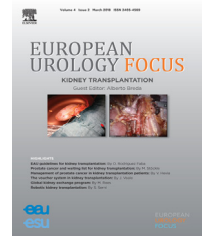


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Review – Female Urology - Incontinence

Management of Female and Functional Urology Patients During the COVID Pandemic

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Article info

Article history:

Accepted May 29, 2020

Associate Editor: Richard Lee

Keywords:

COVID-19
Female urology
Functional urology
Neurourology
Prioritization
Telehealth

Abstract

Context: Coronavirus disease 19 (COVID-19) has changed standard urology practice around the world. The situation is affecting not only uro-oncological patients but also patients with benign and disabling conditions who are suffering delays in medical attention that impact their quality of life.

Objective: To propose, based on expert advice and current evidence where available, a strategy to reorganize female and functional urological (FFU) activity (diagnosis and treatment).

Evidence acquisition: The present document is based on a narrative review of the limited data available in the urological literature on SARS-Cov-2 and the experience of FFU experts from several countries around the world.

Evidence synthesis: In all the treatment schemes proposed in the literature on the COVID-19 pandemic, FFU surgery is not adequately covered and usually grouped into the category that is not urgent or can be delayed, but in a sustained pandemic scenario there are cases that cannot be delayed that should be considered for surgery as a priority. The aim of this document is to provide a detailed management plan for noninvasive and invasive FFU consultations, investigations, and operations. A classification of FFU surgical activity by indication and urgency is proposed, as well as recommendations adopted from the literature for good surgical practice and by surgical approach in FFU in the COVID-19 era.

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<https://doi.org/10.1016/j.euf.2020.05.023>

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Please cite this article in press as: López-Fando L, et al. Management of Female and Functional Urology Patients During the COVID Pandemic. Eur Urol Focus (2020), <https://doi.org/10.1016/j.euf.2020.05.023>

Conclusions: Functional, benign, and pelvic floor conditions have often been considered suitable for delay in challenging times. The long-term implications of this reduction in functional urology clinical activity are currently unknown. This document will help functional urology departments to reorganize their activity to best serve their patients. **Patient summary:** Many patients will suffer delays in urology treatment because of COVID-19, with consequent impairment of their physical and psychological health and deterioration of their quality of life. Efforts should be made to minimize the burden for this patient group, without endangering patients and health care workers.

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1. Introduction

The new acute respiratory syndrome coronavirus type 2 (SARS-CoV-2) and the disease it causes, coronavirus disease 19 (COVID-19), were described in Wuhan, China, on December 2019 [1]. During the first months of 2020, the new SARS-CoV-2 spread worldwide and the World Health Organization (WHO) announced a pandemic on March 11, when there were 118 000 cases in 114 countries and 4291 deaths [2]. As of April 17, 2020, there were 2 078 605 confirmed cases in 213 countries and 139 515 deaths [3].

This new disease has changed urology practice in most countries around the world [4]. The definition of a health system crisis may vary according to local characteristics, including human, economic, and technological resources. Thus, we consider the term crisis to be used to refer to any situation in which there is still an imminent risk of exhausting the capacity of the health service in a given location or country in the short term. Strong national and even regional differences in hospital load due to COVID-19 exist at present and important fluctuations will probably occur in the next few months. Some countries have declared a national emergency, and several have closed their borders to contain the pandemic at the time of writing.

Some of the actions taken in urology departments include cancellation of face-to-face outpatient and nonurgent activity to maintain social distancing, screening of planned clinic appointments, consultations for patients with nonurgent conditions via telephone and rescheduling appointments for a few months later. Clinicians individually evaluated patients with known or suspected malignancies or other urgent conditions. Likewise, outpatient procedures were screened and stratified by urgency. Cystoscopy and prostatic biopsy were carried out only in known or suspected malignant nondeferable cases. For benign conditions, the majority of procedures were deferred [5].

Surgical activity for scheduled patients was cancelled, and only urgent or nondeferable oncological surgeries were carried out. This was because of a lack of personnel who may have been diverted to other department and/or lack of technical resources diverted to the management of COVID-19 patients. In some hospitals, even oncological surgeries were paralyzed for weeks owing to a lack of resources such as ventilators, anesthesiologists, and intensive care unit (ICU) capacity.

This situation will have an impact that cannot be assessed yet on the oncological prognosis of patients with malignant conditions. Patients with benign and disabling conditions

(such as urinary fistula, pelvic pain, urinary incontinence, pelvic organ prolapse) will also suffer from delayed medical attention with consequent negative impacts on their physical and psychological health and ultimately their quality of life. In light of this new situation for urology, authors such as Ficarra et al [6] and Stensland et al [7] have suggested protocols and strategies for reorganizing urological surgical activities. Similarly, strategies for prioritizing urological activity have been published [8,9]. Proietti et al [10] suggested recommendations for endourological management of stones in the COVID-19 era and Gillessen and Powles [11] proposed recommendations for systemic therapy in patients with urological cancers.

The likelihood is that the global effect of the COVID-19 pandemic will last for some time during which national health systems will have to treat COVID-19 and non-COVID-19 patients simultaneously. Therefore, functional urology units will have to reorganize their activity according to patient priority and the scope of the pandemic in each region. The European Association of Urology (EAU) Guidelines Office very recently released EAU guidelines adapted to the COVID-19 era, including guidelines on incontinence, male lower urinary tract symptoms, neurourology, and chronic pelvic pain [12]. The intention of this document is to deepen and expand the previously published information in these fields.

2. Evidence acquisition

The document is based on the limited data available in the literature on SARS-Cov-2 and the experience of the authors in the management of COVID-19 in their institutions. Key opinion leaders in the field of female and functional urology (FFU) from several countries around the world, including those that have been hit the hardest by COVID-19, were asked to devise a strategy for reorganizing functional urological activity (diagnosis and treatment) that would be applicable to most of the world. Countries included Belgium, Brazil, Colombia, France, Iran, Italy, Portugal, Russia, Spain, the Netherlands, Turkey, the UK, and the USA.

A web-based PubMed search was performed using the keywords “SARS-CoV-2”, “COVID19”, “COVID Urology”, “COVID19 surgery”, and “urine analysis”. A narrative review of the evidence found was carried out up to April 15, 2020. Only English language papers and web pages were reviewed.

A modified nominal group technique was used because of the extraordinary meeting and mobility restrictions during the COVID-19 pandemic. Four authors (HH, LLF, DC, SA) began with a discussion and development of the first proposal of recommendations during the COVID-19 pandemic.

This proposal was sent to the rest of the co-authors to encourage contributions from everyone and facilitate quick agreement on the relative importance of issues, problems, or solutions. A revised version was produced and approved by all the authors on April 18, 2020.

3. Evidence synthesis

3.1. COVID-19 and the genitourinary tract

When devising these recommendations, two factors were taken into account: first, some functional urology procedures are invasive, requiring the use of urinary and rectal

catheters and aerosol-generating procedures; and second, any route other than respiratory drops/aerosol may transmit SARS-CoV-2.

Using real-time reverse transcriptase-polymerase chain reaction (RT-PCR), Chen et al [13] detected COVID-19 RNA in lung wash (14/15 samples; 93%), sputum (72/104; 72%), nasal swabs (5/8; 63%), lung biopsy (6/13; 46%), throat swabs (126/398; 32%), feces (44/153; 29%), and blood (3/307; 1%). SARS-CoV-2 has been detected in COVID-19 patients' stools, and the duration of viral shedding from feces after negative pharyngeal swabs is 7 d (range 6–10), regardless of COVID-19 severity [13]. Recent studies reported limited persistence of SARS-CoV-2 in the urine

Table 1 – General and specific considerations for noninvasive and invasive functional urological studies.

General considerations	
1. Follow local and national guidelines; some consider all patients as suspicious of COVID-19 ^a 2. Document COVID-19 status of every patient: clinical record, physical examination and patient interview regarding COVID-related symptoms and exposures 3. No screening for SARS-CoV-2 for asymptomatic patients is recommended unless undergoing surgery or considering hospitalization 4. COVID-19 testing, according to local guidance, should be undertaken for symptomatic and at-risk patients before invasive tests or procedures 5. Avoid invasive tests if not urgent or going to change management of a patient's condition 6. Balance the benefit of performing a diagnostic/therapeutic procedure with the risk of COVID-19 infection, including obtaining signed informed consent	
Noninvasive tests ^b	
Urine analysis	
Uroflowmetry	
Pad test	
Recommended protection	SARS-CoV-2 patient ^c
<u>Patient protection</u> : Surgical facemask ± gloves <u>Health care professional protection</u> : surgical facemask, apron and gloves ± eye protection (visors/goggles)	<u>Do not perform</u> in suspected or confirmed SARS-CoV-2 active infections or symptomatic patients <u>Patients with mild illness</u> : safe to perform 14 d after symptom onset and if the patient is asymptomatic <u>Patients with moderate to severe illness</u> : safe to perform 14 d after hospital discharge and if the patient is asymptomatic
Invasive tests/procedures	
Physical examination	
Cystoscopy	
Transabdominal, translabial, transvaginal, transrectal ultrasound	
Electromyography	
Cystourethrography	
Urodynamics/video urodynamics	
Stent removal	
Intravesical instillation/injection	
Replacement of indwelling bladder catheter/suprapubic tube	
Pessary cleaning/exchange	
Percutaneous tibial nerve stimulation/transcutaneous electrical nerve stimulation	
Neural blockade	
Teaching self-catheterization	
Urethral dilatation	
Pelvic floor rehabilitation techniques	
Recommended protection	SARS-CoV-2 patient ^c
<u>Patient's protection</u> : Surgical facemask ± gloves <u>Health care professional protection</u> : -Include only personnel essential for safe performance of the procedure to avoid exposure-Full personal protective equipment, which includes shoe covers, impermeable gowns, surgical or N95 masks, protective head covering, gloves and eye protection-Movement of personnel in and out of the room should be strictly limited-Trainee participation should be limited	<u>Do not perform</u> in suspected or confirmed active SARS-CoV-2 infections or symptomatic patients <u>Patients with mild illness</u> : safe to perform 21 d after symptom onset and if the patient is asymptomatic <u>Patient with moderate to severe illness</u> : safe to perform 21 d after hospital discharge and if the patient is asymptomatic
^a These recommendations may be adapted according to national or local guidelines.	
^b Noninvasive tests in the COVID-19 era should be considered as any diagnostic test that does not involve proximity to or physical contact with the patient.	
^c If facilities are available, including staff.	

of both humans [14] and animals [15], although this has not been confirmed in other studies [13]. Feco-oral and urinary transmission routes have not been reported, although they may be theoretically possible.

So far, there is no report on the presence of SARS-CoV-2 in the female reproductive tract. Qiu et al [16] carried out the first attempt to detect SARS-CoV-2 in vaginal fluid in ten women with severe confirmed pneumonia. Findings from this small group of cases suggest that no SARS-CoV-2 exists in the vaginal fluid of COVID-19 patients, regardless of the severity of respiratory illness. This suggests that the likelihood of SARS-CoV-2 transmission during vaginal procedures might also be very low [16].

3.2. Outpatient clinics in functional urology

Functional studies are essential tools in the diagnosis of lower urinary tract dysfunction. These can be divided into invasive and noninvasive studies, bearing in mind the risk of SARS-CoV-2 infection to patients and health care workers. Invasive studies carry a higher risk of transmission of SARS-CoV-2 infection. Therefore, during the COVID-19 pandemic it is advisable to reduce invasive studies to only mandatory

life-saving ones. There is another fundamental aspect to consider: patient attendance at a hospital increases the risk of contagion (considering the hospital as a COVID-19 high-prevalence area) and may not maintain the necessary social distancing required (>1–2 m) [17]. The risk of nosocomial transmission must also not be forgotten in view of inpatient care [18].

The rapid spread of COVID-19, and the fact that health care facilities could be sources of contagion, has focused attention on new models of care that avoid face-to-face contact between the clinician and patient. Not all clinical situations are appropriate for video consultations. The value and ultimate contribution of telehealth in functional urology have yet to be completely assessed, but this approach may provide a method for follow-up for cases not requiring a physical examination or other testing methodologies. It is important to weigh the benefit to a patient who attends the hospital for a full examination against the risk of contracting COVID-19, especially for patients in high-risk groups such as immunocompromised and immunosuppressed individuals and those aged >70 yr.

Telemedicine may also not be available to some patients or they may not be able to use technological devices (eg, older

Table 2 – Outpatient management of different bladder and pelvic floor disorders during the COVID-19 crisis.^a

Condition	Category	Plan
Outpatient clinics		• Change from face-to-face to telephone or video consultation • If examination is needed or the patient requests face-to-face consultation, arrange hospital attendance at a later date for nonurgent cases
Stress urinary incontinence and prolapse	Routine	• Conservative treatment including pelvic floor muscle training, weight loss, pads, pessaries • Delay examination and diagnostic tests until the end of the COVID crisis • Delay invasive treatment until the end of the COVID crisis
Overactive bladder and urgency urinary incontinence	Routine	• Conservative treatment including fluid manipulation, bladder training • Medications: antimuscarinics and/or β3-agonists • Delay examination and diagnostic tests until the end of the COVID crisis • Delay invasive treatment until the end of the COVID crisis
Recurrent UTIs	Assess risk of UTIs requiring hospitalization	• Hygiene advice, fluid intake recommendations • Consider low-dose prophylactic antibiotics, vaginal estrogens (in postmenopausal women) • Consider D-mannose, oral vaccine, cranberry tablets/juice • Consider an ultrasound scan of the renal tract to check for stones and postvoid residual urine • Continue bladder instillations if self-administered or delay if nurse-administered until the end of the COVID crisis
Urine retention	Acute	• Emergency long-term urethral or suprapubic catheter • Delay functional tests and cystoscopy until the end of the COVID crisis
	Chronic	• Use urgent ultrasound scanning as a primary diagnostic tool to look at the bladder and kidneys • Emergency long-term urethral or suprapubic catheter if there are signs or symptoms of high pressure retention, UTIs, enuresis, deranged renal function tests • Use urgent ultrasound scanning as a primary diagnostic tool to look at the bladder and kidneys • Delay teaching of intermittent self-catheterization until the end of the COVID crisis
Bladder pain syndrome	Flare episode	• Delay further investigations until the end of the COVID crisis • Start oral medications such as amitriptyline, pentosan polysulfate, ibuprofen, antihistamines
	Chronic	• Continue bladder instillations if self-administered • Delay bladder instillations if nurse-administered until the end of the COVID crisis; continue oral therapy in the meantime
Voiding LUTS	Routine	• Consider oral medication for suspected BPO: α-blockers, 5α reductase inhibitors • Consider the need for a suprapubic or urethral catheter • Delay functional studies (eg, flow tests) until the end of the COVID crisis • Delay surgery for LUTS until the end of the COVID crisis
Urethral diverticulum/urethral problems	Routine	• Delay any diagnostic test or surgery until the end of the COVID crisis
Vesicovaginal fistula	Routine	• Delay any diagnostic test or surgery until the end of the COVID crisis

ce:simple-para id="spar0015">BPO = benign prostatic obstruction; LUTS = lower urinary tract symptoms; UTI = urinary tract infection.

^a The COVID crisis is defined as any situation in which there is still an imminent risk of exhausting the capacity of the health service in a given location or country in the short term. The end of the COVID crisis could be considered as a time of lower epidemic pressure on the health care system.

Table 3 – Classification of surgical procedures according to priority level during the COVID-19 crisis [8].

Time for surgery	Priority level	Functional urology surgeries in this category
24 h	1a, emergency	None
72 h	1b, urgent	Infected prosthesis/implant
4 wk ^a	2	None
3 mo ^a	3	None
>3 mo ^a	4	All the rest (Table 4)

^a Can be deferred in the context of the COVID-19 crisis.

and economically disadvantaged populations). A telephone consultation may be an initial step to help in these instances. In addition, the impacts of various degrees of cognitive dysfunction so common in the older functional urology population may degrade the value of virtual visits, especially in the absence of engaged and responsive family members. Furthermore, the psychological profile of the patient could also limit virtual appointments.

The International Urogynaecological Association has recently published recommendations for urogynaecological conditions [19], suggesting virtual consultations and the use

Table 4 – Classification of female and functional urology surgical activity by indication and urgency during the COVID-19 pandemic.^a

Emergent	<1 h	- Life-threatening emergencies
Urgent	<24 h	- Surgical site or device infection/abscess with sepsis - Urinary retention, unable to place a catheter - Hemorrhage after functional urology surgery
Urgent-elective (high priority)	<4 wk	- Second stage of sacral neuromodulation or withdrawal of electrode after the first stage (risk of infection) - Removal of infected devices (artificial urinary sphincter, slings, mesh) - Removal of urethral extruded devices - Botulinum toxin in patients with high-risk neurogenic bladder (high upper urinary tract risk) - Disabling refractory bladder pain syndrome - Cystectomy in patients with uncontrollable hematuria - Urinary diversion in urinary fistula with sepsis or severe complications
Elective (intermediate priority)	1–3 mo	- Removal of vaginal extruded uninfected material (eg, mesh) - Bladder outlet obstruction due to mesh - Intravesical extrusion or calcifications after vaginal mesh - Botulinum toxin in patients with low-risk neurogenic bladder - Urinary fistula with bladder catheter or nephrostomy - Vesicoureteral reflux with repeat acute pyelonephritis - Prolapse surgery with complications (pain, hematuria, urinary retention, hydronephrosis) - Pudendal neuropathy with refractory pain - Female urinary retention if not self-catheterizing or without an indwelling catheter - Cystectomy + ileal conduit in patients with high-risk neurogenic bladder with upper urinary tract deterioration - Augmentation cystoplasty in patients with high-risk neurogenic bladder with upper urinary tract deterioration - Suprapubic catheter in neurogenic bladder - Urethral diverticulum with complications (infection, retention) - Benign prostatic obstruction surgery (requiring indwelling catheter) - Stent replacement
Elective-discretionary (low priority)	>3 mo	- Elective male stress urinary incontinence - Elective female stress urinary incontinence - Refractory overactive bladder treatment - Elective prolapse surgery - Vesicoureteral reflux - Bladder pain syndrome - Pudendal neuropathy - Established urinary fistula without complications - Urethral diverticulum without complications - Effects of radiation and bowel or pelvic surgery on bladder, bowel, and pelvic floor function - Uncomplicated neurogenic bladder - Benign prostatic obstruction on self-catheterization or safely voiding

Black (emergent and urgent), Red (urgent), Yellow (intermediate) and Green (low).

^a COVID crisis is defined as any situation in which there is still an imminent risk of exhausting the capacity of the health service in a given location or country in the short term. The end of the COVID crisis could be considered as a time of lower epidemic pressure on the health care system.

of questionnaires and bladder diaries before a virtual appointment, and delay of investigations or surgical management until services return to normal. Behavioral therapies, lifestyle changes, physical therapy, and medication could be considered if suitable.

For FFU patients, our recommendation (based on expert advice) is to convert all initial and follow-up consultations to telephone or video consultations. Patients who then need to be examined or wish to have a face-to-face consultation can be invited to attend the hospital at a later date, having weighed the pros and cons of visiting the hospital [20].

Table 1 shows general and specific considerations for noninvasive and invasive functional urological studies [21] and Table 2 presents specific recommendations for outpatient clinics.

3.3. Surgical (diagnostic and operative) activity in functional urology

During the current time of widespread anxiety around the COVID-19 pandemic [22], a pragmatic functional urology guide based on underlying risk stratification and resource utilization can support our ethical duty to patients of assuring access to timely and appropriate surgical care.

Importantly, the notion to “thoughtfully review all scheduled elective procedures” does not reflect a presumed assumption to cancel all elective surgical cases across the world [23].

In most of the treatment schemes proposed in the emerging literature on the COVID-19 pandemic, functional urological surgery is entirely delayed. However, in a prolonged and fluctuating pandemic scenario, there are cases that should be considered for management to avoid the physical and psychological damage that these problems can lead to [24]. The physiological condition of a vulnerable cohort of patients may rapidly worsen in the absence of appropriate surgical care, and the resulting decline in inpatient health makes them more vulnerable to a coronavirus infection [25].

The long-term implications of this reduction in functional urology clinical activity are currently unknown, as it is impossible to predict the duration of the crisis. The American College of Surgeons bulletin contained the following specific recommendations on March 13, 2020 [24]: “Each hospital, health system, and surgeon should thoughtfully review all scheduled elective procedures with a plan to minimize, postpone, or cancel electively scheduled operations, endoscopies, or other invasive procedures until we

Table 5 – Prioritization of female and functional urology procedures during COVID-19 crisis.^a

Condition	Category	Plan
Procedures		Delay until the end of the COVID crisis unless capacity available
Stress incontinence surgery and prolapse surgery (autologous fascial sling, urethral bulking, colposuspension, artificial sphincter, colporrhaphy)	ElectiveLevel 4	- Delay until the end of the COVID crisis - Manage patient as per outpatients (Table 2) with conservative and medical therapy
Intravesical Botox (new and repeat)	ElectiveLevel 4	- Delay until the end of the COVID crisis - Do not commence new injections - Manage patient as per outpatients (Table 2) with conservative and medical therapy
SNM	ElectiveLevel 4	- Delay until the end of the COVID crisis - Do not commence new implants - Manage patient as per outpatients (Table 2) with conservative and medical therapy - Remove percutaneous nerve evaluation lead in outpatient clinic if one in situ - If SNM tined-lead is in situ, cut extension lead in clinic and either remove lead or insert battery at the end of the COVID crisis
Bladder instillations	ElectiveLevel 4	- Continue if self-administered. - Delay until the end of the COVID crisis if administered in hospital for both induction and maintenance courses. - Recommence oral medications if symptoms not bearable. - Only change if in situ for accepted period of time or encrustations/ blockages
Change of indwelling catheter	Elective4-wk delay [28]	
Bladder outlet obstruction surgery for prostate (TURP, Urolift, Rezum, HoLEP/laser)	ElectiveLevel 4	- Delay until the end of the COVID crisis - Prioritize patients with indwelling catheters
Major reconstruction for benign conditions (ileal conduit, benign cystectomy, augmentation cystoplasty, Mitrofanoff)	ElectiveLevel 4	Delay until the end of the COVID crisis except in some scenario such as high-risk neurogenic bladder with upper urinary tract deterioration or vesicoperineal fistula with chronic infection of pressure sore ulcer
Urinary fistula (eg, vesico-vaginal and urethra-vaginal)	ElectiveLevel 4	- Delay until the end of the COVID crisis except in case of recurrent infection. - Prioritize once normal activity is resumed.
Vesicoureteric reflux surgery (bulking, reimplant)	ElectiveLevel 4	Delay until the end of the COVID crisis except in cases of recurrent sepsis
Mesh/sling removal	ElectiveLevel 4	- Delay until the end of the COVID crisis - Prioritize erosion into the urinary tract or untreated severe obstruction
Infected implant (artificial urinary sphincter/ mesh/SNM)	Level 1bUrgent	- Treat with intravenous antibiotics, at home if possible - If severe infection/sepsis, remove urgently (<2 wk)

HoLEP = holmium laser enucleation of the prostate; SNM = sacral neuromodulation; TURP = transurethral resection of the prostate.

^a COVID crisis is defined as any situation in which there is still an imminent risk of exhausting the capacity of the health service in a given location or country in the short-term. The end of the COVID crisis could be considered as a time of lower epidemic pressure on the healthcare system.

have passed the predicted inflection point in the exposure graph and can be confident that our health care infrastructure can support a potentially rapid and overwhelming uptick in critical patient care needs”.

Functional urology surgery has grown in recent years, leading to significant improvements in the quality of life of patients and greater life expectancy, especially in patients with neurogenic bladders. At present, different pathologies can be resolved in a minimally invasive way that includes transurethral, transvaginal, percutaneous, or laparoscopic and/or robotic surgery, but in some cases open surgery is required.

No contraindication exists for open surgery, transvaginal surgery, or a transurethral approach. Special care must be taken with the laparoscopic and robotic approaches. A correlation between urine spillage and fecal-oral transmission during laparoscopic procedures has not been reported, although this is theoretically possible. For laparoscopic and robotic functional surgeries, we proposed that the European Association of Urology Robotic Urology Section (ERUS) measures should be adopted to safeguard the health of health care workers and their patients [26].

Table 3 shows the classification of surgical patients into groups according to priority during the COVID-19 crisis on the basis of recently published intercollegiate guidelines

from the UK National Health Service, the Royal College of Surgeons of England and Edinburgh, and the Royal College of Physicians and Surgeons of Glasgow [8].

It is acknowledged in these guidelines that delays in surgical treatment are forced by limited resources during the COVID-19 crisis and can lead to suboptimal results and worsening of certain conditions. In this context, when surgery is needed, outpatient procedures under local anesthesia should be favored whenever possible to spare the use of ventilators and the inherent risk of virus spread.

Table 4 suggests how FFU patients can be managed during the COVID-19 pandemic. Table 5 shows prioritization of FFU procedures on the basis of expert opinion considering resources available during the COVID-19 crisis. Category levels refer to the classification in Table 3. Table 6 presents general recommendations for good surgical practice and by surgery approach in functional urology [27].

3.4. Post-COVID-19 crisis planning

It is very likely that there will be a very large backlog of FFU patients waiting for procedures and consultations after the COVID-19 crisis. It is therefore important that plans are put in place to help ease the backlog, especially as all other specialties and subspecialties will face a similar problem.

Table 6 – General recommendations for good surgical practice in functional urology during the COVID-19 pandemic [26,27].

General considerations		
1. Follow local and national guidelines; some consider all patients as suspicious for COVID-19		
2. Screen COVID-19 status of every patient according to local guidelines: clinical records, physical examination, and patient questionnaire regarding flu-related symptoms and exposures		
3. COVID-19 testing should be undertaken for any at-risk patient before surgery following local guidelines and availability		
4. Patients with unknown COVID-19 status may be considered “positive until proven otherwise”		
5. Balance the benefit of having a diagnostic/therapeutic procedure with the risk of COVID-19 infection, including obtaining signed informed consent		
PPE for operating room personnel		
1. Include only personnel essential for safe performance of the operation to avoid exposure and preserve PPE resources		
2. Full PPE (shoe covers, impermeable gowns, surgical or N95 masks, protective head covering, gloves and eye protection)		
3. Movement of personnel in and out of the operating room should be strictly limited		
4. Limit staff breaks mid-case when possible		
5. Trainee participation should be limited		
Transurethral [29]	Vaginal/laparotomy	Laparoscopy or robot-assisted
Minimizes smoke production	Minimizes smoke production	Minimizes smoke production
Limit evacuation of surgical smoke	Electrosurgery with low power setting	Electrosurgery with low power setting
Bipolar electrosurgical devices recommended	Avoidance of long desiccation times	Avoidance of long desiccation times
Standard droplet precautions	Dissection using non-electrosurgical techniques	Closed smoke evacuation/filtration system with ULPA capability
	ULPA smoke evacuators are recommended	Use laparoscopic suction to remove surgical smoke and deflate the abdominal cavity
	Use a suction device to remove any surgical smoke	Do not vent pneumoperitoneum into the room
	Minimize blood/fluid droplet spray or spread	Low intra-abdominal pressure (10–12 mm Hg) if feasible
		Avoid rapid deflation or loss of pneumoperitoneum
		Be careful at times of instrument exchange
		Tissue extraction should be performed with minimal CO ₂ escape
		Minimize blood/fluid droplet spray or spread
		Minimize CO ₂ leakage from trocars
PPE = personal protective equipment; ULPA = ultra-low-particulate air filtration.		
As testing becomes more rapid and readily available, universal testing for COVID-19 may be recommended.		

This may include extra working hours during evenings and weekends or operating at other sites. It is important to communicate this to patients and make them aware of such difficulties. Every hospital, city, and country will have different challenges in getting back on track, but the likelihood is that most will not be able to achieve this for at least 6–12 mo, as some health care services were overstretched even before the COVID-19 crisis.

Below are some recommendations to help manage activity in the post-COVID-19 era:

1. Triage and prioritize all outpatient consultations, diagnostic procedures, and operations early.
2. Devise a triaging system that can be followed by your team.
3. Communicate with patients to let them know about the plans and reduce their anxiety.
4. Liaise with hospital management to try and see if consultations, diagnostics, and treatments including surgery can be offered elsewhere, such as in another local hospital, by your team.
5. Ask your team if they have any suggestions and communicate closely with each other so that all are aware of the plans.

4. Conclusions

The COVID-19 pandemic is having a significant impact on health care systems all over the world. Urology departments have entirely changed their daily practice to manage this new challenge. Functional urology and pelvic floor conditions have often been considered suitable for delay in challenging times. The long-term implications of this reduction in functional urology clinical activity are currently unknown, and many patients will suffer delays in treatment with consequent impairment of their physical and psychological health and quality of life. Efforts should be made to minimize the burden for this patient group without endangering patients and health care workers.

Author contributions: Salvador Arlandis had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: None.

Obtaining funding: None.

Administrative, technical, or material support: None.

Supervision: Hashim, Arlandis, López-Fando.

Other: None.

Financial disclosures: Salvador Arlandis certifies that all conflicts of interest, including specific financial interests and relationships and

affiliations relevant to the subject matter or materials discussed in the manuscript (eg, employment/affiliation, grants or funding, consultancies, honoraria, stock ownership or options, expert testimony, royalties, or patents filed, received, or pending), are the following: None.

Funding/Support and role of the sponsor: None.

References

- [1] Naspro R, Da Pozzo LF. Urology in the time of corona. *Nat Rev Urol* 2020;17:251–3. <http://dx.doi.org/10.1038/s41585-020-0312-1>.
- [2] World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19 – 11 March 2020. www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19-11-march-2020.
- [3] World Health Organization. Coronavirus disease (COVID-19) pandemic. WHO; April 17, 2020. www.who.int/emergencies/diseases/novel-coronavirus-2019.
- [4] Dasgupta P, Campi R, Zeng G, Rha KH. Covid-19 and urology. *BJU Int Blog*; March 16, 2020. www.bjuinternational.com/bjui-blog/covid-19-and-urology/.
- [5] Chan MC, Yeo SEK, Chong YL, Lee YM. Stepping forward: urologists' efforts during the COVID -19 outbreak in Singapore. *Eur Urol* 2020. <http://dx.doi.org/10.1016/j.eururo.2020.03.004>, S0302-2838(20)30145-7 [published online ahead of print, 2020 Mar 17].
- [6] Ficarra V, Novara G, Abrate A, et al. Urology practice during COVID-19 pandemic. *Minerva Urol Nefrol* 2020. <http://dx.doi.org/10.23736/S0393-2249.20.03846-1>, [published online ahead of print, 2020 Mar 23].
- [7] Stensland KD, Morgan TM, Moynadeh A, et al. Considerations in the triage of urologic surgeries during the COVID-19 pandemic. *Eur Urol* 2020;77:663–6. <http://dx.doi.org/10.1016/j.eururo.2020.03.027>.
- [8] NHS England. Clinical guide to surgical prioritisation during the coronavirus pandemic. April 11, 2020. www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/C0221-specialty-guide-surgical-prioritisation-v1.pdf.
- [9] Ho HC, Hughes T, Bozlu M, Kadogöglu A, Somani BK. What do urologists need to know: diagnosis, treatment, and follow-up during COVID-19 pandemic. *Turk J Urol* 2020;46:169–77. <http://dx.doi.org/10.5152/tud.2020.20119>.
- [10] Proietti S, Gaboardi F, Giusti G. Endourological stone management in the era of the COVID-19. *Eur Urol* 2020. <http://dx.doi.org/10.1016/j.eururo.2020.03.042>, S0302-2838(20)30217-7 [published online ahead of print, 2020 Apr 14].
- [11] Gillesen S, Powles T. Advice regarding systemic therapy in patients with urological cancers during the COVID-19 pandemic. *Eur Urol* 2020;77:667–8. <http://dx.doi.org/10.1016/j.eururo.2020.03.026>.
- [12] Ribal MJ, Cornford P, Briganti A, et al. EAU Guidelines Office Rapid Reaction Group: an organisation-wide collaborative effort to adapt the EAU Guidelines recommendations to the COVID-19 era. *EAU*; 2020. In: <https://uroweb.org/wp-content/uploads/EAU-Guidelines-Office-Rapid-Reaction-Group-An-organisation-wide-collaborative-effort-to-adapt-the-EAU-guidelines-recommendations-to-the-COVID-19-era.pdf>
- [13] Chen Y, Chen L, Deng Q, et al. The presence of SARS-CoV-2 RNA in the feces of COVID-19 patients. *J Med Virol* 2020;92(7):833–40. <http://dx.doi.org/10.1002/jmv.25825>.
- [14] Ling Y, Xu SB, Lin YX, et al. Persistence and clearance of viral RNA in 2019 novel coronavirus disease rehabilitation patients. *Chin Med J* 2020;133:1039–43. <http://dx.doi.org/10.1097/cm9.0000000000000774>.
- [15] Kim YI, Kim SG, Kim SGM, et al. Infection and rapid transmission of SARS-CoV-2 in ferrets. *Cell Host Microbe* 2020;27:. <http://dx.doi.org/10.1016/j.chom.2020.03.023>, 704–709.e2.

- [16] Qiu L, Liu X, Xiao M, et al. SARS-CoV-2 is not detectable in the vaginal fluid of women with severe COVID-19 infection. *Clin Infect Dis* 2020;ciaa375. <http://dx.doi.org/10.1093/cid/ciaa375>, [published online ahead of print, 2020 Apr 2].
- [17] World Health Organization. Coronavirus disease (COVID-19) advice for the public. WHO; March 31, 2020. www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public.
- [18] Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA* 2020;323:1061–9.
- [19] 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; April 8, 2020. www.iuga.org/publications/covid-19-guidance-for-urogynecological-conditions.
- [20] Greenhalgh T, Wherton J, Shaw S, Morrison C. Video consultations for covid-19. *BMJ* 2020;368:m998.
- [21] Katz EG, Stensland KS, Mandeville JA, et al. Triaging office-based urology procedures during the COVID-19 pandemic. *J Urol* 2020. <http://dx.doi.org/10.1097/JU.0000000000001034>, [published online ahead of print, 2020 Apr 3].
- [22] Ren SY, Gao RD, Chen YL. Fear can be more harmful than the severe acute respiratory syndrome coronavirus 2 in controlling the coronavirus disease 2019 epidemic. *World J Clin Cases* 2020;8:652–7.
- [23] American College of Surgeons. COVID-19: guidance for triage of non-emergent surgical procedures. ACS; March 17, 2020; www.facs.org/covid-19/clinical-guidance/triage.
- [24] Stahel PF. How to risk-stratify elective surgery during the COVID-19 pandemic? *Patient Saf Surg* 2020;14:8.
- [25] Zhang S. What it really means to cancel elective surgeries. *The Atlantic*; March 17, 2020; www.theatlantic.com/science/archive/2020/03/patients-whose-surgeries-are-canceled-because-coronavirus/608176/.
- [26] Motttrie A. ERUS (EAU Robotic Urology Section) guidelines during COVID-19 emergency. European Association of Urology; March 25, 2020. <https://uroweb.org/eau-robotic-urology-section-erus-guidelines-during-covid-19-emergency/>.
- [27] American Association of Gynecologic Laparoscopists. COVID-19: joint statement on minimally invasive gynecologic surgery. AAGL; March 27, 2020. www.aagl.org/news/covid-19-joint-statement-on-minimally-invasive-gynecologic-surgery/.
- [28] Goldman HB, Haber GP. Recommendations for tiered stratification of urological surgery urgency in the COVID -19 era. *J Urol* 2020. <http://dx.doi.org/10.1097/JU.0000000000001067>, [published online ahead of print, 2020 Apr 21].
- [29] Chung YJ, Lee SK, Han SH, et al. Harmful gases including carcinogens produced during transurethral resection of the prostate and vaporization. *Int J Urol* 2010;17:944–9.