



# We are here for you: infertility clinic communication during the first wave of the COVID-19 pandemic

Holly Mehr<sup>1</sup> · Tia Jackson-Bey<sup>2</sup> · Michelle Vu<sup>3</sup> · Victoria Lee<sup>4</sup> · Christopher Herndon<sup>5</sup> · Jacqueline Ho<sup>6</sup> · Lusine Aghajanova<sup>7</sup> · Molly M. Quinn<sup>1</sup>

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## Abstract

**Purpose** To study how SART-member fertility clinics communicated via clinic websites during the first wave of the COVID-19 pandemic following publication of ASRM COVID-19 Task Force recommendations.

**Methods** SART-member fertility clinic websites were systematically surveyed for the presence of an REI-specific COVID-19 message (REI-CM) and analyzed for their adherence to ASRM guidance.

**Results** Of the 381 active clinic websites, 249 (65.3%) had REI-specific COVID messaging. The presence of REI-CM was more common in private than in academic practices (73% vs 38%,  $p < 0.001$ ) and with increasing practice volume: 38% of clinics with < 200 annual cycles vs 91% of clinics with > 1000 cycles ( $p < 0.001$ ). Adherence to ASRM guidance was more common in academic than in private practices (54% vs 31%,  $p = 0.02$ ). Additionally, 9% of REI-CM ( $n = 23$ ) announced continued treatment regardless of a patient's clinical urgency. This messaging was more common in groups doing > 1000 cycles a year (18%,  $p = 0.009$ ). Clinics treating all-comers were less likely to cite ASRM than other clinics (41% vs 62%,  $p = 0.045$ ). However, 75% ( $n = 14$ ) cited COVID-19 guidance from WHO, CDC, and state and local governments.

**Conclusions** Clinic response to ASRM recommendations during the first wave of COVID-19 pandemic was heterogeneous. Although academic practices were more likely to follow ASRM guidance, there was a lower extent of patient-facing messaging among academic practices than private clinics. In event of further escalations of this and future pandemics, clinics can learn from experiences to provide clear messaging to patients.

**Keywords** COVID-19 · Patient communication · Infertility treatment · Professional society guidance

## Introduction

Coronavirus disease 2019 (COVID-19) is a contagious infection caused by a novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The initial outbreak was reported in Wuhan China on December 31st, 2019,

and quickly spread globally. In the USA, the earliest reported case was on January 20th, 2020. On March 11, 2020, COVID-19 was declared a global pandemic by the WHO as cities across the USA and worldwide began to experience a surge of cases. Many states issued shelter in place orders, and recommendations from multiple

✉ Holly Mehr  
holly.mehr@gmail.com

<sup>1</sup> Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, University of California, Los Angeles, Los Angeles, CA, USA

<sup>2</sup> Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, University of Illinois at Chicago, Chicago, IL, USA

<sup>3</sup> Department of Obstetrics and Gynecology, University of Rochester Medical Center, Rochester, NY, USA

<sup>4</sup> David Geffen School of Medicine, University of California, Los Angeles, Los Angeles, CA, USA

<sup>5</sup> Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, University of Washington, Seattle, WA, USA

<sup>6</sup> Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, University of Southern California, Los Angeles, CA, USA

<sup>7</sup> Department of Obstetrics and Gynecology, Division of Reproductive Endocrinology and Infertility, Stanford University, Stanford, CA, USA

government and professional organizations were to stop non-emergent surgical procedures.

On March 17th, 2020, the American Society for Reproductive Medicine (ASRM) published the initial guidance for REI clinics regarding infertility treatment during the COVID-19 pandemic [1]. The goal for the recommendations was to “provide practices with recommendations that guard the health and safety of our patients and staff, and recognize our social responsibility, as an organization and as a community of providers and experts, to comply with national public health recommendations.” At this stage, there was an exponential rise in reported infections and very little data on the impact of COVID-19 on fertility and pregnancy [1]. The recommendations advised against initiation of new fertility treatment cycles outside of emergent fertility preservation. ASRM was clear that the guidelines were “not intended to be the only approved standard of practice or to dictate an exclusive course of treatment.” Further updates were indicated to be forthcoming.

Two updates to this guidance were published by ASRM on March 30th and April 13th which offered some additional guidance but continued to recommend no new cycle starts outside of urgent cases [2, 3]. On 4/24/2020, new guidance was published that gave recommendations for how and when to resume treating patients [4]. Since then, most clinics have reopened and are treating patients, but COVID-19 cases and fatalities continue to rise worldwide [5].

COVID-19 has presented all health care providers and institutions globally with the dilemma of how and when to treat patients while also mitigating the spread of the disease and respecting the needs of local and regional health care facilities (such as the need for adequate personal protective equipment). Little was known at the onset of the pandemic regarding the impact of COVID-19 on maternal health or pregnancy outcomes. Reproductive medicine poses a scenario wherein patients and providers often feel an urgency to proceed with treatment due to the detrimental impact of advancing age on treatment success as well as psychosocial impact of the disease. Further, patients have often faced a significant duration of infertility prior to pursuing treatment [6]. As a result, further delay for any reason and uncertainty of when cycles would resume causes anxiety and distress for all involved [7, 8]. Finally, from a clinic management standpoint, IVF clinics are high overhead enterprises, and cessation of IVF treatment put many IVF programs in financial distress, as revenue slowed and practice owners were forced to furlough staff and potentially close their practices all together [9].

In the weeks to months after ASRM first recommended minimization of clinical activities through the Task Force document, each fertility clinic in the USA had to decide if and how they were moving forward with treatment. Most fertility clinics communicated to their current and prospective patients through clinic-specific websites. Our objective in the current study was to evaluate how SART-affiliated fertility clinics

communicated to the public and their patients via clinic websites during the time period in which ASRM advised a halt on non-emergent fertility treatment.

## Methods

Between 4/20/2020 and 4/24/2020, SART-affiliated fertility clinic websites were systematically surveyed for the presence of an REI-specific COVID-19 message (REI-CM).

Clinic website URLs were gathered from SART’s website. In the event that no URL was provided, a Google search of the medical director and clinic name was performed, and if both matched those provided in the SART database, the website was used.

Each website was systematically surveyed for any COVID-19-specific messaging, and if it was not found, Google searches of the clinic website and “COVID-19” and “coronavirus” were performed. All messages, including blog posts, pop-ups, and pages were collected in a Microsoft Word file for storage to capture the messaging at the time of search (4/20/20–4/24/20) before new guidelines were released and to facilitate any analysis required between reviewers. The message was coded as an REI-CM if the content within the message referred directly to fertility patients or the clinical activities of the REI office. Any COVID messaging that was hospital or health system wide without specific reference to the fertility clinic or patients was categorized as non-REI-specific COVID messaging.

Next, the COVID-19 message was evaluated for various content including the type of fertility treatment offered and to whom it was being offered, plans for liberalizing or resuming care, adherence to updated ASRM guidance, citation of ASRM, WHO, CDC and state and local governmental guidance, educational material on COVID-19 in general and comments on safety in pregnancy, and the provision of psychological resources.

The messages were analyzed for how they communicated their policy on treating patients in general as well as the specific recommendations on treatment cycles outlined in the ASRM guidance: new IVF cycle starts, IUI cycle starts, ovulation induction, embryo transfers, continuing in-cycle patients, continuing diagnostic procedures, surgeries, and emergent, medically indicated fertility preservation.

For each treatment category, the message was analyzed for how the clinic communicated its current policy or practices with patients: treating all-comers regardless of clinical urgency, treating case by case, not treating, no mention of this treatment, vague, or unclear messaging about this treatment. For those treating case by case, the specific definition of “case by case” was also recorded when provided.

The messages were also analyzed for citing guidance from any professional organization, health organization, or

government. Messages were considered to cite ASRM guidance if ASRM was specifically cited by name in the message or a link to current guidelines was included in the messaging.

Each REI-CM was independently evaluated by two different reviewers for the content as is related to the questions above and arbitrated by a third reviewer in the case of discrepancies in findings.

Practice size, as measured by number of completed cycles a year, and practice location were among the predictors abstracted from SART. Twenty clinics did not have 2017 clinic volume data available and were not included in the clinic volume analysis. The type of practice (academic, hybrid, or private) was determined by the website and University affiliation. Clinics were determined to be hybrid if they were private practice groups with a significant University or hospital affiliation and/or an REI fellowship. Hybrid clinics were grouped with private practice for statistical analysis. Clinics were classified according to whether they were under a shelter in place (SIP) order, and the duration of that order, at the time of data abstraction utilizing publicly available data maintained by the CDC [10, 11].

Statistical analyses were performed using Stata software to determine associations between clinic demographics such as practice type and size and patterns in messaging such as advertising ongoing treatment where appropriate. All data was coded to be categorical. Chi squared was used for categorical data with sufficient sample size. Fisher's exact test was used for categorical data when any condition had a frequency of < 5.

## Results

Three hundred eighty-one of 385 SART member clinics had active websites. Of those with websites, 68 clinics were categorized as academic, 293 private practice, 18 hybrid, and 2 military. Eighty-six clinics performed < 200 cycles a year, 126 clinics performed 200–500 cycles a year, 84 clinics performed from 501 to 1000 cycles a year, and 65 clinics performed greater than 1000 cycles per year. Two hundred twelve of 381 clinics were located in states with shelter in place orders for  $\geq 30$  days at the time of data extraction.

Of those with active websites, 309 (81%) had some form of COVID messaging and 249 (65.3%) had an REI-CM. The presence of an REI-CM was more common with increasing practice volume; 38% of clinics with < 200 annual cycles vs 91% of clinics with > 1000 cycles ( $p < 0.001$ ) had an identifiable REI-CM. An REI-CM was also more common in private than academic practice (71% vs 38%,  $p < 0.001$ ), with the majority of academic practices (57%) having an institution-wide COVID message that was not REI-specific and did not give specific information regarding treatment provision. There was also a trend toward more frequent REI-CM in states with a shelter in place (SIP) order for  $\geq 30$  days vs < 30 days ( $n = 61\%$  vs  $70\%$ ,  $p = 0.064$ ) (Table 1).

## Reference to published recommendations

Reference to ASRM guidance was included in 61% ( $n = 152$ ) of messages; however, only 33% ( $n = 82$ ) of messages outlined treatment practices that fit within ASRM recommendations published in “Patient Management and Clinical Recommendations Update #2,” which was active at the time of the data extraction. A majority of this discrepancy is due to a large number of messages that mentioned professional guidance but did not specify what this guidance entailed or how the practice was treating patients ( $n = 52$ ). Explicitly outlining treatment patterns that fit ASRM guidelines was more common in academic practices (54% vs 31%,  $p = 0.02$ ), with a trend toward clinics with SIP orders  $\geq 30$  days ( $p = 0.059$ ) but was not associated with size of practice or geographic region (Table 1).

## Specific recommendations found in ASRM's “Patient management and clinical recommendations during the coronavirus (COVID-19) pandemic”

1. “Suspending initiation of new treatment cycles, including ovulation induction, intrauterine inseminations (IUIs), in vitro fertilization (IVF) including retrievals and frozen embryo transfers, as well as non-urgent gamete cryopreservation.”

Some, but not all, messaging was very explicit about specific treatment options being suspended, including 17% ( $n = 42$ ) NOT starting any new IVF cycles and 28% ( $n = 69$ ) starting emergent IVF only, and 31% ( $n = 78$ ) starting IVF on a case-by-case basis, including urgent gamete cryopreservation.

Example: “Urgent gamete cryopreservation. This does not include patients of advanced reproductive age or diminished ovarian reserve. Urgent gamete preservation is limited to those beginning treatment for illnesses that are considered gonadotoxic (i.e. chemotherapy and/or radiation treatment)”

Messaging for 41.7% ( $n = 104$ ) of clinics clearly stated no IUI cycles and 24.5% ( $n = 61$ ) of messages clearly stated no ovulation induction cycles.

2. “Strongly considering cancellation of all embryo transfers whether fresh or frozen.”

Nineteen (7.6%) REI-CMs explicitly discussed continuing some form of embryo transfer, 101 (40.5%) explicitly stated they have paused embryo transfers, and the remaining messages ( $n = 129$ , 52%) had either vague or omitted information regarding embryo transfer.

Fifty-one percent of clinic messages included some discussion of the safety of COVID-19 in pregnancy which ranged from a statement that safety was not known, to statements suggesting pregnancy is safe, to nuanced evaluation of current evidence. Twelve of 19 (63%) clinics advertising ongoing embryo transfer included a discussion of safety in

**Table 1** Outcome predictors for REI specific COVID-19 messaging

	Practice volume in cycles per year			Practice type		Length of SIP orders			Geographic region							
	< 200	200–500	501–1000	> 1000	P value	Academic	Private/Hybrid	P value	< 30 days	≥ 30 days	P value	NE	MW	South	West	P value
Presence of REI-specific COVID-19 message	33/86 (38%)	77/126 (61%)	64/84 (76%)	59/65 (90%)	<b>&lt;0.001<sup>a</sup></b>	26/68 (38%)	223/313 (71%)	<b>&lt;0.001<sup>a</sup></b>	101/160 (61%)	148/212 (70%)	0.064 <sup>a</sup>	56/79 (71%)	45/74 (61%)	77/123 (62%)	71/103 (69%)	0.430 <sup>a</sup>
Treating within ASRM guidance	13/33 (39%)	25/77 (32%)	24/64 (38%)	15/59 (25%)	0.434 <sup>a</sup>	14/26 (54%)	70/223 (31%)	<b>0.022<sup>a</sup></b>	26/101 (26%)	55/148 (37%)	0.059 <sup>a</sup>	17/56 (30%)	16/45 (35%)	2/77 (26%)	28/71 (39%)	0.339 <sup>a</sup>
Treating regardless of clinical urgency	1/33 (3%)	8/77 (10%)	3/64 (5%)	11/59 (19%)	<b>0.043<sup>b</sup></b>	1/26 (4%)	22/223 (10%)	0.484 <sup>b</sup>	14/101 (14%)	9/148 (6%)	<b>0.037<sup>a</sup></b>	9/56 (16%)	2/45 (4%)	8/77 (10%)	4/71 (6%)	0.150 <sup>b</sup>
Message omitted treatment options	14/33 (42%)	29/77 (38%)	19/64 (30%)	10/59 (17%)	<b>0.028<sup>a</sup></b>	8/26 (31%)	74/223 (33%)	0.805 <sup>a</sup>	35/101 (35%)	44/148 (30%)	0.653 <sup>a</sup>	12/56 (21%)	13/45 (29%)	25/77 (32%)	29/71 (41%)	0.130 <sup>a</sup>
Plans for liberalizing care	7/33 (21%)	8/77 (10%)	14/64 (22%)	19/59 (32%)	<b>0.020<sup>a</sup></b>	2/26 (8%)	47/223 (21%)	0.123 <sup>b</sup>	23/101 (23%)	26/148 (18%)	0.590 <sup>a</sup>	14/56 (25%)	8/45 (18%)	21/77 (27%)	6/71 (8%)	<b>0.023<sup>a</sup></b>
Telehealth	26/33 (78%)	61/77 (79%)	55/64 (85%)	58/59 (98%)	<b>0.015<sup>a</sup></b>	21/26 (81%)	190/223 (85%)	0.288 <sup>a</sup>	84/101 (83%)	127/148 (86%)	0.569 <sup>a</sup>	51/56 (91%)	35/45 (78%)	65/77 (84%)	60/71 (85%)	0.330 <sup>a</sup>

Data are presented as N Yes/N Total (%). Results in bold are statistically significant ( $p < 0.05$ )

<sup>a</sup> Chi-squared test

<sup>b</sup> Fischer’s exact test

pregnancy. Of those explicitly not performing transfers, 53% ( $n = 54$ ) mentioned safety in pregnancy.

Example 1

“At this time there are no direct medical concerns with pregnancy and COVID-19... Researchers will continue their studies on this topic, but as far as we know COVID-19 does not have a direct impact on pregnant women.”

Example 2

“Pregnant patients are routinely exposed to viral infection. Some, like Varicella and Influenza can be significantly more severe, and even devastating in pregnancy. Others, including similar SARS-type viruses and the novel coronavirus (to date) seem to manifest similarly in pregnant women as in other infected patients. While we are still early in the evolution of this disease, there is no evidence that pregnant women are more susceptible to COVID-19.”

3. “Continuing to care for patients who are currently ‘in-cycle’ or who require urgent stimulation and cryopreservation.”

A minority (42%, 104/249) of COVID messages included specific intentions for in-cycle patients. Of those mentioning their in-cycle patients, a vast majority (90%, 94/104) reported that they were continuing treatment.

4. “Suspending elective surgeries and non-urgent diagnostic procedures.”

Twenty-nine percent of messages explicitly stated that they were suspending surgeries and diagnostic procedures ( $n = 74$ ). Seventeen percent of messages announced that clinics were continuing some form of surgery or diagnostic procedures ( $n = 42$ ). The remainder (53%,  $n = 133$ ) either did not mention or had uninterpretable messaging.

5. “Minimizing in-person interactions and increasing utilization of telehealth.”

A majority of centers with REI-CM, 85%, advertised offering telemedicine options ( $n = 211/249$ ) which was more likely in practices with > 1000 cycles a year than < 200 cycles a year (97% vs 76%,  $p = 0.01$ ). Telemedicine availability in REI-CM was similar between academic and private practices, regardless of length of SIP order and geographic region (Table 1).

**Clinics choosing to treat patients outside ASRM guidance**

Clinics also communicated that they were treating patients outside ASRM recommendations. Forty-four (18%)



practices advertised continued treatment of patients on a “case by case basis” with myriad definitions ranging from very specific “women older than 38 and 10 months or with an AMH <0.7” to very vague “as determined by our providers alongside our patients.” The ASRM Task Force did not explicitly consider treating diminished ovarian reserve (DOR) patients an urgent situation, but many of those treating outside guidelines continued to offer DOR patients treatment.

Nine percent of REI-CM ( $n = 23$ ) advertised continued treatment regardless of a patient’s clinical urgency. This rare situation was more common in groups that completed > 1000 cycles a year (19%,  $p = 0.043$ ), in states with shelter in place orders < 30 days at the time of data collection (16%,  $p = 0.037$ ) (Table 1). Groups that advertised ongoing treatment regardless of a patient’s clinical urgency were less likely to mention ASRM guidance (41% vs 62%,  $p = 0.045$ ); however, 75% ( $n = 14$ ) cited COVID-19 guidance from WHO, CDC, and state and local governments.

In general, practices treating outside of ASRM guidance in any way were less likely to mention ASRM in their messaging, but this did not reach significance ( $p = 0.15$ ).

### Messaging that omitted treatment options

Many of the messages were not explicit about their current treatment practices. Thirty-two percent of REI-CM either omitted their current treatment practices or the language was too vague to interpret by two separate reviewers and an arbiter. Omitted practice messaging was inversely related to the number of cycles performed a year, with 42% of those < 200 cycles a year and 17% of those with > 1000 cycles a year ( $p = 0.028$ ). Vague language was not different between private and academic practices ( $p = 0.805$ ), geographic region ( $p = 0.13$ ) or SIP order ( $p = 0.65$ ) (Table 1).

### Resuming care

“The timing of the restart of infertility care, other than that currently deemed urgent or emergency, has yet, and may be impossible, to be precisely determined...While it is not yet prudent to resume non-emergency infertility procedures, the Task Force recognizes it is also time to begin to consider strategies and best practices for resuming time-sensitive fertility treatments in the face of COVID-19 in the population.”

Forty-nine REI-CM (19.6%) included explicit plans for ramping up service before ASRM published guidance on the matter on April 24th, 2020 [4]. This was more common in clinics located in the Northeast (NE) and South than in the Midwest (MW) and West (25%, 27%, 18%, 8%,  $p = 0.02$ ) and more common in clinics with > 1000 cycles a year (32%,  $p = 0.02$ ) (Table 1). Clinics with plans to ramp up before April

24th, 2020 were less likely to cite ASRM guidance ( $p = 0.015$ ).

### Additional ASRM COVID-19 Task Force guidance

1. “Practices should recognize the increased need for emotional and psychological support in both patients and staff.”

Overall, 50.8% (126/249) of clinic COVID messages acknowledged the psychological burden the pandemic was causing for their fertility patients; 25.4% (63/249) of clinics either provided resources (webinars, phone apps) or advertised psychological support services available. Groups that did and did not follow ASRM guidance were equally likely to address the psychological consequence of the pandemic in their messaging (57% vs 48%  $p = 0.19$ ) and offer psychological support resources (24% vs 27%,  $p = 0.64$ ).

Many patient messages focused on reassurance and emphasized the continued presence and support of the clinic regardless of treatment availability with phrases like “We are all in this together, and we are here for you.” or “We are here for you through every step of your journey.”

2. “Providing sufficient minimal staffing, spacing urgent in-clinic appointments throughout the workday, enabling staff to work from home, and implementation of mandatory health screenings at entry to the facility of patients who must be seen in person. Such health screening should include temperature checks, provision of face masks, compulsory hand hygiene, and 6-foot social distancing policies in shared spaces.”

A majority of messages (75%) used language stating safety precautions and cycle cancellations were done for the protection of the patients themselves ( $n = 186/249$ ). Specific safety precautions taken by the clinic or the lab were stressed in 72% ( $n = 179/249$ ) of messages. Behavioral expectations from patients, for example, mask wearing or coming to appointments unaccompanied, were described in 70% ( $n = 174/249$ ).

### Discussion

To the best of our knowledge, this is the first and only study to evaluate how SART-affiliated clinics responded to ASRM guidance during the first wave of the COVID-19 pandemic. Clinic response to ASRM recommendations during the first wave of COVID-19 pandemic was heterogeneous and inconsistent. In event of further escalations of this and future pandemics, clinics can learn from experiences to provide clear and consistent messaging to patients.

## Outcome predictors

We found that the response to ASRM COVID-19 Clinical Practice Recommendations was heterogeneous across practices. Although academic practices were more likely to follow ASRM guidance, there was less patient-facing messaging among academic practices than private clinics to inform patients. The lower extent of messaging among academic programs may be secondary to the challenge of working within a more bureaucratic and less nimble medical system. However, those academic practices who did have messaging were more likely than their private practice colleagues to indicate their adherence to ASRM recommendations. This finding is not surprising given that academic and public institutions tend to be more conservative at baseline with regard to guidance from professional organizations. Additionally, large state or university systems may provide a buffer to the financial impact of COVID-19, as well as such programs' closer proximity to larger hospital systems attempting to meet the needs of COVID-19 patients.

Groups with larger practice volume were more likely to communicate with their patients about what treatments they offer, to continue to treat patients outside ASRM guidance, to treat all patients regardless of clinical urgency, and to liberalize service before ASRM published guidance to do so. This may be a sign of the changing landscape of IVF in the United States. Groups whose business is managed by those outside the medical field may be more willing to work independent of professional society guidance which are unenforceable and unregulated.

Those who closely followed recommendations were more likely to cite ASRM guidance to their patients, perhaps to deflect patient frustration, or to reassure patients that consensus had been reached about delaying treatment based on the best available evidence. Those clinics that continued to treat all patients regardless of clinical urgency often cited guidance from the CDC, WHO, and local health officials while omitting mention of ASRM. Those advertising plans to liberalize services were also less likely to cite ASRM guidance.

We also found clinics within states that had longer shelter in place orders at the time of data extraction trended toward more frequent REI-CM as well as treating within ASRM guidelines. Additionally, clinics in states with SIP orders for < 30 days were more likely to continue to treat all patients regardless of their clinical urgency. These findings suggest decisions made by state and local governments—not only recommendations from professional societies—influence how physicians communicate to their patients and how they practice.

Regardless of treatment availability, REI-CM emphasized the psychological burden of COVID-19, and many clinics offered and reassurance that they continued to support their patients through the pandemic as well as access to psychological support services.

## How other professional societies responded

ASRM guidelines followed a similar trajectory to professional organizations of other surgical and procedurally focused fields when they recommended to pause non-emergent treatment on March 17th and judicious reopening published on April 24th, 2020 [1, 4]. For example, The American College of Surgeons (ACS) published guidance on March 17th, 2020, including an “Elective Surgery Acuity Scale” for triaging the range of surgeries considered “elective” [12–14]. ACS also published guidance on Local Resumption of Elective Surgery on April 17, 2020, which, similar to ASRM, highlighted the need for monitoring local COVID positivity rates, testing availability, regional PPE, staffing and hospital bed availability, and supply chain [15]. Similar guidance was published by many professional societies of surgical subspecialties [16–18], as well as professional societies within the field of OBGYN [19, 20].

No similar studies have been published in the OBGYN field, and little data currently exists as to whether societal guidelines were followed by physicians in other fields [21, 22]. Pirracchio et al. found that the national volume of elective surgeries in all fields dropped precipitously in March 2020, but that the case volume reductions varied greatly by institution [23]. No further analysis has been published to determine factors that influenced this heterogeneity, but limited data suggests a heterogeneous compliance with professional societal recommendations across fields.

## Deciding who and when to treat: a balancing act

The decision to treat patients must balance the risk of adverse treatment outcomes due to delay of treatment with the risk of exacerbating the spread of the disease via in-office transmission. Two recent studies found that a treatment delay of up to 6 months did not change pregnancy outcomes for women with DOR or number of eggs retrieved in a second cycle for women in any age group [24, 25]. While a proportion of clinics continued to treat DOR and AMA patients during this phase, we can reassure those women who were denied care in March and April that it likely did not affect their outcome.

There is no published data on the risk of COVID transmission in either the outpatient or procedural setting as this would require screening for asymptomatic spread and sophisticated contact tracing. We now have data suggesting around 50% of transmission arises from spread from asymptomatic or pre-symptomatic persons, and recent models suggest that the average outpatient clinic provider is likely seeing several asymptomatic patients a week depending on the local infection rates [26, 27]. However, it is clear that the risk of transmission depends on the prevalence of disease in the community, the ability to socially distance in non-clinical spaces such as lunch rooms, the availability of PPE, the adherence of patients and healthcare workers to proper use of PPE and uptake of

vaccination [28–30]. Most retrievals are performed under MAC anesthesia, which is not considered an aerosol-generating procedure, but the American Society of Anesthesia still recognizes MAC as a risk for “dispersion of potentially contaminated exhaled gases” [31]. While no comprehensive data has been made public, many practices are requiring COVID-19 testing before treatment cycles and/or before oocyte retrieval in an attempt to reduce risk.

### Quick adoption of telemedicine

One silver lining in the treacherous landscape of COVID-19 has been the swift adaptation to telemedicine. A vast majority of clinics with REI-CM (85%) adopted and advertised telehealth services to their patients within the span of a month. Large practices were more likely to advertise telemedicine services, likely because they had infrastructure to adopt this new technology quickly. Use of telehealth has been cited as an important tool for mitigating geographic and time barriers to fertility treatment and therefore increasing access to care [32–34]. The Centers for Medicare and Medicaid Services lifting restrictions on telehealth billing likely facilitated this long overdue expansion to access. It is unclear if reimbursement for telehealth will continue outside of the pandemic, but it has the opportunity to significantly improve access to care, and with the increased convenience for patients a decreased clinic space for providers, the medical community is prepared to continue offering telehealth [35].

### Strengths and limitations

The strength of this study was its comprehensive look across the whole of the SART clinics community as a snapshot of this unprecedented time period. It offers a comprehensive view of how clinics communicated to their patients and what services they continued to provide.

Limitations of this study include the fact that public messaging may not necessarily illustrate the actual practices of a clinic; indeed, approximately one-third of messages were uninterpretable with regard to the fertility treatment being offered. Clinics may have communicated with their patients through formats other than their website, and more recent policies would not have been captured. We also deliberately analyzed website content in a narrow window of time just before ASRM published guidance on reopening. This window necessarily fails to capture how an individual center updated its messaging over time. Additional limitations include the potential bias of subjective interpretation of messaging, although this was greatly mitigated through the methodology of secondary review and arbitration process

### Broader implications

COVID-19 cases in the United States are on the rise again as new variants become dominant and, just as we saw in March 2020, elective surgeries are being canceled or delayed in regions most affected in 2021 [36]. While government leaders have recognized the medical necessity of fertility treatment, reproductive endocrinologists may be faced with the decision of who and how to continue to provide care. While the shut down in March and April 2020 was unprecedented in our field, careful analysis of how practices responded and communicated their response to patients may inform optimal response in future waves of COVID-19 or in future pandemics. What is more, the Society for Assisted Reproductive Technologies (SART) is including mandatory COVID-19-related questions in their Clinic Outcome Reporting System (CORS) registry of assisted reproductive technologies (ART), which will add to our understanding of COVID and pregnancy. While a website evaluation is not necessarily a direct survey of services being offered, this study reveals the heterogeneity in how clinics have chosen to practice in the setting of COVID-19 and ASRM guidance. This data combined with data on how clinics were practicing during this time point may provide broader information on how medical operations during international health emergencies may impact both the treatment outcomes of our patients as well as the risk of spread of disease. Finally, our study highlights how the clear communication to patients during health crises such as COVID-19 is central to our role as health professionals.

**Code availability** Not applicable.

### Declarations

**Ethics approval** Institutional Review Board (IRB) reviewed the study and was deemed exempt by the University of California, Los Angeles.

**Consent to participate** Not applicable.

**Conflict of interest** The authors declare no competing interests.

### References

1. American Society for Reproductive Medicine. Patient management and clinical recommendations during the coronavirus (COVID-19) pandemic. <https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/covid-19/covidtaskforceupdate2.pdf>. Accessed on 26 May 2020
2. American Society for Reproductive Medicine. Patient management and clinical recommendations during the coronavirus (COVID-19)

- pandemic. Update #1 <https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/covid-19/covidtaskforceupdate1.pdf> Accessed on 26 May 2020
3. American Society for Reproductive Medicine. Patient management and clinical recommendations during the coronavirus (COVID-19) pandemic. Update #2 <https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/covid-19/covidtaskforceupdate2.pdf> Accessed on 26 May 2020
  4. American Society for Reproductive Medicine. Patient management and clinical recommendations during the coronavirus (COVID-19) pandemic. Update #3 <https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/covid-19/covidtaskforceupdate3.pdf> Accessed on 26 May 2020
  5. World Health Organization Coronavirus Disease Dashboard. <https://covid19.who.int/>
  6. Jain T. Socioeconomic and racial disparities among infertility patients seeking care. *Fertil Steril.* 2006 Apr;85(4):876–81. <https://doi.org/10.1016/j.fertnstert.2005.07.1338>.
  7. Lawson AK, McQueen DB, Swanson AC, Confino R, Feinberg EC, Pavone ME. Psychological distress and postponed fertility care during the COVID-19 pandemic. *J Assist Reprod Genet.* 2021;38:333–41. <https://doi.org/10.1007/s10815-020-02023-x>.
  8. Tuero JM, Robles A, Hercz D, D'Alton M, Forman EJ, Williams Z. The emotional impact of the ASRM guidelines on fertility patients during the COVID-19 pandemic. *Fertil Steril.* 2020;114(3):e63. <https://doi.org/10.1016/j.fertnstert.2020.08.194>.
  9. Solovieva, D. The fertility sector braces for a recession. 2020 Apr, Fortune: Special Report: Business in the Coronavirus Economy [Internet] <https://fortune.com/2020/04/16/fertility-reproductive-medicine-coronavirus-ivf/> Accessed December 15,2020
  10. CDC National Environmental Public Health Tracking Network available at: <https://ephtracking.cdc.gov/DataExplorer/>
  11. Moreland A, Herlihy C, Tynan MA, et al. Timing of state and territorial COVID-19 stay-at-home orders and changes in population movement — United States, March 1–May 31, 2020. *MMWR Morb Mortal Wkly Rep.* 2020;69:1198–203. <https://doi.org/10.15585/mmwr.mm6935a2>.
  12. American College of Surgeons. COVID-19: guidance for triage of non-emergent surgical procedures. <https://www.facs.org/covid-19/clinical-guidance/triage>. Accessed December 1st, 2020.
  13. American College of Surgeons. COVID-19: recommendations for management of elective surgical procedures <https://www.facs.org/covid-19/clinical-guidance/elective-surgery> Accessed December 1st, 2020.
  14. Ross SW, Lauer CW, Miles WS, Green JM, Christmas AB, May AK, et al. Maximizing the calm before the storm: tiered surgical response plan for novel coronavirus (COVID-19). *J Am Coll Surg.* 2020;230(6):1080–1091.e3. <https://doi.org/10.1016/j.jamcollsurg.2020.03.019>.
  15. American College of Surgeons. Local resumption of elective surgery guidance <https://www.facs.org/covid-19/clinical-guidance/resuming-elective-surgery>
  16. Goldman HB, Haber GP. Recommendations for tiered stratification of urological surgery urgency in the COVID-19 era. *J Urol.* 2020;204(1):11–3. <https://doi.org/10.1097/JU.0000000000001067>.
  17. American Dental Association. <https://www.ada.org/en/press-room/news-releases/2020-archives/march/ada-calls-upon-dentists-to-postpone-elective-procedures>
  18. American Academy of Otolaryngology–Head and Neck Surgery <https://www.entnet.org/content/otolaryngologists-and-covid-19-pandemic>
  19. Weber LeBrun EE, Moawad NS, Rosenberg EI, Morey TE, Davies L, Collins WO, et al. Coronavirus disease 2019 pandemic: staged management of surgical services for gynecology and obstetrics. *Am J Obstet Gynecol.* 2020;223(1):85.e1–85.e19. <https://doi.org/10.1016/j.ajog.2020.03.038>.
  20. Joint Statement on Re-introduction of Hospital and Office-based Procedures for the Practicing Urogynecologist and Gynecologist. *J Minim Invasive Gynecol.* 2020 Jul-Aug;27(5):1030–1032. <https://doi.org/10.1016/j.jmig.2020.05.019>.
  21. Jerome JTI, Mercier F, Mudgal CS, Arenas-Prat J, Vinagre G, Goorens CK, et al. Perspectives and consensus among international orthopaedic surgeons during initial and mid-lockdown phases of coronavirus disease. *J Hand Microsurg.* 2020;12(3):135–62. <https://doi.org/10.1055/s-0040-1713964#N72567>.
  22. Boehm K, Thomas A, Bex A, Black PC, Coburn M, Haferkamp A, et al. Outreach and influence of surgical societies' recommendations on minimally invasive surgery during the COVID-19 pandemic—an anonymized international urologic expert inquiry. *Urology.* 2020;145:73–8. <https://doi.org/10.1016/j.urology.2020.07.043>.
  23. Pirracchio R, Mavrothalassitis O, Mathis M, Kheterpal S, Legrand M. Response of US hospitals to elective surgical cases in the COVID-19 pandemic. *Br J Anaesth.* 2021;126(1):e46–8. <https://doi.org/10.1016/j.bja.2020.10.013>.
  24. Romanski PA, Bortoletto P, Rosenwaks Z, Schattman GL. Delay in IVF treatment up to 180 days does not affect pregnancy outcomes in women with diminished ovarian reserve. *Hum Reprod.* 2020;35(7):1630–6. <https://doi.org/10.1093/humrep/deaa137>.
  25. Shaw J, Blakemore JK, McCulloh DH, Licciardi F. Can I take a break?: oocytes retrieved by time interval between in vitro fertilization (IVF) cycles. *Fertil Steril.* 2018;110(4):e335–6.
  26. Johansson MA, Quandelacy TM, Kada S, Prasad PV, Steele M, Brooks JT, et al. SARS-CoV-2 transmission from people without COVID-19 symptoms. *JAMA Netw Open.* 2021;4(1):e2035057. <https://doi.org/10.1001/jamanetworkopen.2020.35057>.
  27. Gerami P, Liszewski W. Risk assessment of outpatient dermatology practice in the setting of the COVID-19 pandemic. *J Am Acad Dermatol.* 2020;83(5):1538–9. <https://doi.org/10.1016/j.jaad.2020.07.035>.
  28. Neuwirth MM, Mattner F, Otchwemah R. Adherence to personal protective equipment use among healthcare workers caring for confirmed COVID-19 and alleged non-COVID-19 patients. *Antimicrob Resist Infect Control.* 2020;9(1):199. <https://doi.org/10.1186/s13756-020-00864-w>.
  29. Çelebi G, Pişkin N, Çelik Bekleviç A, Altunay Y, Salcı Keleş A, Tüz MA, et al. Specific risk factors for SARS-CoV-2 transmission among health care workers in a university hospital. *Am J Infect Control.* 2020;48(10):1225–30. <https://doi.org/10.1016/j.ajic.2020.07.039>.
  30. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Epidemiology of and risk factors for coronavirus infection in health care workers: a living rapid review. *Ann Intern Med.* 2020;173(2):120–36. <https://doi.org/10.7326/M20-1632>.
  31. American Society of Anesthesiologists. COVID-19 and clinical care. <https://www.asahq.org/in-the-spotlight/coronavirus-covid-19-information/clinical-care> Accessed 12/15/2020
  32. American Society for Reproductive Medicine. 2016. White paper: access to care summit. <https://www.asrm.org/globalassets/asrm/asrm-content/news-and-publications/news-and-research/press-releases-and-bulletins/pdf/atcwhitepaper.pdf>
  33. Hernández C, Valdera CJ, Cordero J, López E, Plaza J, Albi M. Impact of telemedicine on assisted reproduction treatment in the public health system. *J Healthc Qual Res.* 2020;35(1):27–34. <https://doi.org/10.1016/j.jhqr.2019.08.004>.
  34. Mikhael S, Gaidis A, Gavrilova-Jordan L. Regional disparities in access to assisted reproductive technology: assessment of patient satisfaction when employing modern technology to close the gap. *J Assist Reprod Genet.* 2021;14:1–6. <https://doi.org/10.1007/s10815-020-02027-7>.



35. Berg WT, Goldstein M, Melnick AP, Rosenwaks Z. Clinical implications of telemedicine for providers and patients. *Fertil Steril*. 2020 Dec;114(6):1129–34. <https://doi.org/10.1016/j.fertnstert.2020.10.048>.
36. Pavola, A. 116+ hospitals postponing elective surgeries broken down by state, Beckers Hospital Review. [https://www.](https://www.beckershospitalreview.com/patient-flow/110-hospitals-postponing-elective-surgeries-by-state.html)

[beckershospitalreview.com/patient-flow/110-hospitals-postponing-elective-surgeries-by-state.html](https://www.beckershospitalreview.com/patient-flow/110-hospitals-postponing-elective-surgeries-by-state.html) Accessed 1/21/2021

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