




Impact of COVID-19 on management of urogynaecology patients: a rapid review of the literature

Jemina Loganathan  · Stergios K. Doumouchtsis^{1,2,3,4} · CHORUS: An International Collaboration for Harmonising Outcomes, Research and Standards in Urogynaecology and Women's Health

Received: 7 October 2020 / Accepted: 2 December 2020

© The Author(s) 2021

Abstract

Introduction and hypothesis The coronavirus (COVID-19) pandemic has impacted health systems worldwide. There is a continuing need for clinicians to adapt practice to facilitate timely provision of medical care, whilst minimising horizontal transmission. Guidance and recommendations are increasingly available, and this rapid review aimed to provide a timely evidence synthesis on the current recommendations surrounding urogynaecological care.

Methods We performed a literature review using PubMed/Medline, Embase and Cochrane and a manual search of national and international societies for management recommendations for urogynaecological patients during the COVID-19 pandemic.

Results Nine guidance documents and 17 articles, including 10 reviews, were included. Virtual clinics are recommended for new and follow-up patients, to assess and initiate treatment, as well as triage patients who require face-to-face appointments. Outpatient investigations such as urodynamics and cystoscopy for benign indications can be deferred. Prolapse and continence surgery should be suspended, except in specific circumstances such as procidentia with upper tract complications and failed pessaries. There is no evidence to support a particular route of surgery, but recommendations are made to minimise COVID-19 transmission.

Conclusions Urogynaecological patients face particular challenges owing to inherent vulnerabilities of these populations. Behavioural and medical therapies should be recommended as first line options and initiated via virtual or remote clinics, which are integral to management during the COVID-19 pandemic. Expanding the availability and accessibility of technology will be increasingly required. The majority of outpatient and inpatient procedures can be deferred, but the longer-term effects of such practices are unclear.

Keywords Coronavirus · COVID-19 · Surgical prioritisation · Telemedicine · Urogynaecology

Introduction

Coronavirus (COVID-19) disease caused by the SARS-CoV-2 virus was first declared as a pandemic by the World Health Organization (WHO) on 11 March 2020 [1]. Since then it has

continued to rapidly spread worldwide impacting all aspects of life, not least medical care and how clinicians assess and treat patients. Medical providers worldwide have been required to adapt and streamline services to minimise unwarranted, multiple healthcare facility attendances and patient contact where possible, by conducting remote consultations, delaying non-urgent visits and optimising provision of one-stop services.

The urogynaecology scope of practice involves, to a significant proportion, care and management of elderly and vulnerable patients and therefore these measures are of particular importance. As the pandemic continues, national and international societies and organisations have published guidance for management mainly based on consensus and expert advice given that evidence base to support recommendations is still scarce [2–5].

Rapid reviews are a method of knowledge or evidence synthesis [6] to produce information in a more timely manner than traditional systematic reviews [7]; therefore, they are

✉ Stergios K. Doumouchtsis
sdoumouc@sgul.ac.uk

¹ Epsom and St Helier University Hospitals NHS Trust, Dorking Road, Epsom KT18 7EG, UK

² St George's University of London, London, UK

³ Laboratory of Experimental Surgery and Surgical Research N.S. Christeas, Athens University Medical School, Athens, Greece

⁴ American University of the Caribbean, School of Medicine, Pembroke Pines, FL, USA

particularly useful for new and emerging topics. Rapid reviews involve an expedited process with omission of certain steps usually performed in a systematic review.

Given the rapid evolution of evidence, recommendations, policies and clinical management adaptations, a rapid review on the current evidence and recommendations is highly warranted. Since the COVID-19 pandemic was declared, several publications have appeared providing narrative reviews in order to bring all the relevant information from the guidelines together in one document, to support patient care [8–10]. These studies summarise and review published guidelines, original studies, consensus statements, opinions and comments in peer-reviewed journals, and professional organisations and societies.

The aim of this rapid review is to systematically review and evaluate the available evidence from published research, as well as to collate guidelines and recommendations in order to provide guidance on the management of urogynaecological conditions and clinical practices in response to the COVID-19 pandemic. This review has been undertaken by CHORUS, An International Collaboration for Harmonising Outcomes, Research and Standards in Urogynaecology and Women's Health (i-chorus.org).

Materials and methods

We performed a literature review using the OvidSP search platform and interrogating through this the databases PubMed/Medline, Embase and Cochrane using keywords and MeSH terms including: COVID-19, SARS-CoV-2, coronavirus, incontinence, pelvic organ prolapse, vaginal prolapse, uterine prolapse, cystocele, rectocele, bladder pain, childbirth trauma, perineal trauma, perineal laceration, urogynaecology, urogynecology, overactive bladder (OAB), recurrent cystitis, recurrent urinary tract infections (UTIs); (Appendix 1).

Literature searches were conducted from 1 January to 22 September 2020. We searched the references of the relevant studies manually using the backward snowballing method [11] in order to identify additional eligible references and studies. In addition, a manual search was conducted of national and international specialist societies and organisations in order to identify practice guidance. We searched the websites of the International Urogynecological Association (IUGA), International Continence Society (ICS), European Association of Urology (EAU), British Society of Urogynaecology (BSUG), Royal College of Obstetricians and Gynaecologists (RCOG), Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG), American Urological Association (AUA), American Urogynecologic Society (AUGS), Asia-Pacific Urogynecology Association (APUGA), Urogynecologist Asia (UG-Asia), Urological Association of Asia (UAA), South African Urogynaecological Association (SAUGA) and Pan African Urological Association

(PAUSA). The latest version of guidelines was used in cases where more than one guideline or update was available. The final decision about the inclusion of guidelines and published articles was based on authors' consensus.

All searches were restricted to English-language publications or those with the facility to translate to English, guidelines and best-practice statements. We did not exclude original articles, comments or perspectives. Inclusion criteria were the presence in the articles of guidance or practical advice for the management of urogynaecology patients during the COVID-19 pandemic.

Exclusion criteria were non-English-language articles with translation not readily available, guidelines unavailable to the public in full text, not involving urogynaecology care or not involving urogynaecology care during the COVID-19 pandemic.

Study selection was conducted in stages. Following title screening, the abstracts of all articles in the database were examined. Two reviewers scrutinised the full text of each article and evaluated the studies potentially eligible for inclusion against the inclusion criteria. Discrepancies regarding inclusion or exclusion were resolved through discussion.

Ethical approval was not required for this review. One reviewer extracted relevant data from all eligible articles. The content of each guideline or article was tabulated including the title of the guidance or article, issuing association or journal, and date of publication.

The quality of guidelines was evaluated using the Appraisal of Guidelines for Research and Evaluation (AGREE II) instrument [12] and the quality of reviews assessed using Scale for the Assessment of Narrative Review Articles (SANRA) [13].

Results

Nine guidance documents and 17 articles, 10 of which are reviews, were included (Fig. 1; Table 1).

Quality assessment of guidelines was performed using Appraisal of Guidelines for Research and Evaluation II instrument (AGREEII). Overall assessment scores are shown in Table 1 (1 lowest quality to 7 highest quality). See Appendix 2 for individual domain scores.

Review articles were assessed using the Scale for the Assessment of Narrative Review Articles (SANRA) with a maximum score of 12. See Appendix 3 for the full SANRA scale.

Recommendations

All 12 articles and guidelines that included outpatient clinic recommendations stated that virtual clinics should be used to minimise horizontal transmission. Virtual clinics can be used for all non-urgent indications such as urinary incontinence and prolapse, and for both initial consultations and follow-up appointments. Patient satisfaction is unaffected and clinic attendance may be increased owing to a reduction in non-attendance [19].

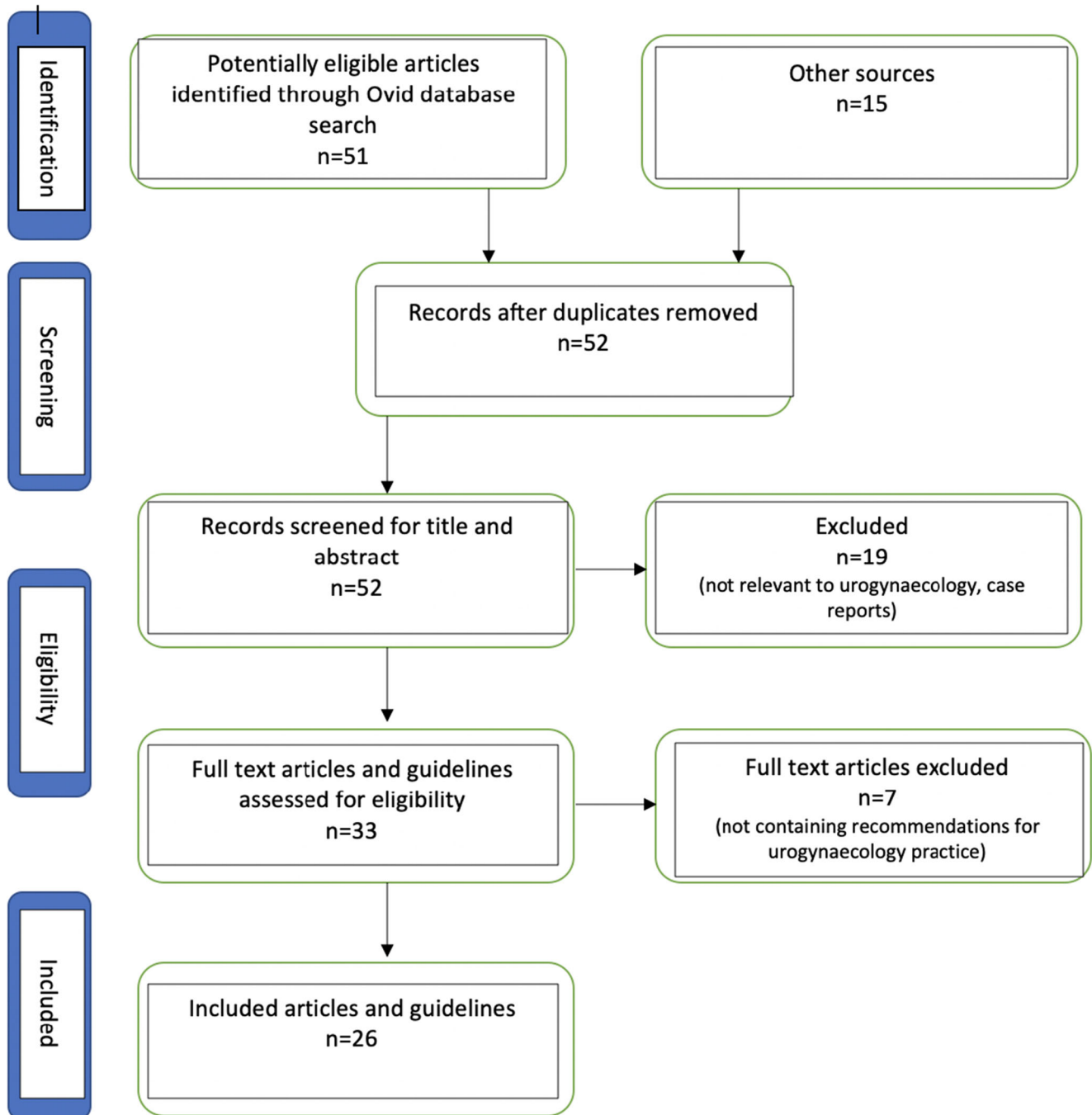


Fig. 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) diagram

When used for postoperative follow-up there is no increase in adverse outcomes [19]. For patients awaiting surgery, virtual clinics can be conducted to rediscuss alternative therapies.

During virtual clinics, patients can be triaged and limited face-to-face appointments arranged if necessary. When seen face to face, appropriate screening should be undertaken, personal protective equipment (PPE) worn, physical distance maintained, and sanitation available [31].

It has been reported that COVID-19 transmission could be as high as 12.8% at a physical distance of less than 1 m

compared with 2.6% at a distance of more than 1 m, reflecting the importance of maintaining physical distance [34].

In keeping with these findings, the Scientific Advisory Group for Emergencies (SAGE), who provide scientific and technical advice to support government decision makers in the UK, reported that COVID-19 transmission could be 2-10 times higher at a physical distance of 1 m compared with 2 m [35]. See Table 2 for a summary of guidance for virtual clinics and inpatient admissions.

Table 1 Included articles and guidelines

Reference	Date	Title	Article type	Topics included	Quality assessment score
[14]	23 March	Urology practice during the COVID-19 pandemic	Guidance	Surgical prioritisation Surgical techniques to minimise exposure Outpatient procedures	5
[2]	26 March	Joint RCOG/BSGE Statement on gynaecological endoscopy during the COVID-19 pandemic	Guidance	Laparoscopic and hysteroscopic surgery Limiting horizontal spread of COVID-19 Optimising patient outcomes	4
[4]	27 March	Joint Statement on minimally invasive gynecologic surgery during the COVID-19 pandemic	Guidance	Limiting horizontal spread of COVID-19 Endoscopic surgery Vaginal and open abdominal surgery	5
[15]	3 April	COVID-19: outpatient services; office consultations and procedures	Guidance	Outpatient clinics and procedures	4
[3]	9 April	BSUG guidance on management of urogynaecological conditions and vaginal pessary use during the Covid 19 pandemic	Guidance	Assessment and management of lower urinary tract symptoms Management of prolapse Pessary management Outpatient procedures	5
[16]	20 April	COVID-19: recommendations for functional urology	Guidance	Assessment and management of lower urinary tract symptoms Management of prolapse Outpatient procedures Surgical prioritisation	6
[17]	28 April	Guidance for the management of urogynecological conditions during the coronavirus (COVID-19) pandemic	Guidance	Assessment and management of lower urinary tract symptoms Management of prolapse Post-operative follow-up	6
[18]	28 April	Joint Statement on re-introduction of hospital and office-based procedures in the COVID-19 climate for the practicing urogynecologist and gynecologist	Guidance	Surgical prioritisation Inpatient and outpatient procedures	5
[5]	July	An organisation-wide collaborative effort to adapt the EAU guidelines recommendations to the COVID-19 era	Guidance	Surgical prioritisation Management of lower urinary tract symptoms	6
[19]	27 April	A guide for urogynecologic patient care utilizing telemedicine during the COVID-19 pandemic: review of existing evidence	Review	Virtual clinics Management of lower urinary tract symptoms Management of prolapse Pessary management	12/12
[20]	24 May	Forecasting the future of urology practice: a comprehensive review of the recommendations by international and European associations on priority procedures during the COVID-19 pandemic	Review	Telemedicine Prioritisation strategies for oncological and non-oncological urology procedures Minimally invasive surgery	11/12
[21]	29 May	Practical recommendations for gynecologic surgery during the COVID-19 pandemic	Review	Surgical prioritisation	8/12
[22]	17 June	Guidance for gynecologists utilizing telemedicine during COVID-19 pandemic based on expert consensus and rapid literature reviews	Review	Telemedicine	12/12
[23]	18 June		Systematic review	Telemedicine	12/12

Table 1 (continued)

Reference	Date	Title	Article type	Topics included	Quality assessment score
		Telehealth in urology: a systematic review of the literature. How much can telemedicine be useful during and after the COVID-19 pandemic?		Management of lower urinary tract symptoms	
[8]	23 June	COVID-19 and gynecological cancer: a review of the published guidelines	Review	Reducing horizontal transmission Surgical prioritisation Outpatient clinics Inpatient admissions	11/12
[24]	9 July	Triaging office based urology procedures during the COVID-19 pandemic	Recommendations	Outpatient procedures	
[25]	25 August	How did COVID-19 pandemic change the way we attend the patients in an urogynaecological unit	Review	Assessment and management of lower urinary tract symptoms Management of prolapse Surgical prioritisation Telemedicine	9/12
[26]	2 September	A lasting impression: telemedicine in urogynecology during the coronavirus disease 2019 pandemic	Review	Telemedicine	10/12
[27]	15 September	A systematic review on guidelines and recommendations for urology standard of care during the COVID-19 pandemic	Review	Uro-oncology Endoscopic and robotic surgery Outpatient procedures	12/12
[28]	15 September	Management of female and functional urology patients during the COVID pandemic	Review	Surgical prioritisation Surgical techniques to minimise exposure Management of lower urinary tract symptoms	11/12
[29]	March	Resumption of elective surgery following COVID-19 outbreak, guideline for female pelvic medicine and surgery	Editorial	Surgical prioritisation	
[30]	1 June	Global challenges to urology practice during the COVID-19 pandemic	Comment	Surgical prioritisation	
[31]	11 June	Technology-based management of neurourology patients in the COVID-19 pandemic: is this the future? A report from the International Continence Society (ICS) institute		Virtual clinics	
[18]	1 July	Widespread postponement of functional urology cases during the COVID-19 pandemic: rationale, potential pitfalls, and future consequences	Editorial	Assessment and management of incontinence and voiding disorders Management of prolapse	
[32]	2 July	Virtual consent for virtual patients: benefits of implementation in a peri- and post-COVID-19 era	Editorial	Virtual clinic and consent	
[33]	17 July	Neuro-urology during the COVID-19 pandemic: triage and priority of treatments	Letter to editor	Voiding dysfunction Neurogenic bladder	

RCOG Royal College of Obstetricians and Gynaecologists, *BSGE* British Society for Gynaecological Endoscopy, *AUGS* American Urogynecologic Society, *RANZCOG* Royal Australian and New Zealand College of Obstetricians and Gynaecologists, *BSUG* British Society of Urogynaecology, *EAU* European Association of Urology

Table 2 Summary of guidance for virtual clinics and inpatient admissions

Reference	Virtual clinics/telemedicine	Outpatient department, inpatient admissions
[17]	Postoperative follow-up can be virtual Non-inferior for patient satisfaction, complication rates and adverse events	
[31]	Cancel all face-to-face outpatient appointments Virtual consultations where possible Can identify patients requiring urgent consultation	
[28]	Initial and follow-up consultations can be virtual Triage patients for face-to-face consultation	If seeing face-to-face, patient to wear surgical mask and gloves, clinician to wear apron, surgical mask, visor and gloves Invasive tests: clinician wears N95 mask, impermeable gown, gloves and visor
[19]	Virtual clinics: patient satisfaction unaffected, can increase clinic attendance Postoperative virtual clinics: no increase in adverse outcomes or primary care visits Native tissue prolapse repair and mid-urethral sling with no incontinence can be safely followed up in virtual clinic Triage all patients for virtual clinic: established patients not requiring examination, new patients who would benefit from non-surgical treatment, postponed patients awaiting surgery to rediscuss alternative therapies Provide patient information leaflets from established bodies	
[8]	Virtual clinics Work from home Minimise face-to-face	Physical distancing Sanitisation areas Limit friends and family accompanying Adequate PPE
[3]	Virtual clinic for pessary follow-up Triage patients: see semi-urgently, within 30 days or delayed review	
[16]	Use telemedicine Avoid face-to-face where possible	
[26]	Telemedicine to minimise exposure	
[22]	Use telemedicine Avoid face-to-face where possible Use telemedicine to assess need for face-to-face review	
	Postoperative follow-up: equal patient-related outcomes with telemedicine compared with face-to-face	
[36]	Use video or teleconsults for all non-urgent indications	
[5]	Use telemedicine to allow physical distancing and minimise footfall	
[18]	Telemedicine whilst awaiting surgery to help with symptom management	
[15]		Essential staff only in clinic rooms Discourage accompanying persons Physical distancing Cleaning surfaces with appropriate disinfectant Handwashing before and after patient contact Waiting and clinic room with appropriate safe spacing COVID-19 positive or those in isolation should not be seen face-to-face. If no option, then wear appropriate PPE If face-to-face appointment, screen all patients and accompanying persons for symptoms, travel and exposure

PPE personal protective equipment

Table 3 Summary of guidance for urinary incontinence and prolapse

Reference	OAB, UUI and SUI	Prolapse and pessaries
[17]	<p>Virtual consultations</p> <p>Use validated questionnaires for urinary symptoms</p> <p>Lifestyle measures, PFMT as first line</p> <p>Consider starting antimuscarinics/B3 agonist/vaginal oestrogen</p> <p>Regular follow-up, i.e. 4 weeks after starting antimuscarinics</p> <p>Yearly review of long-term antimuscarinic</p> <p>For SUI consider incontinence pessaries</p>	<p>Virtual consultations</p> <p>Use validated questionnaires for prolapse</p> <p>If mild symptoms: PFMT</p> <p>If severely affecting bladder/bowel function and/or ulcer present, may require face-to-face appointment</p> <p>Pessaries: arrange face-to-face if bleeding or pain symptoms</p> <p>Can delay pessary change for an additional 3 months after routine 6-month interval, then review</p>
[33]	<p>For neurogenic SUI: device implantation can be deferred until safe, no time limit, use pads in interim</p> <p>Erosion from implants requiring removal of prosthesis: defer up to 4 weeks</p> <p>Neurogenic bladder with risk factors for upper renal tract, e.g. DSD: Botox can be deferred up to 8 weeks</p> <p>Neurogenic bladder without risk factors for upper renal tract: can defer Botox during pandemic, no time limit</p>	
[31]	Can teach and monitor PFMT via video consultation	
[28]	<p>Delay all continence procedures until after COVID crisis</p> <p>Manage as outpatients with conservative and medical therapy</p> <p>Delay all new sacral neuromodulation until end of COVID crisis</p> <p>Remove percutaneous nerve evaluation lead in outpatient clinic if one in situ</p> <p>If infected implant treat with intravenous antibiotics; if severe infection remove urgently, i.e. <2 weeks</p> <p>Conservative and medical treatments for SUI and OAB/UUI</p>	
[27]	Stage 2 neuromodulation: no delay owing to risk of infection	Pessary changes: defer for 3–6 months
[19]	<p>Behavioural measures</p> <p>Self-inserted incontinence tampons or pessaries can be recommended</p> <p>Patients having invasive treatment, e.g. intravesical Botox, can restart antimuscarinic/mirabegron until service restarts</p> <p>Short-term antimuscarinic unlikely to cause dementia therefore can use in elderly if required</p>	<p>Virtual consultations</p> <p>Online instructions for PFMT</p> <p>Behavioural measures, e.g. weight loss, Kegel exercises, PFMT</p> <p>Smart phone apps, e.g. for Kegel training</p> <p>Home biofeedback devices</p> <p>Pessaries: encourage self-cleaning at home</p> <p>Can safely delay change up to 6 months</p> <p>Consider vaginal oestrogen and empiric treatment for bacterial vaginosis</p> <p>If bleeding/discharge can remove and observe for voiding dysfunction prior to clinic review</p>
[3]	<p>Initial virtual consultations</p> <p>Can commence treatment remotely</p> <p>Provide patients with information resources</p>	<p>Initial virtual consultations</p> <p>Proctientia causing bowel/urinary problems need early review within 30 days</p> <p>Pessaries: face-to-face review within 7 days if symptoms suggestive of fistulation</p> <p>Pessaries: face-to-face review within 30 days if bleeding/-pain/ulceration</p> <p>Pessaries: refer via local PMB cancer pathway if PMB with pessary and uterus in situ</p> <p>Ring pessaries: can defer change up to 6 months</p> <p>Shaatz, shelf, Gelhom, double pessaries: defer for a maximum of 3 months</p> <p>Patients to be given contact numbers in the case of symptoms of ulceration</p>
[16]	Encourage conservative and medical treatments	Virtual clinics

Table 3 (continued)

Reference	OAB, UUI and SUI	Prolapse and pessaries
	SUI: all new patients with signs of retention and overflow, see face-to-face for PVR with external probe	If grade 4 prolapse, consider US KUB
		Favour pessary management
		Consider surgery if stage 4 prolapse, failed pessaries and obstructive renal failure
[26]	Non-surgical options as first line whilst elective surgeries restricted	Non-surgical options as first line whilst elective surgeries are restricted
	Medication management	Smart phone apps
	Smart phone apps	
[25]	Start all UI consultations using telemedicine	
	Supplement with use of mobile apps	
	Conservative measures—weight loss, bladder training, PFMT, Kegel exercises ± medications	
[36]	Prescribe medication if required, all intravesical Botox postponed	PFMT postponed to maintain physical distancing
	PFMT postponed to maintain physical distancing	Use pessary
	Screen for red flag symptoms that may indicate bladder cancer and warrant urgent cystoscopy	Urgent surgery if grade 4 prolapse/renal tract complications and failed pessaries
	Postpone SNS unless in test phase. If test phase, consider removal or placement of pacemaker under local anaesthesia	
[21]	Use non-surgical management UI as advised by IUGA	
[23]	Evidence that behavioural measures and PFMT via video conferencing as effective as face-to-face	Use of behavioural measures and PFMT
[5]	Use conservative and medical treatments	
[24]		Can delay pessary change up to 3 months if no erosion or ulcer

BSUG British Society of Urogynaecology, *EAU* European Association of Urology, *OAB* overactive bladder, *UUI* urge urinary incontinence, *SUI* stress urinary incontinence, *PFMT* pelvic floor muscle training, *DSD* detrusor sphincter dyssynergia, *PVR* post-void residual volume, *UI* urinary incontinence, *SNS* sacral nerve stimulation, *IUGA* International Urogynecological Association, *US KUB* ultrasound kidneys, ureters and bladder, *PMB* postmenopausal bleeding

Of 15 articles and guidelines providing recommendations regarding the management of urinary incontinence and OAB, 12 advise behavioural therapies as the first line.

Two recommend use of smart phone apps to supplement education, for example, for Kegel exercises [19, 26]. Suspension of invasive therapies for urinary incontinence is advised, except where stage 1 sacral neuromodulation is in place or in cases of neurogenic bladder with a high risk of upper renal tract complications [33]. Pelvic floor muscle training is recommended as the first-line for symptomatic prolapse [16, 17, 19, 23, 26]; however, in one editorial, suspension of pelvic floor muscle training is suggested to maintain physical distancing [36].

Use of pessaries is recommended, whilst prolapse surgery is deferred [16, 26, 36], and the pessary change interval can be extended by 3–6 months unless the patient has symptoms of ulceration or fistulation [3, 24, 27]. See Table 3 for a summary of guidance for urinary incontinence and prolapse.

Acute retention or a blocked catheter warrants urgent review for catheterisation [20].

If an indwelling catheter is in situ, routine changes can be deferred for 2–4 weeks, unless the patient has a history of difficult changes or recurrent UTIs [24]. Deferring suprapubic

catheter changes [3, 20] for up to 3 months has been suggested and changes in the community rather than in the hospital setting are preferred [3, 36].

Urinary tract infections can be managed via virtual consultation [17, 19, 23, 25]. If the patient has recurrent UTIs conservative measures and non-antibiotic therapies should be encouraged [17]. If antibiotics are required, they should be prescribed according to previous culture results. Face-to-face review should be arranged if the patient has complicated UTI or is refractory to treatment [19]. See Table 4 for a summary of voiding dysfunction and urinary tract infection.

Gross haematuria requires urgent investigation with cystoscopy; however, microscopic haematuria investigations can be deferred. A systematic review of telemedicine in urology, however, reported that data indicate that virtual clinics for initial evaluation are feasible, effective, and associated with a high degree of patient satisfaction [23].

Bladder pain syndrome investigations should be deferred, but oral treatments can be started [5, 28].

Fourteen articles reported recommendations for outpatient procedures, including cystoscopy, intravesical Botox and

Table 4 Summary of voiding dysfunction and urinary tract infection

Reference	Voiding dysfunction and catheters	Urinary tract infection
[17]	Severe voiding difficulty requires face-to-face appointment for PVR ± ISC	Virtual consultations Acute UTI: consider antibiotics based on symptoms and previous cultures For recurrent UTI: non-antibiotics therapies, fluid advice, hygiene advice, vaginal oestrogen low dose. Self start or rotating antibiotics. Safety net re: ascending infection
[33]	If chronic retention, no limit on deferral IDC if ISC not available	
[31]	Can teach and monitor ISC via video consultation	
[28]	If acute retention, see face-to-face to assess for IDC or SPC ± US KUB. Delay functional tests Indwelling catheter: can defer by 4 weeks. Change earlier if encrustations/blockages	Conservative and lifestyle measures: hygiene, non-antibiotics therapies, low-dose antibiotics, vaginal oestrogen
[24]	IDC: can defer change for 2–4 weeks unless history of difficult changes or recurrent UTI	
[19]	Encourage conservative measures to help void Chronic retention >300 ml >6 months and acute retention: face-to-face review CISC preferable to IDC	Culture with every episode and treat whilst awaiting results Previous cultures can guide prescribing Remote prescribing effective, may have a negative impact on antibiotics resistance. Fever and diabetes can indicate severe infection, may warrant face to face appointment Prescribing: nitrofurantoin or cotrimoxazole 3–7 days. Seven-day course for the elderly and diabetic. Fluoroquinolone in complicated UTI to avoid admission Encourage conservative measures, e.g. cranberry, hydration, d-mannose, vaginal oestrogen Consider face-to-face review if refractory UTI with complications
[20]	Acute retention: see face-to-face Defer all SPC and IDC changes	
[14]	Acute retention: see face-to-face for IDC or SPC	
[3]	If acute retention need emergency/urgent review (within 12 hours) for IDC If arranging TWOC, can defer on a case-by-case basis. If high PVR, then teach CISC Change of SPC can be delayed up to 3 months Aim for SPC change in community not hospital setting	
[25]	Encourage conservative measures to help void, e.g. double/triple voiding Chronic urinary retention, e.g. >300 ml for >6 months, consider USS KUB and face-to-face consultation for ISC or IDC ISC preferable to IDC Teach ISC face-to-face, follow-up via virtual clinic	Empirical treatment of UTI, including recurrent UTI Electronic prescribing is effective and efficient Resolution of symptoms indicative of cure
[36]	Acute retention: place IDC or SPC, change regularly in the community. Consider ISC if teaching and education possible	
[30]	Obstructive urinary disorders—face-to-face clinics with reduced capacity	
[5]	Voiding dysfunction: teach ISC or catheterise Blocked catheter requires emergency review	Sepsis/complicated UTI: high priority
[23]		Can be managed safely and effectively using telemedicine

BSUG British Society of Urogynaecology, *EAU* European Association of Urology, *PVR* post-void residual volume, *ISC* intermittent self-catheterisation, *IDC* indwelling urethral catheter, *SPC* suprapubic catheter, *US KUB* ultrasound of the kidneys, ureters and bladder, *UTI* urinary tract infection, *CISC* clean intermittent self-catheterisation, *TWOC* trial without catheter

Table 5 Summary of guidance for haematuria, bladder pain syndrome and outpatient procedures

Reference	Haematuria and bladder pain syndrome	Outpatient procedures
[17]	Referral to secondary care if gross haematuria	
[24]	Gross haematuria: urgent cystoscopy, no deferring Microscopic haematuria with risk factors: can defer for up to 3 months unless symptomatic Microscopic haematuria and no symptoms: can defer for 3 months or more	Delay urodynamics for 3–6 months
[27]	Most but not all experts recommend urgent cystoscopy for macroscopic haematuria. EAU and USANZ say it can be deferred for 1–2 months	Delay urodynamics. Time frame 1–6 months Neurogenic intravesical Botox can be deferred for up to 4 weeks Slings: clinical harm unlikely if postponed for 6 months Defer all cystoscopy for benign conditions
[20]	Macroscopic haematuria: urgent cystoscopy Microscopic: postpone	
[23]	Use telemedicine for initial haematuria consult and triage, then see face-to-face if needed	
[30]	Continue cystoscopy for suspected cancer	All outpatient cystoscopy suspended, continue only for suspected cancer
[28]	Delay BPS investigations until after COVID Use oral medications, e.g. amitriptyline Continue bladder instillation if self-administered already Defer if administered in hospital	Do not commence new intravesical Botox treatments Delay intravesical Botox until end of COVID crisis
[19]	Consider face-to-face review if acute BPS flare requiring instillation	
[5]	Manage BPS conservatively Can offer amitriptyline	All urodynamics postponed
[31]		All urodynamics postponed Intravesical Botox can be carried out under local anaesthetic for high-risk patients, e.g. autonomic dysreflexia
[14]		Defer all cystoscopy for benign conditions
[3]		Defer all outpatient treatments and investigations, i.e. cystoscopy (non-cancer indications), bladder instillations, PTNS
[16]		Intravesical Botox suspended unless neurological bladder with upper tract risk Cystoscopy: perform within 2 months if risk factors for cancer and refractory OAB
[25]		If planned intravesical Botox, can defer and restart antimuscarinics/B3 agonists
[36]		Intravesical Botox postponed. Consider continuing under local anaesthesia for neurogenic bladder with renal tract complications
[29]		Intravesical Botox: non-essential, i.e., not time sensitive unless, e.g. failure of conservative and progressive symptoms
[18]		Tier 1 can delay beyond 12 weeks i.e. new Botox, new bulking, new PTNS, urodynamics, pessary fittings, new PFMT Tier 2 delay 4–12 weeks, e.g. repeat bulking agent, pessary cleaning, PFMT follow-up Tier 3 delayed for up to 4 weeks Microscopic haematuria, established PTNS, bladder instillations Tier 4 cannot be delayed Macroscopic haematuria, new ISC instruction, voiding trial, urinary retention, SPC follow-up

EAU European Association of Urology, BSUG British Society of Urogynaecology, USANZ Urological Society of Australia and New Zealand, BPS bladder pain syndrome, PTNS percutaneous tibial nerve stimulation, OAB overactive bladder, PFMT pelvic floor muscle training, ISC intermitten self-catheterisation

Table 6 Summary of guidance for elective surgery and techniques to minimise horizontal transmission

Title of article or guidance	Elective surgery and consent	Surgical techniques to minimise horizontal transmission
[2]	<p>Outcomes worse for asymptomatic COVID-19 patients so surgery may worsen or accelerate progression</p> <p>COVID-19 test all patients</p> <p>14 days self-isolation preoperatively</p> <p>Temperature on admission, defer if $\geq 37.3^{\circ}\text{C}$ and retest after 14 days</p> <p>Aim for local/regional anaesthetic if possible</p> <p>Negative pressure in theatre</p> <p>High frequency of filtered air exchange</p> <p>Essential theatre staff only</p> <p>Most experienced surgeon operating</p> <p>PPE when GA: water repellent, long-sleeved gowns, eye and face protection, gloves and FFP3 respirators</p> <p>If pyrexial within 30 days screen and retest for COVID-19</p>	<p>No evidence of increased risk with laparoscopy when PPE worn</p> <p>Vacuum suction devices for desufflation</p> <p>Use smoke extractor</p>
[28]	<p>No contraindications to open, transurethral and vaginal procedures</p> <p>Special care to be taken with laparoscopic and robotic procedures</p> <p>Consider local anaesthesia where possible to minimise AGPs</p> <p>COVID testing for any at-risk patient prior to surgery according to local guidelines and availability</p> <p>Most surgery is priority level 4 and can be deferred over 3 months</p>	<p>Low power setting for electrosurgery</p> <p>Avoid long desiccation times</p> <p>Closed smoke evacuation/filtration system with ULPA capability</p> <p>Laparoscopic suction to remove smoke and deflate abdomen</p> <p>Low intra-abdominal pressure 10–12 mmHg if feasible</p> <p>Avoid rapid deflation</p> <p>Minimise blood/fluid droplet spread</p> <p>Be careful at time of instrument exchange and tissue extraction</p> <p>Minimise CO₂ leakage from trocars</p>
[27]		<p>Endoscopic and robotic surgery: low electrocautery settings to generate less smoke, lowest pressure insufflation, only essential staff present in theatre, all staff in PPE</p>
[20]	<p>Route of surgery at surgeon's discretion</p>	<p>Use closed system for insufflation</p> <p>Smoke extractor</p> <p>Adequate PPE</p> <p>Use lowest intrabdominal pressure possible</p> <p>Use lowest cautery setting possible</p>
[8]	<p>Symptom screen and COVID test all patients preoperatively</p> <p>Clean COVID-free sites for surgery</p> <p>All elective surgery for benign indications suspended</p>	<p>Shorter hospital stay</p> <p>Can physical distance more than in open surgery</p> <p>Risk of COVID transmission if not operating on GI tract during laparoscopy is low</p> <p>Low power diathermy. Closed smoke evacuation</p> <p>Filtration system</p> <p>Use suction to deflate abdomen</p> <p>Low pressure 10–12 mmHg intraoperatively</p> <p>Avoid rapid desufflation, minimise blood or fluid spray</p> <p>Check seals around all reusable ports</p> <p>GA in negative pressure room</p>
[14]	<p>Experienced surgeon to minimise operating time</p> <p>Clinical trials and trials of new technology to be postponed</p> <p>COVID test all patients preoperatively</p> <p>Temperature testing and wearing masks on arrival</p> <p>Reduce inpatient beds to allow physical distancing</p>	<p>Filter system to reduce viral release with gas</p> <p>Low pressure pneumoperitoneum</p> <p>Low bipolar cautery setting</p>
[4]	<p>Suspend all elective surgery</p> <p>Universal COVID-19 testing recommended before all surgery</p>	<p>Low intra-abdominal pressure 10–12 mmHg</p> <p>Low power settings for electrosurgical devices</p>

Table 6 (continued)

Title of article or guidance	Elective surgery and consent	Surgical techniques to minimise horizontal transmission
	<p>Preoperative screening on day of surgery, i.e. history examination</p> <p>Full PPE in theatre—shoe covers, impermeable gowns, surgical or N-95 masks, protective head covering, gloves and eye protection</p> <p>Restricted movement of personnel in and out of the operating room</p> <p>Trainee participation should be limited and include only essential personnel</p>	<p>Avoidance of long desiccation times</p> <p>Closed smoke evacuation or filtration system with ultra-low particulate air filtration capability</p> <p>Suction desufflation of abdomen</p> <p>Avoid rapid desufflation, i.e. with specimen removal</p> <p>Minimise CO₂ leakage from trocars</p> <p>Minimise blood/fluid droplet spray</p> <p>Vaginal and open surgery: non-electrosurgical techniques where possible</p> <p>Low power setting, avoidance of long desiccation times</p> <p>Smoke evacuators alongside ULPA filters</p> <p>Suction device to remove surgical plume</p> <p>Minimize blood/fluid droplet spray or spread</p>
[16]	Enhanced recovery	<p>Limit intra-abdominal pressure</p> <p>Balloon trocars to minimize CO₂ leak</p> <p>Smoke extractors</p> <p>Suction of CO₂ for desufflation</p>
[30]	<p>Only urgent procedures to minimise inpatient stays</p> <p>Screening consultation prior to procedure—symptoms in last 2 weeks, any travel</p> <p>Test patients and clinical team prior to procedure</p> <p>Positive pressure on hold during procedure and restarted 20 min after patient leaves</p> <p>Limited personnel in theatre</p>	Safety of minimally invasive surgery remains undetermined
[5]	<p>Recommend only high priority/emergency cases, experienced surgeon</p> <p>Minimal staff numbers, no observers</p> <p>Intubation and extubation in negative pressure room</p> <p>Use low cautery settings</p> <p>Avoid monopolar or advanced bipolar where possible</p> <p>If monopolar use smoke evacuator</p> <p>No clear evidence to favour open or laparoscopic</p> <p>Consider treating intermediate priority patients if capacity available but not during COVID surge</p> <p>Follow local recommendations to test staff and patients for COVID</p> <p>Follow local recommendations for PPE</p> <p>Wear full PPE for COVID-positive patients as per WHO guidance</p>	<p>Low insufflation pressure</p> <p>Suction of gas prior to removing ports</p> <p>Smoke evacuation system capable of filtering aerosolized particles from CO₂ should be provided for laparoscopic surgery</p>
[31]	All invasive procedures under GA deferred	
[19]	<p>All elective cases deferred</p> <p>Aim for same-day discharge where possible</p> <p>Spinal anaesthesia in preference to general anaesthesia, unlikely to greatly increase voiding dysfunction</p>	
[25]	<p>Transmission of fomites during vaginal surgery appears highly unlikely</p> <p>Regional anaesthesia preferable to general anaesthesia—lower risk postoperative retention, reduces aerosol generation</p>	
[36]	<p>Augmentation cystoplasty, cystectomy, and continent and incontinent diversions all postponed owing to high-dependency in-patient care required</p>	

Table 6 (continued)

Title of article or guidance	Elective surgery and consent	Surgical techniques to minimise horizontal transmission
[21]	Screen all patients with health questionnaire Swab test before all elective surgery All team members trained in appropriate use of PPE Reduce all team members in theatre If COVID positive, operate once fully recovered, i.e. asymptomatic and two negative tests at 24-h interval	
[32]	Ideal is virtual consultation with electronic consent including pre-printed information and patient's electronic signature Requires development with GMC and MHRA Consent signed on day of procedure may lead to inadequate consent and litigation	

RCOG Royal College of Obstetricians and Gynaecologists, *BSGE* British Society for Gynaecological Endoscopy, *EAU* European Association of Urology, *PPE* personal protection equipment, *GA* general anaesthesia, *AGP* aerosol-generating procedure, *GMC* General Medical Council, *MHRA* Medicines and Healthcare Products Regulatory Authority, *ULPA* ultra-low particulate air, *GI* gastrointestinal, *WHO* World Health Organisation

urodynamics. All urodynamics and cystoscopy for benign indications should be deferred. See Table 5 for a summary of guidance for haematuria, bladder pain syndrome and outpatient procedures.

Recommendations regarding surgery advise regional or local anaesthesia where possible, in order to reduce aerosol generation with general anaesthesia [2, 19, 25, 28]. Screening for COVID-19 symptoms and testing preoperatively is advised, as evidence has shown poorer surgical outcomes for asymptomatic COVID-19 patients, therefore surgery may worsen or accelerate progression [2, 4, 5, 8, 14, 21, 28, 30]

Although better able to maintain physical distance and potentially shorter hospital stays with laparoscopic surgery than with open surgery [8], no evidence is available to support a specific route of surgery; therefore, this is at the surgeon's discretion [5, 20].

Recommendations to reduce horizontal transmission in surgery include having essential staff only in theatre, low electrocautery settings, closed smoke evacuation and minimising blood and fluid droplet spray [4, 5, 8, 14, 16, 20, 27, 28]. See Table 6 for a summary of guidance for elective surgery and techniques to minimise horizontal transmission.

Continuing or restarting surgery during the pandemic requires prioritisation of cases, taking into account the severity of the pathology, patient comorbidities and the impact on physical and mental health and quality of life. Seven documents specified prioritisation guidance. See Table 7 for a summary of the prioritisation of surgery.

Strengths

We followed a standardised rapid review methodology in order to provide a summary of recommendations and practice

guidelines in a timely manner. We performed a comprehensive literature search including published articles, articles in press and association guidelines to ensure that we identified and included all available evidence regarding management of urogynaecology patients during the COVID-19 pandemic.

There is a high degree of consensus regarding the use of virtual clinics, management outpatient procedures, and surgical techniques to minimise horizontal transmission of COVID-19.

However, variations in recommendations exist and are summarised in this review. Therefore, it can be used as a resource to support adjustments in practice as local conditions evolve.

As further evidence emerges, resources change and the pandemic continues, this synthesis of available guidance can be used as a reference for clinicians to guide management.

Limitations

Given the aim to issue a summary without delay using rapid review methodology, some studies may have been omitted, which is an inherent limitation of rapid reviews. There is susceptibility to bias in streamlining a systematic review process, for example, in choosing studies for inclusion or exclusion and in data extraction, as fewer independent reviewers conduct each step.

Recommendations are predominantly based on expert opinion and, given the rapidly evolving nature of the COVID-19 virus, there is often a lack of robust scientific evidence [8] for clinically relevant questions.

Indeed, the COVID-19 “infodemic” has been described by WHO as an “overabundance of information—some accurate and some not—that occurs during an epidemic” [37].

Table 7 Summary of prioritisation of surgery

Reference	Prioritisation of surgery
[28]	<p>Emergency <1 h: life-threatening emergencies</p> <p>Urgent <24 h: e.g. haemorrhage after functional urology surgery, urinary retention, unable to place catheter, surgical site or device infection</p> <p>Urgent elective <4 weeks: e.g. second stage of SNS, disabling refractory BPS, Botox in high-risk neurogenic bladder patients, urinary diversion in urinary fistula with severe complications</p> <p>Elective, intermediate priority, 1–3 months: e.g. Botox in low-risk neurogenic bladder, bladder outlet obstruction due to mesh, removal of vaginally extruded uninfected mesh, prolapse with complications, e.g. retention, hydronephrosis</p> <p>Elective, low-priority, >3 months: e.g. refractory OAB, elective SUI surgery, BPS, elective prolapse surgery, urethral diverticulum without complications, uncomplicated neurogenic bladder</p>
[8]	<p>1a: emergency <24 h to save life</p> <p>1b: urgent <72 h as life-threatening condition</p> <p>2: is required within <4 weeks with expectation of cure</p> <p>3: can defer for 10–12 weeks with no predicated negative outcome</p> <p>Enhanced recovery pathways: delay any oncology surgery by at least 15 days if COVID-19 symptoms preoperatively</p>
[16]	<p>A: continue, e.g. second-stage neuromodulation, intravesical Botox for neurogenic bladder with risk of high bladder pressure, surgery for grade 4 prolapse with acute renal failure and failed pessary</p> <p>B: 1–8 weeks, e.g. refractory OAB and bladder cancer risk factors</p> <p>C: delay 8–16 weeks, e.g. intravesical Botox</p> <p>D: can be delayed >16 weeks, e.g. stress urinary incontinence surgery</p>
[29]	<p>1: urgent, <1 month—delay could cause major harm, e.g. prolapse beyond hymen with voiding dysfunction or upper renal tract complications</p> <p>2: essential elective, <3 months—increased risk of adverse outcomes if delayed for undetermined time period, e.g. prolapse beyond hymen with progressive symptoms, impaired QoL, failed pessaries but no upper renal tract complications</p> <p>3: non-essential elective, postpone up to 1 year—not time sensitive, e.g. prolapse beyond hymen with no upper renal tract complications and able to use pessary</p> <p>Continence surgery: non-essential elective, unless failure of conservative and progressive symptoms</p>
[21]	<p>Category 1: urgent: within 30 days, potential to deteriorate and become an emergency</p> <p>Category 2: semi-urgent: within 60 days, causes pain dysfunction or disability, but unlikely to deteriorate quickly, unlikely to become an emergency</p> <p>Category 3: elective: within 365 days, causes pain dysfunction or disability, unlikely to deteriorate quickly, does not have potential to become emergency</p> <p>All urogynaecology cases are category 3, should be postponed. Can start in highly symptomatic patients when risk of transmission reduces, depending on local situations</p>
[5]	<p>Low priority: clinical harm very unlikely if postponed for 6 months, e.g. stress or urge incontinence surgery, surgery for urethral diverticula</p> <p>Intermediate: clinical harm possible if postponed for 3–4 months but unlikely, e.g. surgical management of patients with urinary retention, intravesical Botox for selected cases of neurogenic bladder</p> <p>High priority: clinical harm likely if postponed for over 6 weeks, e.g. cystoscopy for macroscopic haematuria</p> <p>Emergency: life-threatening situation and likely to have presented in ED despite pandemic</p>
[18]	<p>Tier 1: non-life-threatening illness, low acuity, i.e. SUI surgery, laparoscopic sacrocolpopexy, native tissue transvaginal prolapse surgery, asymptomatic mesh exposure</p> <p>Tier 2: non-life-threatening, but potential for near future morbidity or mortality, intermediate acuity, i.e. fistula repair, mesh-related complication, e.g. severe pain/infection</p> <p>Tier 3: high potential for near future morbidity or mortality, severe impairment of QoL, high acuity, i.e. prolapse with upper tract obstruction and unable to retain pessary, obstructed voiding after MUS</p> <p>Tier 4: emergency surgery</p> <p>Each tier has subsets A and B</p> <p>Subset B denotes patients with comorbidities that may be deferred until after lower acuity patients</p>

EAU European Association of Urology, BPS bladder pain syndrome, OAB overactive bladder, SUI stress urinary incontinence, ED emergency department, MUS mid-urethral sling, QoL Quality of life

This is an inherent limitation of all reviews in this area given the unprecedented public health crisis and the epidemiological characteristics of the current pandemic.

As the COVID-19 pandemic continues, and our understanding and resources change, there is high potential for modifications within recommendations and publication of further guidance, which may have already occurred during publication of this rapid review.

Conclusion

The COVID-19 pandemic has changed the way in which we conduct healthcare and will do so for the foreseeable future. Evidence suggests that a large proportion of urogynaecological conditions might be able to be managed using virtual consultations utilising behavioural measures, lifestyle changes and medical therapy. Outpatient procedures in one-stop clinics to investigate and treat conditions such as refractory OAB can be maximised to avoid inpatient admissions, and to reduce the frequency of visits and the use of general anaesthesia.

Technology is required to maintain and develop the quality of virtual consultations and this is particularly important for remote teaching of clean intermittent self-catheterisation, home trial without catheter, pessary management and triaging symptoms. For those unable to use or without access to the required technology, smaller ad hoc face-to-face clinics with PPE and physical distancing should be considered.

Various healthcare providers and organisations have developed and published guidance for practice, which should always be observed, as it is linked and adapted to local policies, sociodemographic and epidemiological conditions, as well as infrastructures. This review is aimed at providing a wider perspective on practice recommendations that have been published to date and can be adapted or even considered for implementation at local levels.

Although adaptations and provisions are being made to manage urogynaecological conditions, given that the majority of patients are elderly with comorbidities that increase risk of COVID-19 morbidity and mortality, and with most surgical procedures for quality of life, the resumption of elective activity is expected to be slow. Consequently, there is likely to be a significant impact on quality of life within this cohort of patients and the impact of delayed diagnosis and treatment on the trajectory of the disease is yet to be determined.

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1007/s00192-021-04704-2>

Funding S.D. has previously had expenses paid by Contura. There are no funding disclosures for this review article.

Compliance with ethical standards

Conflicts of interest The authors declare that they have no conflicts of interest.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

1. World Health Organisation Virtual press conference on COVID-19. 2020.
2. Joint RCOG/BSGE Statement on gynaecological endoscopy during the COVID-19 pandemic. 2020.
3. Jha S, Pradhan A. BSUG guidance on management of urogynaecological conditions and vaginal pessary use during the Covid 19 pandemic. <https://www.rcog.org.uk/globalassets/documents/guidelines/2020-04-09-bsug-guidance-on-management-of-urogynaecological-conditions-and-vaginal-pessary-use-during-the-covid-19-pandemic.pdf>. 2020.
4. Joint statement on minimally invasive gynecologic surgery during the COVID-19 pandemic—general—news | AUGS. Accessed 4 October 2020. Available from: <https://www.augs.org/joint-statement-on-minimally-invasive-gynecologic-surgery-during-the-covid-19-pandemic>
5. Ribal MJ, Cornford P, Briganti A, Knoll T, Gravas S, Babjuk M, et al. European Association of Urology Guidelines Office Rapid Reaction Group: an organisation-wide collaborative effort to adapt the EAU guidelines recommendations to the COVID-19 era. *Eur Urol* 2020;78(1):21–8.
6. Garrity C, Gartlehner G, Nussbaumer-Streit B, King VJ, Hamel C, Kamel C, et al. Cochrane Rapid Reviews Methods Group offers evidence-informed guidance to conduct rapid reviews. *J Clin Epidemiol*. 2020;130:13–22. <https://doi.org/10.1016/j.jclinepi.2020.10.007>
7. Tricco AC, Antony J, Zarin W, Striffler L, Ghassemi M, Ivory J, et al. A scoping review of rapid review methods. *BMC Med*. 2015;13(1):224. <https://doi.org/10.1186/s12916-015-0465-6>.
8. Uwins C, Bhandoria GP, Shylasree TS, Butler-Manuel S, Ellis P, Chatterjee J, et al. COVID-19 and gynecological cancer: a review of the published guidelines. *Int J Gynecol Cancer*. 2020;30(9):1424–33.
9. Hasanzadeh M, Azad A, Farazestanian M, Mousavi SL. Covid-19: what is the best approach in gynecological oncology patient management during the coronavirus pandemic? *Asia Pac J Clin Oncol*. 2020. <https://doi.org/10.1111/ajco.13476>.
10. De Leeuw RA, Burger NB, Ceccaroni M, Zhang J, Tuynman J, Mabrouk M, et al. COVID-19 and laparoscopic surgery: scoping review of current literature and local expertise. *JMIR Public Health Surveill*. 2020;6(2):e18928. <https://doi.org/10.2196/18928>

11. Wohlin C. Guidelines for snowballing in systematic literature studies and a replication in software engineering. ACM International Conference Proceeding Series. 2014. <https://doi.org/10.1145/2601248.2601268>
12. Brouwers MC, Kho ME, Browman GP, Burgers JS, Cluzeau F, Feder G, et al. AGREE II: Advancing guideline development, reporting and evaluation in health care. *CMAJ*. 2010;182(18):E839–42.
13. Baethge C, Goldbeck-Wood S, Mertens S. SANRA—a scale for the quality assessment of narrative review articles. *Res Integr Peer Rev*. 2019;4(1):5.
14. Ficarra V, Novara G, Abrate A, Bartoletti R, Crestani A, de Nunzio C, et al. Urology practice during the COVID-19 pandemic. *Minerva Urol Nefrol*. 2020;72(3):369–75.
15. RANZCOG. COVID-19: outpatient services; office consultations and procedures. Available from: <https://ranzocg.edu.au/news/covid-19-outpatient-services;-office-consultation>. Accessed 4 October 2020.
16. Michel F, Gaillet S, Cornu JN, Robert G, Game X, Phé V, et al. French Association of Urology. COVID-19: recommendations for functional urology. *Prog Urol*. 2020;30(8–9):414–25.
17. Thakar R, Robinson D, Rantell A, Ness W, Seleme M, Berghmans B. Guidance for the management of urogynecological conditions during the coronavirus (COVID-19) pandemic iuga.org/publications/covid-19-guidance-for-urogynecological-conditions. 2020
18. Society for Gynecologic Surgeons. Joint statement on re-introduction of hospital and office-based procedures in the COVID-19 climate for the practicing urogynecologist and gynecologist. *J Minim Invasive Gynecol*. 2020;27(5):1030–32.
19. Grimes CL, Balk EM, Crisp CC, Antosh DD, Murphy M, Halder GE, et al. A guide for urogynecologic patient care utilizing telemedicine during the COVID-19 pandemic: review of existing evidence. *Int Urogynecol J*. 2020;31(6):1063–89.
20. Amparore D, Campi R, Checcucci E, Sessa F, Pecoraro A, Minervini A, et al. Forecasting the future of urology practice: a comprehensive review of the recommendations by international and European associations on priority procedures during the COVID-19 pandemic. *Eur Urol Focus*. 2020;6(5):1032–48.
21. Chiofalo B, Baiocco E, Mancini E, Vocaturo G, Cutillo G, Vincenzoni C, et al. Practical recommendations for gynecologic surgery during the COVID-19 pandemic. *Int J Gynecol Obstet*. 2020;150(2):146–50.
22. Grimes CL, Balk EM, Dieter AA, Singh R, Wieslander CK, Jeppson PC, et al. Guidance for gynecologists utilizing telemedicine during COVID-19 pandemic based on expert consensus and rapid literature reviews. *Int J Gynecol Obstet*. 2020;150:288–98.
23. Novara G, Checcucci E, Crestani A, Abrate A, Esperto F, Pavan N, et al. Telehealth in urology: a systematic review of the literature. How much can telemedicine be useful during and after the COVID-19 pandemic? *Eur Urol*. 2020;78(6):786–811.
24. Katz EG, Stensland KD, Mandeville JA, MacLachlan LS, Moinzadeh A, Sorcini A, et al. Triaging office based urology procedures during the COVID-19 pandemic. *J Urol*. 2020;204(1):9–10.
25. Escura Sancho S, Ros Cerro C, Anglès-Acedo S, Bataller Sánchez E, España-Pons M. How did COVID-19 pandemic change the way we attend the patients in an urogynaecological unit. *Clin Invest Ginecol Obstet*. 2020;47(3):111–7.
26. Serna-Gallegos T, Ninivaggio CS. A lasting impression: telemedicine in urogynecology during the coronavirus disease 2019 pandemic. *Curr Opin Obstet Gynecol*. 2020;32(6):456–60.
27. Heldwein FL, Loeb S, Wroclawski ML, Sridhar AN, Carneiro A, Lima FS, et al. A systematic review on guidelines and recommendations for urology standard of care during the COVID-19 pandemic. *Eur Urol Focus*. 2020;6(5):1070–85.
28. López-Fando L, Bueno P, Carracedo D, Averbeck M, Castro-Díaz DM, Chartier-Kastler E, et al. Management of female and functional urology patients during the COVID pandemic. *Eur Urol Focus*. 2020;6(5):1049–57.
29. Ghanbari Z, Mostaan F, Eftekhari T, Deldar M, Changiz N, Adabi K. Resumption of elective surgery following COVID-19 outbreak, guideline for female pelvic medicine and surgery. *J Family Reprod Health*. 2020. 14(1):1–4
30. Ahmed K, Hayat S, Dasgupta P. Global challenges to urology practice during the COVID-19 pandemic. *BJU Int*. 2020;125(6):E5–6.
31. Huri E, Hamid R. Technology-based management of neurourology patients in the COVID-19 pandemic: is this the future? A report from the International Continence Society (ICS) institute. *NeuroUrol Urodyn*. 2020;39(6):1885–8.
32. Mukherjee S, Raza A. Virtual consent for virtual patients: benefits of implementation in a peri- and post-COVID-19 era. *Br J Hosp Med (Lond)*. 2020;81(7):1–3.
33. Musco S, del Popolo G, Lamartina M, Herms A, Renard J, Manassero A, et al. Neuro-urology during the COVID-19 pandemic: triage and priority of treatments. *NeuroUrol Urodyn*. 2020;39(7):2011–5
34. Chu DK, Akl EA, Duda S, Solo K, Yaacoub S, Schünemann HJ, et al. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *Lancet*. 2020;395(10242):1973–87.
35. Transmission of SARS-CoV-2 and mitigating measures. EMG-SAGE. 2020. <https://www.gov.uk/government/publications/transmission-of-sars-cov-2-and-mitigating-measures-update-4-june-2020>
36. Phé V, Karsenty G, Robert G, Gamé X, Cornu JN. Widespread postponement of functional urology cases during the COVID-19 pandemic: rationale, potential pitfalls, and future consequences. *Eur Urol*. 2020;78(1):4–5.
37. Galvão J. COVID-19: the deadly threat of misinformation. *Lancet Infect Dis*. 2020. <https://doi.org/10.1016/S1473-3099>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.