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Guideline of guidelines: urinary incontinence

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The objective of the article is to review key guidelines on the management of urinary incontinence (UI) to guide clinical management in a practical way. Guidelines produced by the European Association of Urology (updated in 2014), the Canadian Urological Association (updated in 2012), the International Consultation on Incontinence (updated in 2012), and the National Collaborating Centre for Women's and Children's Health (updated in 2013) were examined and their recommendations compared. In addition, specialised guidelines produced by the collaboration between the American Urological Association and the Society of Urodynamics, Female Pelvic Medicine and Urogenital Reconstruction on overactive bladder and the use of urodynamics were reviewed. The Appraisal of Guidelines for Research and Evaluation II (AGREE) instrument was used to evaluate the quality of these guidelines. There is general agreement between the groups on the recommended initial evaluation and the use of conservative therapies for first-line treatment, with a limited role for imaging or invasive testing in the uncomplicated patient. These groups have greater variability in their recommendations for invasive procedures; however, generally the mid-urethral sling is recommended for uncomplicated stress UI, with different recommendations on the approach, as well as the comparability to other treatments, such as the autologous fascial sling. This 'Guideline of Guidelines' provides a summary of the salient similarities and differences between prominent groups on the management of UI.

Keywords

urinary incontinence, guidelines, urodynamics, anti-incontinence procedures

Introduction

Urinary incontinence (UI) is a common disease, with prevalence as high as 30% in women aged 30–60 years. About 50% of this UI is attributable to stress UI (SUI) [1]. Urgency UI (UUI) is another type of UI that contributes significantly. With myriad treatment options, both conservative and invasive, many professional organisations have created guidelines to help clinicians provide care for individual patients with UI.

These guidelines provide recommendations on the appropriate examinations and diagnostic testing for UI, as well as the role of conservative or invasive therapy. The methodologies upon which the guidelines are based are similar, starting with systematic reviews and grading of available literature (Table A1). Recommendations are then made with different definitions and strengths (Table A2) between the publications. Guidelines are not necessarily meant to be exhaustive, but act more as practical review of the evidence-based management of 'index patients'.

Guidelines Reviewed

The European Association of Urology (EAU) guidelines on UI, now in its third edition (2014) [2], initially utilised the first International Consultation on Incontinence (ICI) in 1998 [3] (Table 1). Subsequent updates have used both the International Consultation on Urologic Diseases [4] and the National Institute for Health and Care Excellence (NICE) [5] literature reviews to create an underlying framework to their guidelines. However, since 2012, editions have been written based on thorough literature review, integrating studies from databases such as MedLine with Cochrane Centre publications and meta-analyses, creating a completely new framework, Updates are now performed annually to include newer interventions, such as mirabegron or more current evaluation of drug options, and patient-reported outcomes, and provides grades of recommendations A–C (Table A2) [2].

The Canadian Urological Association (CUA) first published practical guidelines in 2005 and gave updated recommendations in 2012 based on a review of PubMed, MedLine, and The Cochrane Library database. They provided grades of recommendations that were defined similarly to the EAU guidelines, with the addition of a recommendation Grade D for inconsistent or inconclusive evidence [6].

The AUA focused on surgical management for female SUI and created a meta-analysis from literature review in 1997 [7], updated with current literature in 2009 [8] and again

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Table 1 Guidelines reviewed.

Guideline	Year of publication/ update
European Association of Urology (EAU)	2014
Canadian Urological Association (CUA)	2012
American Urologic Association (AUA)	2012
International Consultation on Incontinence (ICI)	2012
Diagnosis and Treatment of Overactive Bladder (Non-Neurogenic) in Adults: AUA/SUFU Guideline	2012
Urodynamic Studies in Adults: AUA/SUFU Guideline	2012
National Institute for Health and Care Excellence (NICE)	2013

revised in 2012 [9]. Their goal was to provide standards, recommendations and options to guide clinicians on the management of SUI (Table 2). This will be referred to as the AUA guideline; however, this organisation also has a separate guideline in collaboration with the Society of Urodynamics, Female Pelvic Medicine and Urogenital Reconstruction (SUFU) specifically on the diagnosis and treatment of overactive bladder (OAB), updated in 2014 [10] (referred to as the AUA/SUFU OAB guideline) and a 2012 guideline on the use of urodynamic studies (UDS) in adults (referred to as the AUA/SUFU UDS guideline). This UDS guideline, like the others mentioned, is based on a systematic review of articles from 2005 to 2011 [11].

Other guidelines exist, such as the continued work of the ICI, which collaborates with the International Scientific Committee (ISC) to produce clinical recommendations for practitioners. The ICI produced its fifth edition of recommendations in 2012 on a vast number of topics initially analysed by sub-committees, including evaluation and treatment of UI [4]. Recommendations were based of the on subjective opinion of their group of recognised experts in the field and a review of the available published literature (Table 2). The ICI also creates a separate grading for recommendations for diagnostic tests and studies (Table 3).

The NICE created an updated guideline on SUI, OAB, and mixed UI (MUI) in women in 2013 [5]. This group used literature from the Ovid platform and assessed guidelines provided by other groups to create their own evidence synthesis and recommendations.

Of necessity, these guidelines relied on expert opinion or consensus to generate recommendations when the data on topics were either limited or conflicting. Although this does limit the strength of the recommendation, all the guidelines reviewed clearly articulated when 'Expert Opinion' was relied upon. By providing the recommendations of all these organisations, this guideline of guidelines will hopefully help clinicians evaluate if a recommendation is varied, due to both known and unknown external influences, and determine a treatment pathway that is best for the patient and less affected by biases. It would be ideal for the clinician if a formalised collaborative effort could be made between these groups to create a singular guideline on management of UI. However, these organisations represent patient populations that are different and unique, and influenced by very different healthcare systems and, in some cases, external influences. Therefore, a uniform recommendation may not be applicable universally.

Prominent groups, such as the Royal Australian College of General Practitioners, have also produced guidelines on management of UI [12]; however, many groups, including this one, drew upon the previously mentioned guidelines to form their recommendations. In an effort to avoid redundancy and create a concise summary, these other guidelines are not specifically discussed.

We used the Appraisal of Guidelines for Research and Evaluation II (AGREE) instrument [13] to describe the

Table 2 Initial evaluation.

Recommendation	Guideline supporting recommendation (Grade included if specified)
Detailed history with emphasis on characterization of incontinence	EAU, AUA, CUA, NICE (Level 4), ICI (Level 5 – Grade D)
Detailed partum history	EAU
Exclude other disease processes (e.g. malignancy, ectopic ureter, etc.)	EAU
Physical examination	EAU, AUA, CUA, NICE, ICI
Pelvic examination	ICI, NICE (Level 4), CUA (Grade C)
Leakage of urine objectively observed in order to diagnose SUI	AUA (Standard)
Assess patient treatment expectations	CUA (Level 2 – Grade B)
Bladder/voiding diaries	NICE (Level 3)
3-day bladder diary	ICI (highly recommends)
3–7-day bladder diary	EAU (Level 2b – Grade A)
Voiding diary	AUA (Grade C), AUA/SUFU OAB
Questionnaires	EAU Grade B (for monitoring changes)
ICIQ for initial assessment	CUA and ICI (Grade A)

Table 3 Diagnostic tests.

Recommendation	Guideline supporting recommendation (Grade included if specified)
Urine analysis	EAU, AUA, CUA, ICI, NICE (Level 2)
Post-void residual urine volume measurement for symptoms of incomplete emptying or distended bladder on examination	EAU, AUA, CUA, ICI, NICE
Pad testing for quantifying UI	EAU (Grade C), AUA (Recommendation)
Pad testing for monitoring change after treatment	EAU (Grade C)
Routine imaging not recommended	EAU, AUA, CUA, ICI, NICE
Cystoscopy not recommended in uncomplicated UI	EAU, AUA, CUA, ICI, NICE
Cystoscopy when fistula suspected	CUA

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quality of the guidelines examined. When provided, supplementary material was reviewed and included in our analysis. The present paper's authors found that all guidelines drew upon high quality literature and thus had high values for the 'Rigour of Development', and generally had excellent description of scope, purpose, and applicability, with clear presentation of topics. However, several of the guidelines were limited in describing contributing authors' conflicts and competing interests, and at times the intended user of the guideline was not clearly articulated. Scores were assigned based on careful review of the guidelines and material provided. Ultimately, the AGREE analysis is meant to comment on the reader's ease of ascertaining the topics the AGREE analysis touches upon. Low scores may therefore be given for difficulty determining the answers to these topics in the body of work, although the answers may be present. It is important to note that several of these guidelines were not intended as exhaustive review articles, but rather as an accessible and applicable resource for clinicians. As a result, although all these guidelines are excellent in many of the domains of the AGREE II analysis, they receive low scores in certain areas that may have been beyond the intent of their work. We think all these guidelines are robust, for which reason they were included in our present review. Lower scores on the AGREE II analysis should not be interpreted as less reliable recommendations, but instead as not adhering strictly to all factors considered as complete by the AGREE instrument.

Overall, all guidelines were assigned high scores, validating their high quality (Table A4).

Initial Evaluation

History and physical

The guidelines on UI agree that a detailed history is a requirement (Table 2). The consensus of these guidelines is a characterisation of the UI, focused on severity, degree of bother, timing, presence (or absence) of urgency, or mixed symptoms (EAU, AUA, NICE). The ICI makes recommendation as well but gives it the lowest level and quality of data (Level 5, Grade D) [14].

The guidelines on UI recommend considering other disease processes that can present as UI, but require further evaluation and a different management pathway. Emphasis varies based on the scope of the guideline (i.e. UI in general vs disease-specific guidelines – SUI).

The physical examination is appreciated as an important part of the evaluation and diagnosis of UI, but lacks high-quality data to prove its worth. The evaluation should include general status (mental status, obesity, mobility), an abdominal examination, and a pelvic examination. The CUA (Grade C) and ICI encourage specific evaluation of pelvic floor muscles. NICE gives 'Expert Opinion' that an assessment of the patient's pelvic floor should be evaluated to determine if pelvic floor muscle training (PFMT) would be therapeutic, although they acknowledge there is a lack of evidence to support this (level of evidence 4). The AUA provides a 'Standard' that, in order to diagnose SUI, a leakage of urine with increased abdominal pressure must be objectively shown on examination (positive stress test); otherwise the symptoms may represent an abnormal detrusor contraction. However, an opinion piece by Bhavin et al. [15] reviewing these guidelines questions this dogma, and counsels that, in their experience, patients with absent objective findings of SUI may still have subjective improvement in symptoms with therapy.

Questions and questionnaires

Assessment of patients' treatment expectations is given a Grade B recommendation (level of evidence 2) by the CUA as this guides treatment options. This sentiment is echoed by the AUA, making the assessment of patient expectations a 'Recommendation', here based on panel consensus. The EAU guideline specifically asked if assessment of patient perspective improved patient outcomes. They do not find evidence; therefore do not specially make a recommendation. There is a statement in the document that poor adherence to therapy may be related to unrealistic expectations.

The ICI highly recommends the use of a 3-day bladder diary for initial evaluation, while the EAU specifies a Grade A recommendation (level of evidence 2b) to use 3–7 day diaries if a patient with UI is having concurrent storage and voiding symptoms. The exact duration is not agreed upon based on the studies they reviewed [16,17]. Similar level of evidence existed for the diary to be used as a measure of outcome [18]. The AUA guideline for treatment of SUI also recommends the use of a voiding diary (Grade C, Panel Consensus), as does the AUA/SUFU OAB guideline. NICE cautions that the optimal duration of a voiding diary is unclear (level of evidence 4), and recommend a minimum of 3 days for initial assessment of OAB.

The scope and aim of the various guidelines may result in different conclusions about the utility and evidence behind the use of questionnaires, with some more highly recommended than others. The CUA and ICI give a Grade A recommendation to include the ICI Questionnaire (ICIQ) as part of initial assessment for specific clinical situations. However, the EAU guideline on UI states there is low level evidence of the increased sensitivity of tests such as the ICIQ or quality-of-life (QoL) questionnaires over bladder diaries [19], where no evidence was found to show that these questionnaires have an impact on outcome of treatment. In fact, many of the studies the EAU reviewed using patient-reported outcome measures were actually done in patients without UI [19,20]. The EAU gives a Grade B

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recommendation for their use in standardised assessments, e.g. to monitor change after an intervention. NICE recommends the use of high-quality questionnaires for quantifying the impact of symptoms on QoL, and to use for assessing outcomes after treatment. Similar to other guidelines, they recommend the use of questionnaires such as the ICIQ, amongst others.

Initial Diagnostic Tests

Guidelines on UI agree upon a urine analysis as an initial diagnostic test and, if a patient is having symptoms of incomplete emptying or examination findings are concerning for a distended bladder, to measure post-void residual urine volume (PVR) (Table 3). Interpretation of this value must be done cautiously, as there is no consensus on an abnormal PVR [15].

The EAU (Grade C recommendation) and the AUA (Recommendation) supports pad testing when quantification of UI is required, as there is good evidence that pad tests can diagnose UI, as well as correlate the test to a patient's symptoms (Level 1b evidence by the EAU) [21,22]. In addition, studies support (level of evidence 1b) that changes in leaked urine volume in repeat pad testing has use in measuring treatment outcome [23,24], The EAU supports repeat pad testing for detecting change after treatment (Grade C). NICE agrees pad testing has utility in evaluating therapy; however, they caution that there is a lack of evidence of its use affecting outcome (Level 3).

Tests for urethral mobility or competence include the Q-tip test, Bonney, Marshall, and Fluid-Bridge tests. Based on a lack of evidence that these tests aid clinical assessment, NICE recommends against their use.

Guidelines agree with a high level of evidence that routine imaging is not recommended unless there is concern for other underlying pelvic disorders. There is agreement that routine cystoscopy should not be performed in the uncomplicated UI patient.

There are certain indications where the initial diagnostic testing is not sufficient. The AUA, for example, recommends further evaluation in the following circumstances: OAB symptoms, history of prior pelvic surgery (especially prior anti-UI procedures), neurogenic bladder, an elevated PVR, high-grade pelvic organ prolapse (POP), a negative stress test with SUI symptoms, an uncertain diagnosis, and, perhaps most importantly, the patient's willingness to undergo these studies. Further evaluation may include cystoscopy, UDS, imaging studies, pad testing, and voiding diaries. In some clinical scenarios, a fistula can be a cause of UI, and therefore test with dyes to stain urine can help. The use of dyes is also included in the appendix of the EAU guidelines, but no specific recommendation is made. The CUA recommends cystoscopy when a fistula is suspected [25].

Urodynamic Studies

UDS are a series of tests that can be invaluable for managing the lower urinary tract and LUTS (Table 4). The questions that arise surrounding UDS usually focus on the timing of this test during the management algorithm, patient populations in whom UDS are indicated, and in what situations do UDS help predict outcomes of interventions.

In neurologically intact adults with SUI, the EAU provides Level 1a evidence that although 'preliminary urodynamics' did influence choice of treatment, they did not alter the clinical outcome of conservative or drug therapy [26]. They cite Level 1b evidence that 'preliminary urodynamics' failed to improve outcome of SUI surgery in patients that have uncomplicated clinical SUI [27,28]. The EAU recommendation is to not perform UDS if conservative treatment is pursued (Grade B), and recommends advising patients that UDS is useful to discuss treatment options, but does not predict treatment outcome (Grade C). The AUA/SUFU UDS guideline [11] provides 'the option' to perform UDS in patients with UI if considering invasive treatment, and both the ICI and the EAU recommends UDS testing if the results will alter treatment recommendation and management. NICE recommends against UDS before initiating conservative treatment. All guidelines recommend UDS if there is recurrent UI after invasive treatments.

The AUA/SUFU guideline on UDS made a total of 19 statements about UDS on four disease states: SUI/POP, OAB UUI and MUI, neurogenic bladder, and LUTS. For example, if symptomatic SUI is not seen on UDS, it recommends repeat stress testing with urethral catheter removal. This is based on studies by Maniam et al. [29] and Huckabay et al. [30], which report that 50% of women with SUI will fail to

Table 4 Urodynamic studies.

Guideline	Recommendation
EAU	Do not perform if pursuing conservative treatment (Grade B) Counsel that UDS does not predict treatment outcome (Grade C) Use UDS if results will alter treatment recommendation and management
ICI	Use UDS if results will alter treatment recommendation and management
AUA/SUFU UDS guideline	Option: perform in patients with UUI if considering invasive treatment
NICE	Consider if diagnosis unclear, history of prior surgery for SUI, or for symptoms suspicious for detrusor overactivity or voiding dysfunction (Level 4)
All guidelines reviewed	Use UDS if there is recurrent UI after failure of invasive treatments

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demonstrate SUI with a catheter in place; however, they will have objective SUI after the catheter is removed. It gives an 'Option' when stress-testing women with high-grade POP that the POP be reduced to assess for occult SUI [31]. Almost all of the statements made about UI are based on Grade C evidence strength or 'Expert Opinion'.

Conservative Management

All guidelines recommend a trial of conservative treatment before invasive therapy (Table 5). These conservative therapies include behavioural therapy, physical therapy, and scheduled voiding.

Behavioural therapy is recommended early in the treatment algorithm for both UUI and SUI. Scheduled voiding and restriction of fluid in women with excessive intake receives a Grade B recommendation from CUA, a well-validated recommendation by other groups such as the French College of Gynecologists and Obstetricians [32]. NICE recommends advising modification of overly high or overly low fluid intake in patients with OAB or UI symptoms. Smoking cessation receives a Grade C recommendation from the CUA, while the EAU gives a Grade A recommendation for cessation advice, consistent with good medical practice. However, the EAU acknowledges that smoking cessation does not have a definite effect on UI, based on a systematic review by Imamura et al. [33] providing only Level 4 evidence to support cessation.

Avoidance of caffeine is also recommended for the management of UI (Grade B from CUA and EAU). The EAU clarifies that caffeine reduction (Level 2 evidence) improves urgency and frequency, but not UI [34]. NICE gives a recommendation to encourage a trial of caffeine reduction in women with OAB. In obese women, the CUA gives a Grade A recommendation for weight loss as an intervention, and the EAU recommends >5% weight loss as a treatment plan (Grade A) [35]. Weight reduction evidence is cited in the AUA/SUFU OAB guidelines [36], included as one of the components of behavioural therapy. NICE recommends advising weight loss in women with a body mass index of >30 kg/m^2.

Table 5 Conservative management.

Recommendation	Guideline supporting recommendation (Grade included if specified)
Scheduled voiding	NICE (Level 3), CUA (Grade B)
Restriction of fluid	NICE (Level 1), CUA (Grade B)
Smoking cessation	CUA (Grade C), EAU (Grade A)
Avoidance of caffeine	NICE, CUA (Grade B), EAU (Level 2 – Grade B)
Weight loss >5% reduction	NICE (Level 3), CUA (Grade A) EAU (Grade A) AUA/SUFU OAB guideline
Treatment of constipation	EAU (Level 4 – Grade C)
Use of containment devices or disposable pads for light UI	EAU (Grade A)
Pads, external devices, and catheters for moderate-to-severe UI	EAU (Grade A)
PFMT	EAU (Level 1 – Grade A), CUA (Grade A)
Posterior tibial nerve stimulation (PTNS) for UUI	EAU for second-line treatment (Level 2b – Grade B) CUA (Grade B) AUA/SUFU OAB guidelines (use as third line)

Constipation is commonly treated in patients with UI; however, the EAU found no strong evidence that treating constipation will improve UI (level of evidence 4) and provide a Grade C recommendation to treat co-existing constipation in women with UI.

Bladder training (fluid intake, caffeine restriction, bowel habits, and voiding schedules) receives Grade A recommendations by both the CUA and the EAU as first-line therapies for UUI or MUI, although the EAU acknowledges Level 2 evidence that the effectiveness of this therapy diminishes when treatment is stopped. NICE recommends a trial of bladder training for a minimum of 6 weeks for OAB or MUI. The CUA provides Level 2 evidence that behavioural therapy improves symptoms at 3 months but is not sustained at 12 months [37].

The EAU supports the use of containment devices and recommends disposable pads for light UI (Grade A), and pads, external devices and catheters for moderate-to-severe UI (Grade A), with attention paid to balancing benefits and harms of each [38].

PFMT provides stabilisation of the urethra, and increases urethral closure pressures. The EAU reports Level 1 evidence that PFMT improves UI and QoL in both SUI and MUI as compared with no treatment [39], and both the CUA and EAU give Grade A recommendations for PFMT as first-line therapy for UUI [40]. However, the EAU reports Level 2 evidence that short-term benefits are not maintained at 15 years of follow-up [41]. NICE recommends a trial of supervised PFMT for a minimum of 3 months as a first-line treatment. If benefit is derived, they recommend continuing an exercise programme for these patients.

Posterior tibial nerve simulation (PTNS) is used in patients with UUI. Characterised as 'conservative therapy' in the EAU guideline, this therapy is considered in patients that have already tried antimuscarinic therapy. PTNS is also considered as a 'third line' in the AUA/SUFU OAB guidelines [10]. The EAU reports Level 2b evidence that PTNS is effective in patients who have failed antimuscarinic therapy, and give a Grade B recommendation to offer PTNS as a short-term option for improvement, although not cure, for these patients [42]. The CUA also gives a Grade B recommendation for its use, cautioning that maintenance is necessary to maintain efficacy [43]. However, NICE found that there was limited

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evidence evaluating the effectiveness of PTNS over alternative treatments, with limited outcome evidence supporting its use. As a result, NICE recommends against PTNS unless conservative management has failed, and recommend counselling patients that there is insufficient evidence to recommend its use.

Drug Therapy

Antimuscarinics are recommended as first- or second-line treatment for UUI by the CUA (Grade B) (Table 6). The CUA and EAU provide Level 1a evidence that the antimuscarinics are superior to placebo [44], but do not provide recommendation on which medication to choose. Instead the CUA guideline encourages the choice to be based upon patient and physician preference, physician experience, and coverage. Similarly, the AUA/SUFU OAB guidelines counsel clinicians with a 'Standard' (evidence strength Grade B) that they should offer symptomatic patients medication, with similar efficacy noted between all these oral medications [10]. The EAU supports that there is no consistent evidence that one antimuscarinic is better than another for curing UUI or improving QoL (level of evidence 1a); however, they do provide some drug-specific recommendations, such as using the immediate release (IR) formulations of medications for initial drug therapy for UUI, and switching to extended release (ER) or long-acting formulations if IR is ineffective. (Grade A) [44,45]. NICE recommends initiating therapy at the lowest recommended dose. The AUA/SUFU OAB guidelines give a 'Standard' that ER formulations should be preferentially prescribed over IR formulations, if available, for lower rates of dry mouth. NICE recommend offering transdermal formulations in patients with inability to tolerate oral medications. The ICI and the CUA recommends a trial of 8–12 weeks to assess efficacy of drugs, with consideration of an alternative drug if initial therapy is poorly tolerated. The AUA/SUFU OAB guidelines support this idea with a 'Clinical Principle' to consider dose modification or trial of another antimuscarinic if symptoms are not controlled, or for significant adverse drug effects. NICE recommends counselling patients on common adverse effects and that full benefits may not be achieved until 4 weeks after initiation.

Table 6 Drug therapy.

Recommendation	Guideline supporting recommendation (Grade included if specified)
Antimuscarinics as first- or second-line treatment for UUI	NICE, CUA (Grade B), AUA/SUFU OAB guideline (Grade B; Standard)
Similar efficacy between oral antimuscarinics	EAU (Level 1a)
Use IR formulations for initial therapy, use ER if ineffective	EAU (Grade A)
ER preferential to IR due to lower rates of dry mouth	AUA/SUFU OAB guidelines (Standard)
Trial of 8–12 weeks to assess efficacy of drugs	ICI, CUA
Consider dose modification or trial of another antimuscarinic if ineffective or adverse drug effects	NICE, AUA/SUFU OAB guidelines (Clinical Principle)
Caution use in elderly	EAU, CUA, AUA/SUFU OAB guideline
Use non-pharmacological treatments first	EAU (Grade A)
Combine behavioural changes with drug therapy	EAU (Grade C)
Duloxetine use for SUI and MUI	EAU (level 1a), NICE (second line therapy; Level 1+)
Use for temporary improvement in UI symptoms	ICI (Grade B), EAU (Grade B)
Mirabegron as a second-line treatment for SUI	EAU (Level 1a-grade B), AUA/SUFU OAB guideline, ICI, NICE
Desmopressin for short-term relief	EAU (Level 1b – Grade B), NICE
Post-menopausal women	EAU (Grade A), NICE (Level 1+)
Offer topical hormonal therapy if vulvovaginal atrophy present	EAU (Level 1a – Grade A)
Use alternative HRT for women on oral conjugate equine oestrogens	

HRT, hormone replacement therapy.

The EAU, the CUA, and the AUA/SUFU OAB guidelines caution against antimuscarinic use for UUI treatment in the elderly, and the EAU gives Grade A recommendation to make every effort to use non-pharmacological treatments first, due to cumulative effects of drugs on cognition that increases with length of exposure, and to combine modifications with drug therapy to reduce drug load (Grade C recommendation). As a 'Clinical Principle', the AUA/SUFU OAB guidelines state that antimuscarinics should not be offered to patients with narrow angle glaucoma without approval from the patient's ophthalmologist, and also to use with caution in patients with impaired gastric emptying or history of urinary retention. NICE specifically states that oxybutynin should not be used in frail, older women, as its risk of impairment of daily functioning is common.

α-Adrenergic drugs have the potential to increase urethral closure pressure. The EAU guidelines echo the Cochrane review [46] that these drugs are not superior to placebo for SUI. β-adrenergic receptor agonists can stimulate detrusor relaxation and the EAU now recommends offering mirabegron for UUI, along with patient counselling that the long-term effects are as yet uncertain (Grade B, Level 1a evidence) [47,48]. The AUA/SUFU OAB guideline gives a 'Standard' that either oral antimuscarinics or β_3-adrenoceptor agonists should be offered as a second-line treatment, with a level of evidence of Grade B that mirabegron is as efficacious as antimuscarinic therapy, and may have lower rates of constipation and dry mouth. There is limited knowledge of potential long-term effects of mirabegron, and potential adverse effects on patients with other significant comorbidities [10].

Duloxetine is not curative, but there is Level 1a evidence demonstrated by the EAU that it improves SUI and MUI in women [49,50]. However, there are high rates of

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discontinuation due to significant gastrointestinal and CNS side-effects. Both the ICI and the EAU give grade B recommendation to offer it for temporary improvement in UI symptoms.

The EAU found Level 1b evidence that desmopressin reduces UI within 4 h of administration; however, continuous use does not provide improvement or cure [51]. Therefore they gave a Grade B recommendation to offer its use to patients for short-term relief, not for long-term control, and that patients should be counselled that the European Union and the USA Food and Drug Administration does not license this medication for this purpose. NICE recommends desmopressin to reduce nocturia if that is the primary bothersome symptom, although caution for its use in women with cystic fibrosis and women aged >65 years with cardiovascular disease or hypertension.

The EAU (level of evidence 1a) and NICE (level of evidence 1+) found that oral conjugate equine oestrogens can increase the risk or worsen pre-existing UI in women [52]. They recommend topical hormonal therapy in postmenopausal women with UI and findings of vulvovaginal atrophy.

Surgical Management for SUI

The overall goal of surgical management should be to improve or cure UI (Table 7). An individual surgeon's experience factors into the type of surgical intervention offered. With this caveat in mind, the guidelines provide recommendations on how to counsel and decide between the various interventions. The guidelines reviewed cured/dry rates, as well as long-term cure rates for the different types of surgeries. Open colposuspension was historically considered the 'gold standard' surgical treatment for SUI, so a large body of research uses this technique as the comparator.

Open colposuspensions were compared with laparoscopic colposuspensions. The EAU and AUA found similar efficacy for SUI in terms of cured/dry rates, similar risks of voiding difficulties or *de novo* urgency, but found that laparoscopic surgery was associated with decreased length of hospital stay and lower risk of 'other complications' per the EAU [53]. The AUA described lower rates of febrile complications in laparoscopic vs open, based on their meta-analysis; however, they note higher rates of ureteric injury (4–11% vs 1% in open surgery) [9]. The CUA found comparable subjective outcomes, although poorer objective outcomes with laparoscopic colposuspension when compared with open colposuspension and mid-urethral slings (MUS) in the short- and medium-term for treatment of SUI (level of evidence 2). The CUA (Grade A) and NICE recommend against the use of laparoscopic colposuspension for routine surgical treatment of SUI, and the CUA gives a Grade D recommendation to consider this option if the patient is undergoing laparoscopic surgery for another intervention. The EAU and the AUA did not give specific recommendations about a choice between laparoscopic and open surgery.

Table 7 Surgical management for SUI.

Recommendation	Guideline supporting recommendation (Grade included if specified)
Open vs laparoscopic colposuspensions have comparable cured/dry rates	EAU, AUA
Due to poorer objective outcomes, recommend against laparoscopic technique	CUA (Grade A), NICE (Level 1)
Retropubic mid-urethral slings (MUS) is the preferred surgical treatment for uncomplicated SUI	EAU (Level 1a – Grade A)
MUS should be offered as preferred surgical treatment (retropubic, transobturator, or single incision)	AUA (Grade A)
Transobturator and retropubic approach for MUS have equivalent cure rates	EAU (Level 4), CUA
Counsel on higher risk of chronic pain and dyspareunia with transobturator approach, higher risk of perioperative complications with retropubic approach	EAU (Grade A)
Retropubic MUS as effective as autologous fascial sling	CUA (Level 2 – Grade A)
Autologous fascial sling more effective than biological or synthetic slings	CUA (Grade A)
Single-incision synthetic slings are less effective than conventional MUS techniques	EAU (Level 1b), CUA
Recommend against this approach for SUI treatment	CUA (Grade A)
Counsel that the efficacy of this approach is not yet determined	EAU (Grade A)
Concomitant SUI and prolapse surgical treatment can be performed	AUA (Recommendation), EAU (Grade A)
Tension the sling only after prolapse is repaired	AUA (Panel Consensus)
Benefit of prophylactic treatment of occult SUI is uncertain	AUA, EAU (Grade C)
Bulking agents provide short term improvement in SUI	CUA (Grade B), NICE (Level 3)
Do not offer to women seeking cure of SUI symptoms	EAU (Grade A)

MUS, mid-urethral slings.

The EAU, AUA and CUA found evidence that the retropubic MUS gave equivalent cure rates for SUI vs colposuspension, including a randomised comparative trial by Ward et al. [54] from the UK that revealed equivalent cure rates at 6 months between transvaginal tape and colposuspension for treatment of SUI. In addition, equivalent cure rates were noted between Burch colposuspension and the transobturator approach [55]. The EAU found a lower rate of *de novo* urgency symptoms and voiding dysfunction (level of evidence 1a) of the MUS vs colposuspension. The EAU made a Grade A recommendation that the MUS should be offered as the preferred surgical treatment when available for women with uncomplicated SUI.

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NICE overall recommends offering MUS, open colposuspension or autologous rectus fascial sling to patients who fail conservative therapy, and does not recommend one over the others.

The EAU and the CUA compared the transobturator with the retropubic approach to the synthetic MUS and found equivalent cure rates at 12 months. However, the EAU cited lower rates of *de novo* urgency, voiding symptoms, and intraoperative bladder perforation, and higher rates of chronic pain at 12 months with the transobturator approach vs the retropubic approach (level of evidence 1a) [56]. Overall, the EAU determined no evidence to support one type of procedure over another (Level 4 evidence). The EAU gave a Grade A recommendation to counsel on higher risk of chronic pain and dyspareunia with the transobturator approach, and the higher risk of perioperative complications in the retropubic approach. NICE recommends counselling patients that long-term data on the transobturator approach are lacking long-term outcome data.

When comparing autologous fascial slings, the EAU determined a similar cure rate when compared with open colposuspension (Level 1b); however, autologous fascial slings had higher complication rates including voiding dysfunction and postoperative UTIs [57]. The CUA found the retropubic MUS is as effective as the autologous fascial sling (Level 2 evidence); however, the autologous fascial sling was associated with more *de novo* storage urinary symptoms than the retropubic MUS [58]. The CUA gave a Grade A recommendation that the autologous fascial sling may be more effective than biological or synthetic slings, but caution that there are higher rates of storage urinary tract symptoms postoperatively.

The EAU and CUA reviewed single-incision synthetic sling (SIS) operations; however, the EAU determined these approaches were less effective than conventional MUS, despite shorter operative times and less immediate postoperative pain (level of evidence 1b) [59]. The CUA published that SIS are not recommended for SUI (Grade A), while the EAU gave a Grade A recommendation to counsel that the efficacy of SIS is not yet determined. NICE recommends against the use of needle suspensions in treating SUI.

The AUA guideline issued a 'Standard' that the intervention choice should be based on the patient's preferences, as well as the surgeon's experience and judgment. However, they did make a Grade A recommendation that the MUS (retropubic, transobturator, or SIS) should be offered as the preferred surgical treatment when available, due to the shorter operative time and recovery time, and the lower short-term morbidity. If the MUS is not available, they recommend offering colposuspension or autologous fascial sling, with counselling that there is a higher risk of obstructive voiding symptoms with the latter (Grade C).

The AUA evaluated SUI outcomes when surgical treatments were performed concomitantly with POP repair and, based on their meta-analysis, the AUA made a recommendation that it is safe to perform concomitant SUI and POP surgery only after the completing the POP repair ('Panel Consensus'). The panel did not have an opinion on the role of a prophylactic UI surgery on women presenting with high-grade POP who are discovered to have occult UI. The EAU gave a Grade A recommendation to perform simultaneous surgery for treatment of POP and SUI, although patients should be counselled that there is an increased risk of adverse events with combined surgery as compared with POP repair alone (level 1b evidence) [60]. Similar to the AUA, they state that the benefit of prophylactic treatment of occult SUI for POP is uncertain (Grade C recommendation). NICE did not include patients with POP in their guideline recommendations.

Bulking agents are periurethral injections that allow for short-term improvement in SUI symptoms. The EAU determined that repeat injections are often required for therapeutic effect (level of evidence 2a); however, the benefit is low adverse risks compared with open surgery [61]. The CUA advises bulking agents for indications such as older age, patients opting for less invasive surgery, and patients with high anaesthetic risk. They give a Grade B recommendation to offer this treatment, although both CUA and NICE recommend that patients should be counselled on the likelihood of requiring repeat injections, that the efficacy is inferior to conventional surgical techniques, and that the efficacy decreases over time [50].

Mesh Complications

Given recent USA governmental regulatory statements and the medical legal ramifications, the AUA guideline directly addressed the use of synthetic slings. They acknowledge that there are unique complications related to mesh insertion; however, they determined that these risks are rare, and gave a standard of care statement that intraoperative cystoscopy should be performed on all sling surgeries to help minimise these risks.

The AUA encourages surgeons to have an open discussion about mesh-related complications and the benefits of synthetic slings compared with biological or autologous slings. The CUA also recommends counselling on the potential need for repeat surgical intervention should a mesh-related complication arise. The CUA and AUA guidelines outline contraindications to mesh surgery that raise the risk of mesh-related complications.

'Surgical' Management for UUI

For patients with UUI, after failure of conservative and medical therapy, surgical interventions can be offered. Botulinum toxin (BTX) injections result in variable continence rates, ranging from 29% to 87% [6]. Repeat injections maintain efficacy without increasing adverse events [62]. The CUA gives their

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use a Grade B recommendation; however, notes that at the time of its guideline publication, it was not yet approved for use in idiopathic detrusor overactivity (DO) in Canada, although as of 2014 it has been approved for this indication. The ICI gives a Grade C recommendation for BTX use in treating symptomatic DO unresponsive to other therapies. Interestingly, the EAU gives a Grade A recommendation for BTX use in refractory UUI, although it recommends counselling patients on the limited duration of response, the risk of UTI, and the potential need to perform clean intermittent catheterisation (CIC). The AUA/SUFU OAB guidelines give clinicians a 'Standard' to offer BTX for patients who fail first- and second-line therapy, and cautions that this should only be offered to patients who agree to frequent visits to monitor for retention and are willing to catheterise if necessary. NICE states that this therapy should only be initiated if women have been sufficiently trained in CIC and are able to perform CIC if needed. They recommend starting with a dose of 200 units, although this should be reduced to 100 units if patients prefer a lower risk of catheterisation in exchange for potentially reduced chance of success.

Sacral neuromodulation (SNS) (Interstim®) has a cure rate of 39% for UUI and has approval for use in OAB, with numerous complications but low rates [63]. These include implantation site pain, lead migration, bowel dysfunction, infection, and generator problems. It is noted by the CUA to be an 'expensive treatment'. However, due to the efficacy of this treatment, both the EAU and CUA give a Grade A recommendation for use in refractory UUI. The AUA/SUFU OAB guideline makes the 'Recommendation' to offer SNS as a third-line treatment for refractory OAB symptoms. They counsel that, although SNS has been shown to offer subjective improvement, symptoms can return if treatment ceases. Because of the significant QoL improvements, they even state that the benefit for the appropriate patient outweighs the risks of the procedure. However, they give a recommendation Grade C on its use based on the lack of 'blinded' studies showing efficacy of SNS. NICE recommends counselling patients on long-term implications including the risk of failure, the long-term commitment required for efficacy, and adverse effects including potential need for surgical revision.

Augmentation cystoplasty is an intervention for refractory DO that is associated with high short- and long-term severe complications [64]. The CUA cites a 50% patient satisfaction rate with the outcome [65]. The EAU recommends offering this intervention only to patients with refractory DO who are not interested in BTX or SNS (Grade C). NICE, the EAU, and AUA/SUFU OAB guidelines advise counselling patients on the risks for CIC, the long- and short-term complications, and the possible small risk of malignancy (EAU Grade C). The AUA/SUFU OAB guidelines give the 'Expert Opinion' that this can be offered for rare cases of severe refractory OAB, with most of these cases related to neurogenic bladders. NICE discusses use of urinary diversion if patients fail conservative therapy and BTX, augmentation cystoplasty and SNS either fail or are unacceptable options.

Complicated UI

There are generally two broad categories for patients who have complicated UI: MUI and failed surgical therapy. For MUI, all guidelines recommend focusing on and treating the predominant symptom. The CUA recommends counselling patients that UUI may not improve with surgery for SUI (Grade B); however, there is a 50–74% chance of improvement or cure of OAB symptoms after sling procedures [66]. The EAU recommends counselling patients that the success of SUI surgery for MUI is decreased when compared with treating SUI alone (Grade A).

For patients who have failed prior surgery, the EAU found Level 2 evidence that SUI surgical options are less effective when they are performed as a second-line surgical therapy [67]. While autologous fascial slings were associated with improved cured/dry rates as compared with open colposuspension (level of evidence 2) [68], there is no evidence that one surgical option is better than another for second-line surgery (level of evidence 3). The EAU recommends basing surgical technique for recurrent SUI on careful evaluation of the patient and findings from UDS (Grade C). Patients should be counselled that second-line procedures have inferior outcomes, reduced efficacy, and a higher risk of complications when compared with first-line procedures (Grade C).

Conclusion

The topic of UI is vast and includes subtleties and intricacies regarding diagnosis, treatment, and varied patient populations and disease states. The guidelines that were discussed in the present review all have similar suggestions for the initial evaluation and use of conservative therapies. It is generally agreed that the initial evaluation should include a thorough history and tools to quantify and qualify the degree of UI. For the patients with uncomplicated SUI, invasive testing and imaging should be avoided, and UDS should be reserved for more complicated cases. Conservative therapy should be first line, including behavioural modifications.

As expected, there is more variability when it comes to recommendations for invasive measures. It is generally agreed upon that the MUS should be recommended for the patient with uncomplicated SUI, with different recommendations on the approach, as well as the comparability to other treatments such as the autologous fascial sling.

This is in no way a complete analysis of each guideline, but summarises some of the salient similarities and differences. As with any guideline or recommendation, if evidence is limited it does not necessarily imply that there is no role for

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the test or intervention in question, but rather a recommendation cannot be made based on the available evidence. However, there are situations when evidenced-based medicine debunks myths or dogma and thus the efforts that have been put forth in these documents are critical to continue to advance the field of UI.

Reviewing multiple guidelines has also highlighted the considerable redundancy that exists. Organisations that conduct such systematic reviews and structuring of guidelines are often duplicating efforts. Although it is reassuring as a consumer of the guideline to know that independent efforts arrive at the same conclusions, in some cases more formalised collaboration could be argued as a more efficient methodology. Even here the quality of the data in some cases can limit or bias conclusions that are drawn. There are other factors that may motivate organisations to undertake the endeavour of creating their own 'guideline'. These may include things like differences in available devices or medications, different regulatory bodies, unique needs of their constituents or patient populations, and the ability to highlight options of those they consider 'expert'. Guidelines try to be evidence based when possible, but given some limitations the art of medicine still has a role.

Key points

- Guidelines are not exhaustive, but practical evidence based reviews of 'index patients'.
- Evaluation should include detailed history and characterisation of urinary incontinence (UI).
- Guidelines suggest a stepwise approach to treat both urgency UI and stress UI, starting with conservative therapy, advancing to more invasive procedures as needed.
- Urodynamics should be used if there is recurrent UI after failure of invasive treatments.
- Retropubic mid-urethral sling is the preferred surgical treatment for uncomplicated stress UI.

Conflicts of Interest

Raveen Syan: No conflicts of interest.

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Abbreviations: AGREE, Appraisal of Guidelines for Research and Evaluation II; BTX, Botulinum toxin; CIC, clean intermittent catheterisation; CUA, Canadian Urological Association; DO, detrusor overactivity; EAU, European Association of Urology; ER, extended release; ICI(Q), International Consultation on Incontinence (Questionnaire); IR, immediate release; MUS, mid-urethral slings; NICE, National Institute for Health and Care Excellence; OAB, overactive bladder; PFMT, pelvic floor muscle training; POP, pelvic organ prolapse; PTNS, posterior tibial nerve simulation; PVR, post-void residual urine volume; QoL, quality of life; (E)(I)R, (extended) (immediate) release; SIS, single-incision synthetic sling; SNS, sacral neuromodulation; SUFU, Society of Urodynamics, Female Pelvic Medicine and Urogenital Reconstruction; UDS, urodynamic studies; (M)(S)(U)UI, (mixed) (stress) (urgency) urinary incontinence.

Appendix

Table A1 Definitions used for level of evidence in clinical guidelines.

	EAU	CUA	AUA*	ICI	NICE
1	1a Evidence obtained from meta-analysis of randomised trials 1b Evidence obtained from at least one randomised trial	Meta-analysis of randomised trials or at least one randomised trial	A high quality evidence, well-conducted RCTs, exceptionally strong observational studies	Usually involves meta-analysis of trials (RCTs) or a good quality RCT, or 'all or none' studies in which no treatment is not an option	Meta-analyses or systematic reviews of RCTs with: 1++ very low risk of bias 1+ low risk bias 1– high risk of bias
2	2a Evidence obtained from one well-designed controlled study without randomisation 2b Evidence obtained from at least one other type of well-designed quasi-experimental study	One well-designed controlled study without randomisation or at least one other type of well-designed quasi-experimental study	B Moderate quality evidence; RCTs with weakness; generally strong observational studies	'Low' quality RCT or meta-analysis of good quality prospective 'cohort studies'	2++ systematic reviews of case-control or cohort studies 2+ well conducted case control or cohort studies 2– case control or cohort studies with risk of confounding or bias
3	Evidence obtained from well-designed non-experimental studies, such as comparative studies, correlation studies and case reports	Well-designed non-experimental studies (comparative, correlation and case reports)	C low quality evidence; observational studies that provide conflicting information or design problems	Good quality retrospective 'case-control studies' or 'case series'	Non-analytical studies
4	Evidence obtained from expert committee reports or opinions or clinical experience of respected authorities	Expert committee reports or opinions or clinical experience of respected authorities	N/A	Expert opinion based not on evidence but on 'first principles' or bench research	Expert opinion or formal consensus

Nomenclature used by the AUA for all of its guidelines, including the three guidelines reviewed in the present paper. RCT, randomised controlled trial.

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Table A2 Definitions used for clinical guidelines regarding grade of recommendation. The terms 'Standard', 'Recommendation' and 'Option', and the respective definition, are included in order of increasing degree of flexibility of the recommendation.

	EAU	CUA	AUA	ICI	NICE
A	Based on clinical studies of good quality and consistency addressing the specific recommendations and including at least one randomised trial	Clinical studies of good quality and consistency addressing the specific recommendations and including at least one randomised trial based on Level 1 evidence (recommended)	*Standard – benefits of taking a decisive action outweigh risks/ burdens OR risks/burdens outweigh benefits based on Grade A or B evidence; panel is making a directive statement to take or not to take a specific action	Depends on consistent Level 1 evidence, often means recommendations are effectively mandatory and placed within a clinical care pathway. May follow Level 2 evidence; however, needs a greater body of evidence if based on anything except Level 1 evidence	At least one meta-analysis, systematic review, or RCT where evidence level is 1++ or 1+ with consistent results, or evidence drawn from NICE technology appraisal
B	Based on well conducted clinical studies, but without randomised clinical trials	Well-conducted clinical studies, but without randomised clinical trials, consistent Level 2/3 evidence (recommended)	*Recommendation – if benefits outweigh risks/burdens OR risks/ burdens outweigh benefits based on Grade C evidence; panel is making a directive statement to take or not to take a specific action	Depends on consistent Level 2 and/or 3 studies, or 'majority evidence' from RCTs	Body of evidence includes 2++ studies with overall consistency of results or extrapolated from 1++ or 1+ studies
C	Made despite the absence of directly applicable clinical studies of good quality	Made despite the absence of directly applicable clinical studies of good quality, Level 4 studies or majority evidence (optional)	*Option – if benefits and risks/burdens are evenly balanced or unclear based on Grade A, B or C evidence; decision to take or not to take a specific action is up to practitioner and patient	Depends on Level 4 studies or 'majority evidence' from Level 2/ 3 studies or Delphi processed expert opinion	Body of evidence with 2+ studies or extrapolated from 2++ studies
D	N/A	Evidence inconsistent/ inconclusive (no recommendation possible) or the evidence indicates the drug should not be recommended	†Clinical Principle –statement about a component of clinical care that is widely agreed upon by urologists or other clinicians; may or may not be evidence in literature †Expert Opinion – statement achieved by consensus of the Panel based on members' clinical training, experience, knowledge and judgment; no published evidence	No recommendation possible: where evidence is inadequate or conflicting and when expert opinion is delivered without a formal analytical process, such as by Dephi	Evidence Level 3 or 4, or extrapolated from 2+ studies, or based on formal consensus *D (GPP): good practice point recommendation based on experience of guideline development group

*RCT, randomised controlled trial. *Nomenclature used by the AUA for all of its guidelines, including the three guidelines reviewed in this paper. †Used in the AUA/SUFU OAB guidelines and the AUA/SUFU UDS guidelines.*

Table A3 Definition of grades of recommendations used by the ICI for diagnostic tests and studies.

Highly recommended	A test that should be done on every patient
Recommended test	Test of proven value in evaluation of most patients, and its use is strongly encouraged during initial evaluation
Optional test	Test of proven value in evaluation of selected patients; its use is left to clinical judgment of the physician
Not recommended	A test of no proven value

Table A4 AGREE II instrument scores obtained from two reviewers.

	EAU	CUA	AUA	ICI	NICE
%:					
Domain 1: Scope and Purpose	100	78	100	100	100
Domain 2: Stakeholder Involvement	83	72	100	83	100
Domain 3: Rigour of Development	100	100	100	100	100
Domain 4: Clarity of Presentation	100	100	100	100	100
Domain 5: Applicability	68	75	75	83	83
Domain 6: Editorial independence	54	33	54	17	100
Overall	100	83	83	100	100%

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