	71			83			122		
Statements/guideline (mean)	35.5			41.5			24.4		
Clinical principles	10	12.0%	0.421	10	14.1%	0.863	28	23.0%	0.020
Total non-clinical principle statements	61	85.9%		73	87.9%		94	77.0%	
Evidence based statements	43	70.5%	0.397	52	71.2%	0.293	64	68.1%	0.635
Non-evidence based statements	18	29.5%		21	28.8%		30	31.9%	
Statement strength									
Total with statement strength designation	43	100%		52	100%		64	100%	
High	12	27.9%	1	33	63.5%	<0.001	12	18.8%	0.162
Moderate	24	55.8%	0.255	12	23.1%	0.002	23	35.9%	0.169
Low	7	16.3%	0.191	7	13.5%	0.055	29	45.3%	0.004
Evidence quality									
Total with evidence quality designation	43	100%		52	100%		39	100%	
High	0	0.0%	0.091	2	3.8%	0.392	3	7.7%	1
Moderate	12	27.9%	0.858	25	48.1%	0.023	11	28.2%	0.853
Low	31	72.1%	0.232	25	48.1%	0.088	25	64.1%	0.86

published by the AUA (370) far exceeds that of the AAOS (260) and AAO-HNS (161), though the proportion may be lower. This study also found significant heterogeneity in statement strength and evidence quality in the AUA guidelines. While 58% of all guideline statements are evidence based, surprisingly few total statements are based on high quality evidence because of the current limitations in the urologic literature.

The AUA invests significant resources into the development of these guidelines, and may be more willing to provide guidance across a wider range of subjects where evidence is lacking or unavailable. There is a general impression among most urologists that the AUA is a leader in guideline development and that this improves patient care. Although evidence may be limited in pediatrics or sexual medicine, guideline creation can still benefit these areas of urology through expert opinion. Among the urology guidelines, most of the high-quality evidence was identified in the oncology documents where there tend to be more randomized, controlled clinical trials that comprise these grade A data. Meanwhile, at the time of this analysis, the AAOS and AAO-HNS guidelines did not address any oncologic topics.

CPGs have become critically important not only in individual clinical practice but also in systems based healthcare where physicians are expected to provide consistent, high quality care.[5] Furthermore, as non-physician providers take on larger roles in primary care and underserved areas, guidelines serve as a template for managing routine problems in urology. CPGs are also factored into reimbursement as they form the basis of quality of care measures and cost-effectiveness determinations.[11]

In urology, multiple groups can release guidelines on the same subject, creating dissonance and confusion. One study assessed 13 different clinical practice guidelines for the treatment of localized prostate cancer and showed significant variability in development rigor, applicability and editorial independence.[9] Other studies have evaluated guidelines for male infertility (n = 4), male lower urinary tract symptoms (n = 8) and urological trauma (n = 3), and all found variation in the methodological quality, implementation strategies and recommendation specifics.[10,14,15]

TABLE 5. **Characteristics, statement strength and evidence quality of the American Urological Association (AUA), American Academy of Orthopedic Surgeons (AAOS) and American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) guidelines**

	AUA		AAOS			AAO-HNS		
	n	%	n	%	p (AUA vs. AAOS)	n	%	p (AUA vs. AAO-HNS)
Baseline characteristics								
Total guideline documents	25		18			13		
Total statements	672		330			163		
Statements/guideline (mean ± SD)	22.6 ± 13.04		17.9 ± 9.2		0.191	12.5 ± 3.3		0.009
Clinical principles	106	15.8%	7	2.1%	< 0.001	0	0.0%	< 0.001
Total non-clinical principle statements	566	84.2%	323	97.9%		163	100.0%	
Evidence-based statements	370	65.4%	260	80.5%	< 0.001	161	98.8%	< 0.001
Non-evidence based statements	196	34.6%	63	19.5%		2	1.2%	
Statement strength								
Total with statement strength designation	370	100.0%	260	100.0%		161	100.0%	
High	122	33.0%	55	21.2%	0.001	29	18.0%	< 0.001
Moderate	157	42.4%	83	31.9%	0.008	102	63.4%	< 0.001
Low	91	24.6%	122	46.9%	<0.001	30	18.6%	0.144
Evidence quality								
Total with evidence quality designation	307	100.0%	260	100.0%		161	100.0%	
High	22	7.2%	55	21.2%	< 0.001	26	16.1%	0.004
Moderate	103	33.6%	83	31.9%	0.72	131	81.4%	< 0.001
Low	182	59.3%	122	46.9%	< 0.001	4	2.5%	< 0.001

This variation may lead to issues of compliance with guidelines. Studies have shown that urologists have highly variable rates of AUA CPG adherence – adherence for BPH guidelines varied between 53%-93%, for hematuria 36% of evaluations were guideline-adherent, and for non-muscle invasive bladder cancer less than 1% of patients received all recommended measures.[1,2,16] Regardless of irregular adherence, CPGs have been shown to impact national surgical practice patterns. After the release of the first AUA guideline on the management of small renal masses (2009), the rate of partial nephrectomy increased significantly in a population-based analysis.[4]

While the AUA guidelines follow similar methodology for development, one limitation of these studies is heterogeneity in nomenclature when describing strength of statements and evidence grade. The AUA most recently updated its nomenclature framework for new guidelines in 2015, and older guidelines are pending or undergoing update to provide consistency. Another suggested way to improve the development of clinical practice guidelines is to involve non-physician key stakeholders like patients, other health professionals, charitable organizations, and insurers.[17] By diversifying the panel of authors, guidelines could become more patient-centered, focusing on process of care, outcomes of importance and shared decision-making. Furthermore, uniform guideline nomenclature across medical specialties could allow for easier interpretation of the strength and evidence basis underlying those recommendations.

Government-issued guidelines can be politically charged and have been criticized for recommending too much or too little. For example, in 1995 the Agency for Healthcare Policy and Research (AHCPR) reviewed the

evidence for the management of acute back pain and strongly recommended nonsurgical management.[18] The North American Spine Society strongly objected to these statements, and lobbied congress to significantly reduce funding for the AHCPR on the basis that these guidelines were biased against surgery. Nearly two decades later in 2012, a similar uproar was heard after the U.S. Preventative Services Task Force (USPSTF) issued a Grade-D recommendation against prostate specific antigen based screening for prostate cancer. Subsequent academic debate and political lobbying lead to the USPSTF recommendation being overturned in 2017.

This study is not without limitations. These data only provide a snapshot of the guidelines available at the current moment in time. AUA and other guidelines are periodically updated and new statements are released annually. In the future, this analysis could be repeated to evaluate how the guidelines change as different topics are addressed and new evidence reshapes existing documents. Studying the strength of recommendations and evidence grade provides an interesting perspective, but content of individual documents could be further dissected to gain deeper insight.

Conclusions

The AUA has published an extensive body of CPGs across a wide range of subspecialty topics that far exceed the guidelines of other surgical subspecialties. Despite lack of high quality evidence in many topics, the AUA has utilized extensive resources to provide guidance to practicing urologists to help standardize care, while other surgical subspecialties tend not to provide guidelines when evidence appears to be limited. With the continued increase in higher quality, randomized trials, the AUA will be able to provide practicing urologists and physicians with a robust set of high quality, evidence-based CPGs. □

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