COVID-19

The Impact of Telemedicine on Sexual Medicine at a Major Academic Center During the COVID-19 Pandemic

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ABSTRACT

Introduction: Telemedicine has the potential to improve access to care; however, its utility in the field of sexual medicine remains in question.

Aim: To examine the importance of video visits for the treatment of male sexual medicine at our academic center during the period of peak telemedicine use in April 2020.

Methods: We collected and compared deidentified data from all nonprocedure, adult outpatient encounters conducted as either office visits in April 2019 (n = 1,949) or video visits in April 2020 (n = 608). The primary International Classification of Diseases codes (ICD-10) labeled as diagnoses from all encounters were collected, with most encounters linked to several disease codes (n = 4,584). Demographic data were also collected. We performed comparative analyses on Stata (College Station, TX, USA) with significance set at α = .05.

Main Outcome Measures: Disease codes were categorized based on their use and classification in urological care and the proportion that each category made up within the outpatient practice was calculated.

Results: In comparison to the office visits, which took place in April 2019, male sexual medicine visits in April 2020, during the peak of telemedicine use, made up a significantly larger overall share of our practice (P = .012), defined by relative rises in encounters pertaining to male hypogonadism, infertility, penile abnormalities, and testicular abnormalities. Outpatients seen over video visits were also younger than outpatients seen during the previous year over office visits (58.9 vs 60.8, P = .008). Further, race and ethnicity characteristics in the outpatient population were unaffected during the period of telemedicine use.

Conclusions: During the period of historically high telemedicine use following the SARS-CoV-2 outbreak, encounters associated with male sexual medicine made up a significantly larger portion of our outpatient practice. Although the full influence of the COVID-19 pandemic cannot be delineated, our findings suggest telemedicine use is compatible with the field of sexual medicine. **Rabinowitz MJ, Kohn TP, Ellimoottil C, et al. The Impact of Telemedicine on Sexual Medicine at a Major Academic Center During the COVID-19 Pandemic. Sex Med 2021;9:100366.**

Key Words: Male Sexual Impotence; Telemedicine; Care; Outpatient; SARS-CoV-2; Populations; Vulnerable; Urology

INTRODUCTION

Over the past decade, advances in technology have enabled the development of telemedicine modalities, such as video visits happening in real-time between patients and providers (synchronously), and remote monitoring programs (asynchronously).[1] A multi-institutional study conducted in 2019 found that only 14% of urologists surveyed claimed any active telemedicine use in their practice, while over 70% cited reimbursement as a major barrier to implementation.[2] However, during the outbreak of

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COVID-19 in early 2020, the expansion of telehealth coverage,[3] relaxation of federal regulations,[4] and the necessity for remote care ushered in telemedicine at a historic pace.

Accordingly, the role of telemedicine in the field of urology has expanded dramatically in recent months. A 2020 cross-sectional analysis found the use of telemedicine in clinical urology practices across the globe has nearly tripled during the pandemic.[5] The European Association of Urology now advocates for the formalization of telemedicine into the field of clinical urology, citing reduced healthcare costs, improved face-to-face time, and greater satisfaction for both providers and their patients.[6] Remote care has proven to be safe and effective throughout the pandemic for the treatment of prostate cancer, urinary incontinence, urinary stones, and urinary tract infections.[7]

Despite the recent surge in telemedicine, very little has been documented regarding the use of remote visits for the care and treatment of sexual medicine patients.[8] A 2020 meta-analysis identified only 2 published studies (Leusnik et al, 2006, Van Lankveld et al, 2009) investigating the application of telemedicine for sexual dysfunction, the findings of which strongly support the use of the remote format.[9,10] The field of sexual medicine seems primed and well-suited for the use of telemedicine as many of the most common male sexual dysfunctions, such as erectile dysfunction, premature ejaculation, and hypogonadism, have the potential to be safely managed via remote encounters.[11] While it is estimated that nearly 50% of men will suffer from erectile dysfunction in their lifetimes, only 1 in 4 will seek treatment, with men often citing the stigma and shame of impotence as reasons for avoiding care.[12,13] Therefore, the objective of our study was to examine trends in the utilization of video visits for the treatment of male sexual dysfunction at our academic center during the period of peak telemedicine use in April 2020. We aimed to answer how the rapid adoption of telemedicine affected patient composition and diagnoses seen by our urology department amid a pandemic.

MATERIALS AND METHODS

Study Population and Data

The present study conducted at our institution was a retrospective analysis of patient data gathered through the EPIC (Verona, WI, USA) electronic medical record (EMR), our institution's software of choice that allows providers to access patient information from multiple arenas of care through one digital chart. Data were gathered for all adult (≥18 years) outpatient encounters during the months of April 2019 and April 2020 (n = 3,601). The study was approved by our center's Institutional Review Board (IRB00251253). All encounters during April 2019 and 2020 were categorized based on EMR coding as occurring via a remote, telemedicine video visit or as a traditional, in-person office visit. Office visits that were deemed ineligible to be translated to a remote format (ie, outpatient procedures, cystoscopy) were tagged and excluded from comparative analyses (n = 743). From the remaining eligible encounters, 2 groups were constructed: unique patients seen via in-person, office visits conducted during April 2019 (n = 1,949) and those seen by video visits during April 2020 (n = 608).

Primary Outcomes

We aimed to assess how the historically high, nearly compulsory utilization of telemedicine in April 2020 affected which types of visits were taking place in our clinical practice, with specific attention paid to if certain outpatient encounters increased or decreased in prevalence relative to office visits that occurred in April 2019. The primary International Classification of Diseases codes (ICD-10) labeled as diagnoses from all encounters during these 2 study periods were collected, with many encounters linked to one or more disease codes (n = 4,584). After collection, these disease codes were categorized based on their use and classification in urological care. The categorization of sexual medicine use was aided by the aspects of care identified in Dooley et al, 2020 and Novara et al, 2020.[7,11] Relevant disease codes included erectile dysfunction, ejaculatory dysfunction, premature ejaculation, delayed ejaculation, pyronine's disease/ penile abnormalities, hypogonadism, low libido, and others (Table 1, Supplementary Table 1). Using the prevalence of various diseases codes in office visits and video visits, the proportion, or share, that each category made up within the outpatient clinic was assessed.

For all encounters that met our inclusion criteria, demographic variables were obtained from the EMR including age at the time of encounter, race, ethnicity, primary language preference, use of public insurance (Medicaid or Medicare), 5-digit zip codes, and use of our institution's language interpretation services. Driving distance was estimated using a Google Maps (Mountain View, CA, USA) application programming interface based on the distance between a patient's originating zip code and the address of our intuition's urban campus. Further, rurality of patient zip codes was assessed using the list of "eligible" rural zip codes defined by the Federal Office of Rural Health Policy.[14] Medically underserved areas were determined by associating zip codes with data from the 2015 Health Resources & Services Administration Data, which reports on physician density and physicians specialty per geographic region.[15]

Statistical Analysis

For the purposes of our comparative analyses and hypothesis testing, Pearson's chi-squared tests and student's t-tests were performed with statistical significance set at α = .05 using Stata 15 (College Station, TX, USA). Graphs and tables were constructed using Microsoft Excel (Redmond, WA, USA). To predict the likelihood of patients participating in video visits based on demographic and geographic variables, a multivariate logistic regression analysis was conducted. Odds ratios (OR) were generated along with confidence intervals (CI) set at 95%.

Table 1. International classification of disease (ICD-10) codes used for "male sexual medicine" category (further categorization is defined in Supplemental Table 1)

Anejaculation	Epididymo-orchitis without abscess	Erectile dysfunction following radiation therapy
Anorgasmia of male	Epididymo-orchitis, acute	Erectile dysfunction following radical prostatectomy
Consultation for sterilization	Left testicular pain	Erectile dysfunction of organic origin
Delayed ejaculation	Orchalgia	Erectile dysfunction, unspecified erectile dysfunction type
Ejaculatory disorder	Orchitis	Other male erectile dysfunction
Encounter for monitoring testosterone replacement therapy	Pain in left testicle	Hypospadias, unspecified hypospadias type
Gender dysphoria in adult	Retractile testis	Painful erection
Infertility male	Testes pain	Paraphimosis
Infertility management	Testicle pain	Penile abnormality
Klinefelter syndrome	Testicular mass	Penile curvature, acquired
Libido, decreased	Testicular nodule	Penile discharge
Low libido	Testicular pain, left	Penile lesion
Low testosterone	Testicular pain, right	Penile mass
Male hypogonadism	Testicular swelling	Penile pain
Male infertility	Testis pain	Penile pain, chronic
Other ejaculatory dysfunction	Combined arterial insufficiency and corporo-venous occlusive erectile dysfunction	Peyronie disease
Premature ejaculation	Corporo-venous occlusive erectile dysfunction	Peyronie's disease
Premature ejaculation, acquired, generalized, severe	Cuff erosion of artificial urinary sphincter, subsequent encounter	Phimosis
Retrograde ejaculation	Drug-induced erectile dysfunction	Vasculogenic erectile dysfunction, unspecified vasculogenic erectile dysfunction type
Sterilization education	ED (erectile dysfunction) of nonorganic origin	Postprocedural erectile dysfunction, unspecified type
Vasectomy evaluation	ED (erectile dysfunction) of organic origin	Priapism
Hypogonadal obesity	Erectile dysfunction associated with type 2 diabetes mellitus	Priapism due to sickle cell disease
Hypogonadism in male	Erectile dysfunction associated with vasculopathy	Postprocedural erectile dysfunction, unspecified type
Hypogonadism male	Erectile dysfunction due to arterial insufficiency	Priapism
Left varicocele	Erectile dysfunction due to diseases classified elsewhere	Priapism due to sickle cell disease
Spermatocele		
Spermatocele of epididymis		
Varicocele		
Chronic epididymitis		
Epididymal cyst		
Epididymitis		
Epididymitis, bilateral		
Epididymitis, left		

RESULTS

Outpatient Encounters Overview

Video visits increased from 0% (0/2,670) of all outpatient encounters during April 2019 to 66% (608/923) of the practice in April 2020 ($P < .001$). Excluding all visits that were deemed unable to be replicated remotely, in April 2020, video visits were utilized for 74% (608/824) of all the outpatient encounters suitable for telemedicine. When including all procedure visits, ancillary visits, clinical support, and miscellaneous visits, total outpatient encounters were reduced by 65% when comparing April 2020 to the previous year's data (923 vs 2,670, respectively). The median age of clinical urologists in our practice is 48 with an interquartile range (IQR) of 43−58. The members of our practice who adopted telemedicine by April 2020 had a median age of 47 (IQR: 40, 55), while those who did not had a median age of 58 (IQR: 52, 65).

Shift in Diagnosis Code Usage

When analyzing the primary disease codes associated with video visits in 2020 or office visits in 2019, several categories displayed significant changes between the modalities, including an approximate 30% relative rise in encounters relating to male sexual medicine during peak telemedicine use ($P = .012$). Disease codes related to male hypogonadism more than doubled in their share of the outpatient practice via video visits in April 2020 ($P < .001$); encounters involving male infertility, penile abnormalities, and testicular abnormalities also rose relatively, while encounters pertaining to erectile dysfunction were virtually unchanged (Table 2).

Demographic Representations During Peak Telemedicine Use

Representations of race ($P = .14$), ethnicity ($P = .10$), and public insurance use ($P = .89$) in the outpatient population were

Table 2. Comparison of disease code representation stratified by office visits (2019) and video visits (2020)

Diagnosis code category (ICD-10)	% Office visits (2019) codes	% Video visits (2020) codes	Total change (%)	Relative change (fold)
Male sexual medicine	5.9%	7.8%	**1.6%***	**1.3**
Male hypogonadism	1.7%	3.6%	**1.9%****	**2.1**
Erectile dysfunction	4.5%	4.4%	-0.1%	1.0
Testicular/scrotal involvement	2.0%	2.6%	0.7%	1.3
Penile abnormalities	1.0%	1.7%	0.7%	1.6
Prostate pathologies	22.9%	21.7%	-1.2%	0.9
Prostate cancer	11.8%	12.1%	0.3%	1.0
PSA surveillance	9.8%	9.2%	-0.6%	0.9
Benign prostatic hyperplasia	7.7%	7.3%	-0.4%	0.9
Bladder pathologies	24.0%	19.1%	**-4.9%****	**0.8**
Bladder cancer	6.9%	3.7%	**-3.2%****	**0.5**
Urine findings	6.7%	4.9%	**-1.9%***	**0.7**
Infections and UTIs	2.5%	1.8%	-0.7%	0.7
Urine findings, gross	2.8%	2.3%	-0.5%	0.8
Renal/kidney pathologies	12.0%	14.9%	**2.9%***	**1.2**
Renal/kidney cancer	1.2%	1.5%	0.3%	1.3
Kidney stones/calculi	4.9%	5.9%	1.0%	1.2
All cancer	23.1%	20.4%	-2.7%	0.9

* = $P < .05$, ** = $P < .01$. Bolded values indicate statistically significant findings as defined under "Statistical Analysis".

not statistically different between patients seen via video visits in April 2020 and those seen via office visits in 2019. Representation of biological sex was also consistent comparing the 2 arms ($P = .20$). Additionally, the rurality of patients partaking in telemedicine visits during April 2020 was unchanged from patients participating in office visits in April 2019 (Table 3).

Several demographic features of the outpatient clinic significantly changed during the period of peak telemedicine use. Comparing April 2020 to April 2019, outpatients seen over video visits were significantly younger than outpatients seen during the previous year over office visits (58.9 vs 60.8, $P = .008$). A multivariate logistic regression analysis found patients who were older than 60 years old were 31% less likely to participate in telemedicine compared to younger patients. Further, patients with a non-English language preference were 76% less likely to participate in video visits as compared to English speaking patients. Patients originating from zip codes with low internet upload speeds, defined as less than 5 megabits/s, were 32% less likely to participate in video visits. Patients with a driving distance of over 100 miles from their zip code to our intuition's urban outpatient center were 30% less likely to participate in video visits. Ethnicity, race, biological sex, or originating from a medically underserved area did not significantly alter the likelihood of a patient's participation in telemedicine (Figure 1).

DISCUSSION

Telemedicine Compatibility With Sexual Medicine

The objective of our study was to examine trends in the utilization of video visits for sexual medicine at our academic center during the period of peak telemedicine use in April 2020. Our findings provide evidence that the compulsory rise of telemedicine in April 2020 came with a significant shift in the makeup of our outpatient practice; while some aspects of clinical urology shrank in terms of their proportion of the practice, male sexual medicine rose significantly. The outbreak of SARS-CoV-2 caused unprecedented interruptions in patient care, and despite a rapid shift to telemedicine, the medical field suffered losses of care across specialties, including urology.[16] This was reflected in our study period, as our practice saw a dramatic fall in overall patient visits and a swift rise in telemedicine use, which paralleled the national trend. Nonetheless, the encounters occurring over telemedicine in our practice were constituted by a substantially higher share of sexual medicine visits.

Although diagnoses codes are a coarse indicator of a patient encounter, these findings suggest that practitioners and patients alike in our practice were able to successfully utilize telemedicine to execute sexual medicine encounters, even during a period of such high turmoil. We believe the relative rise of encounters associated with male sexual health observed during peak telemedicine use in 2020 indicates the compatibility telemedicine holds with sexual medicine.

Recent literature suggests the use of telemedicine has been reliable, safe, time-efficient, and cost-effective in the setting of clinical urology during the COVID-19 era.[7,17,18] Even prior to the outbreak of the pandemic, the compatibility of telemedicine in the field of male sexual health had become apparent. Popular Direct-to-Consumer websites, such as "Hims" and "Roman," saw their web traffic increase by 1,688% between 2017 and 2019, perhaps representing the paradigm shift already occurring

Table 3. Patient demographics stratified by office visits in April 2019 and video visits in April 2020

	Office visits (*n* = 1,949)	Video visits (*n* = 608)	*P* value
Mean Age, years [SD]	60.8 [15.5]	58.9 [15.6]	**.008**
Patients ≤50, *n* (%)	422 (21.7%)	159 (26%)	**.03**
Patients 51–64, *n* (%)	572 (29.3%)	183 (30.1%)	-
Patients ≥65, *n* (%)	955 (49%)	266 (44%)	-
Biological sex, *n* (%)			.20
Female	328 (16.8%)	116 (19%)	-
Male	1624 (83.2%)	492 (81%)	-
Race, *n* (%)			.14
White or Caucasian	1259 (64.6%)	392 (65%)	-
Black or African American	490 (25.1%)	159 (26%)	-
Asian	78 (4%)	14 (2.3%)	-
Other	114 (5.9%)	29 (4.8%)	-
Ethnicity, *n* (%)			.10
Not Hispanic or Latinx	1842 (95%)	569 (94%)	-
Hispanic or Latinx	83 (4.3%)	23 (3.8%)	-
Non-English language preference, *n* (%)	69 (3.5%)	9 (1.5%)	**.001**
Interpretation service use, *n* (%)	65 (3.3%)	9 (1.5%)	**.02**
Rurality, *n* (%)	78 (4.3%)	30 (5.2%)	.35

Bolded values indicate statistically significant findings as defined under "Statistical Analysis".

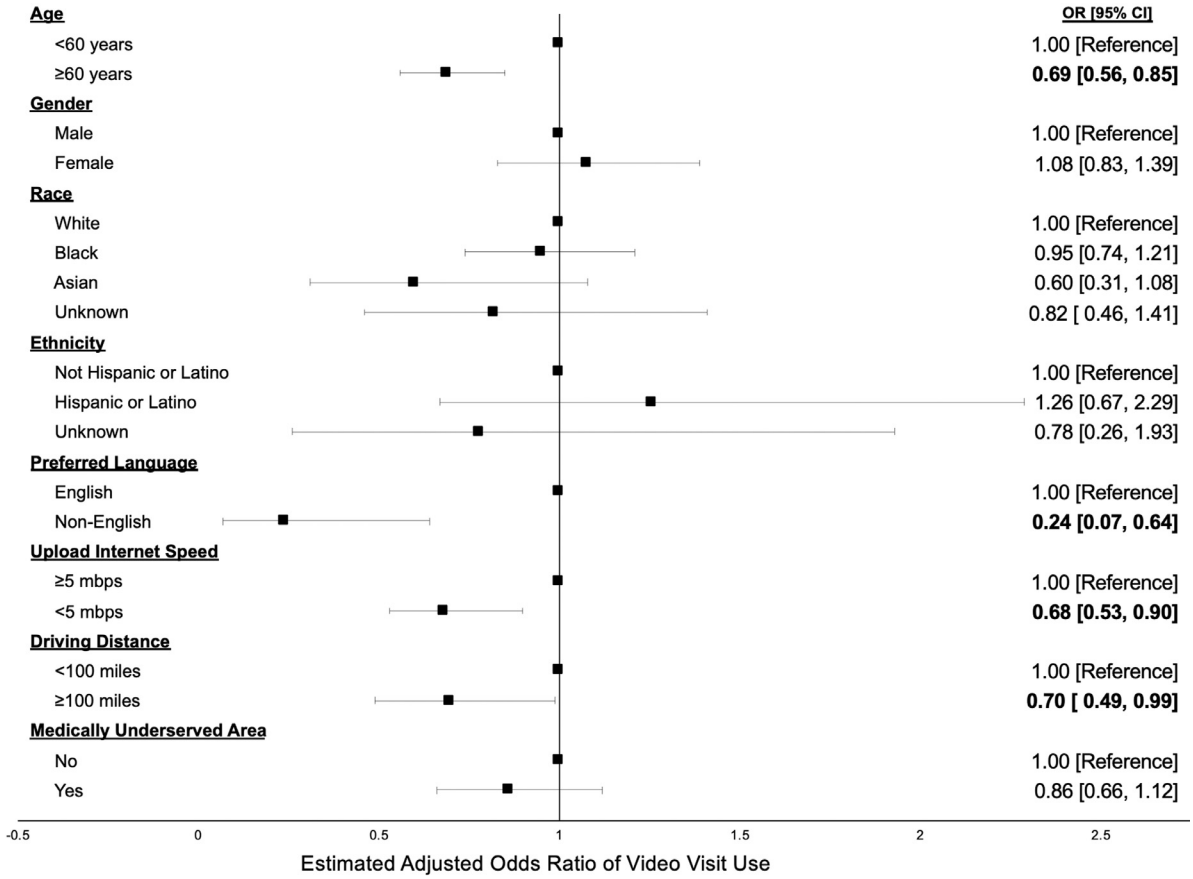

Figure 1. Forest plot of multivariate regression analysis predicting the likelihood of patients participating in video visits. 95% CI = 95% confidence interval; OR = odds ratio.

in sexual medicine.[19] Telemedicine provides men with the opportunity to discuss extremely personal and often stigmatized health issues, such as impotence and infertility, from the security and discretion of their own homes.[20]

The rise of remote platforms for the treatment of male sexual health emphasizes the competitive advantage and outreach telemedicine stands to offer to practitioners who can safely and effectively adopt these new modalities.[11] Concerns have been raised regarding these "pill-mills"[20] and the ability of Direct-to-Consumer platforms to safely treat patients, such as men with erectile dysfunction, who are at a substantially higher risk for comorbid conditions (ie, cardiovascular disease) that are indications for referral to outside specialists.[19,21] The superior ability of primary care physicians and urologists to treat, diagnose, and if needed refer their patients via telemedicine could improve patient safety amidst the rapidly evolving landscape of remote care. Nonetheless, we must also recognize the potential shortcomings of telemedicine. Lack of data protection, lapses in patient confidentiality, and clear physical barriers to a full clinical assessment are all emerging issues that must be addressed in the years to come for this promising modality to be maintained in clinical practice.[6,22]

Although the full impact of the COVID-19 pandemic cannot be adequately delineated in our findings, the study period we chose, albeit tumultuous, may offer insights into the new zeitgeist in medicine that is developing. Remote care has the ability to address limitations in mobility, reduce unnecessary visits to the clinic, and improve overall access to care.[22] While the COVID-19 pandemic may soon become the past, its effects on healthcare delivery are believed to be enduring.[6,17,20]

Implications of Telemedicine Use in Vulnerable Populations

The representation of ethnic and racial identities in our outpatient population were maintained in the comparisons of office visits in 2019 to video visits in 2020. Further, originating from a medically underserved area did not significantly alter the likelihood of a patient accessing care over telemedicine during the study period. Recognizing that racial and ethnic minorities are commonly included among medically vulnerable populations,[23] these results support the ability of telemedicine to expand access to care equitably.

Conversely, our multivariate logistic regression suggests patients who were over 60 years of age, non-English proficient, originated from zip codes with unstable internet access, or had a driving distance of over 100 miles from our urban institution all were significantly less likely to participate in encounters via video conference during April 2020. A recent digital equity survey found that 25−30% of internet users who are limited in English proficiency, older than 65, or had an annual income of less than US $25,000 lack the basic digital literacy needed to send an e-mail, fill out an online form, or even search for information.[24] These disparities are particularly concerning in the scope of sexual medicine; for example, men with erectile dysfunction who are older than 65 are most likely to be affected, yet least likely to seek treatment.[12]

While telemedicine offers the potential to improve healthcare access and costs, arduous effort must be taken in its adoption to assure health equity is not diminished. For example, academic centers in the United States have recently developed initiatives designed to improve appropriate utilization of telemedicine by providers and assure patients may access video platforms prior to scheduled encounters. Such programs include telemedicine workflow sheets for physicians, web-based video tutorials, and outreach programs to elderly patients.[25]

Limitations

As stated previously, limitations of our study included its adjacency to the ongoing COVID-19 pandemic. This study period was selected in order to observe peak utilization of telemedicine in our practice, although we must acknowledge that this period limits the external validity of our study. Further, as our study was conducted during a period of rapid telemedicine expansion in our department, the preferences of our urologists, such as how quickly they adopted the new medium, cannot be adequately captured in our study. We hope that our future investigations are conducted in collaboration with multiple academic centers, with study periods that may be established in a setting unaffected by the ongoing national emergency.

We also recognize that the utilization of disease codes to categorize the nature of outpatient encounters is an approximation rather than a precise measurement; it is difficult to identify codes that were ascribed as a result of a coding error, or codes that were incidentally left off of an encounter's note. Lastly, the scope of our study did not include telemedicine visits occurring via telephone, as these visits were not reliably labeled in the EMR and likely constituted a very small portion of all official outpatient encounters documented in our records. Nonetheless, patients who are limited to an audio-only format make up another telemedicine population that may be examined in futures observations.

CONCLUSION

During the period of historically high telemedicine use following the COVID-19 outbreak, encounters associated with male sexual medicine made up a significantly larger portion of our outpatient practice while many other aspects of clinical urology decreased. We observed that representations of ethnicity and race in our outpatient population were unaffected by the use of telemedicine. Nonetheless, care must be taken to assure the formalization of this new modality maintains healthcare equity in older populations. It has been

shown elsewhere that telemedicine offers sexual medicine practitioners the ability to safely and effectively provide care to their patients. Although the full influence of the pandemic cannot be delineated, our findings suggest telemedicine use is compatible with the field of sexual medicine.

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SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.esxm.2021.100366.