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REVIEW

Access to Fertility Care in Geographically Underserved Populations, a Second Look

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Abstract

Infertility has a prevalence of up to 16% worldwide and is on the rise in developed nations, largely due to pursuing childbearing at advanced reproductive ages. Advances in assisted reproductive technology have benefitted socioeconomically advantaged patients disproportionately. High costs of fertility care are largely responsible for this disparity; however, patients in rural areas also face barriers in accessing both gynecology and reproductive endocrinology subspecialty care. Here, focusing on the USA, we discuss fertility care in geographically underserved areas and low-resource settings, and the impact on reproductive outcomes. Increased innovation to improve patient access to fertility care such as assisted reproductive technology is critical for ensuring equity. Remote monitoring is frequently performed by fertility centers, but partnership with local gynecologists has also been demonstrated to be an effective assisted reproductive technology monitoring method. Telehealth is now in mainstream use and the continued application to reduce geographic barriers to infertility patients is imperative. Partnership between local gynecologists and reproductive endocrinology and infertility specialists may improve patient access to fertility care and provide the unique benefits of continuity and ongoing local social support.

Keywords Infertility · Health equity · Health disparities · Rural fertility treatment

Introduction

Reproduction is a fundamental process of the human body; thus, infertility is a disease and patients without adequate access to fertility care are medically underserved. Infertility impacts up to 9.3% of patients in less developed nations and 16.7% in more developed nations [1]. The National Survey of Family Growth reports in 2006–2010 only 38% of nulliparous women with infertility sought infertility services and far fewer accessed assisted reproductive technology (ART) [2]. Because many couples ultimately require in vitro fertilization (IVF) to achieve pregnancy, infertility evaluation and management is suboptimal without access to a physician trained to counsel on and manage IVF cycles. IVF physicians and ART centers are congregated in metropolitan regions [3], which are typically medically resource-rich areas. In this paper, we will discuss relevant studies on geographically underserved patients regarding fertility care and how this may impact their clinical course and clinical decision-making from our perspective as ART practitioners.

Herein we refer to "women" or "female" patients desiring pregnancy who were assigned female sex at birth; however, we acknowledge that these terms may not represent the gender identity of many individuals.

Infertility in Geographically Underserved Populations

The dearth of fertility care in developing countries is a significant barrier to equitable treatment of infertility worldwide and will not be addressed here but has been reviewed in other commentaries and studies [4, 5]. While the percentage of people in the USA living in rural areas has declined over time, almost 20% of the population lives in rural areas [6]. Notably, in 2010, 49% of counties in the USA were

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without an obstetrician-gynecologist [7], the physician who is often seen first by women having difficulty conceiving, or being treated for conditions such as pelvic inflammatory disease, endometriosis, or polycystic ovary syndrome, which can negatively impact fertility. Reproductive endocrinologists, the specialists within the field of gynecology that treat infertility and have the exclusive privileging to manage IVF services, number only 1,300 nationally [8], and are concentrated on the coasts and in the cities. Women living in rural communities have decreased access to primary care and subspecialists and as such have poorer health outcomes [7]. In addition, patients in rural areas may have delayed diagnoses and resultant worsening of underlying conditions that may cause infertility (e.g., endocrinopathies).

Racial and ethnic minorities may compose a unique subset of geographically underserved patients. Reproductive outcomes in ethnic minorities and populations historically underserved in the USA have been studied and reviewed elsewhere [9–13]. However, it is important to note that the location of fertility clinics may not be geographically advantageous to these patients, and even in metropolitan areas, Black patients have been shown to travel farther for treatment [14]. Importantly, the concerns that patients have around IVF may vary by ethnic background [14]; thus, in addition to access to care, a degree of cultural fluency is key to caring for a diverse patient population.

The psychological impact of infertility diagnosis and treatment is significant, leading to psychological distress, anxiety, and depression in many women [15]. Because patients in low-resource or geographically underserved settings may have less exposure to ART, the psychological and social impact may be higher for them than patients in areas with higher ART utilization. Accordingly, patients from historically marginalized and underserved backgrounds may experience similar psychological distress as ART is less likely to be normalized within their community.

Geographic Barriers to Equitable Fertility Care

A study by Harris et al. has mapped the distribution of ART centers in the USA. Based on this, it is estimated that 25 million women in the USA live in an area that does not have an ART facility nearby [3]. Similarly, Nangia, Likosky, and Wang have mapped the distribution of male fertility specialists in the USA, demonstrating there is also a dearth of male infertility specialists outside of areas with ART centers [16]. The increasing distance between a patient and the nearest trained infertility specialist and ART center often leads to a delay in care. In the case of a female patient with diminished ovarian reserve, a common finding during a complete infertility evaluation, this may significantly impact her chances of success when she eventually does receive treatment if her ovarian reserve has decreased further in the interim. Likewise, treatment for conditions such as endometriosis and fibroids may be delayed, further compromising fertility. For male factor infertility patients, abnormal sperm parameters may be a sign of an underlying medical condition such as testicular cancer or an endocrinopathy and in this way, fertility care is a component of comprehensive medical care.

A recent study by Pew research illustrates the disparities in IVF access by region. States with robust insurance mandates for infertility coverage (and thus a higher concentration of infertility physicians) see 4.5% of births resulting from ART [17], a rate similar to that seen in several European countries that also share mandates for infertility [18]. This stands in contrast to states without infertility coverage where less than 1% of births are from ART (New Mexico, South Dakota, Oklahoma, Louisiana, Arkansas, Mississippi, Alabama, Tennessee, Kentucky, and West Virginia) [17].

Patients of different socio-economic backgrounds may begin childbearing at different ages, and it is plausible that rural communities could have less need for infertility care if women in these communities are less impacted by infertility associated with advanced reproductive age. An Australian study addressed this question and found that there was still a disparity in accessing fertility care for socioeconomically disadvantaged patients, even when adjusting for need, and this disparity was also demonstrated for patients living in remote areas [19]. Interestingly, Australia has federal insurance support for ART, and utilization rates of ART are among the highest in the world [19, 20], indicating that other barriers exist for these patients. While there has not been a similar study in the USA, this study highlights that socioeconomically disadvantaged patients indeed have a need for ART and are likely underserved in the USA as well.

Many patients travel several hours for infertility treatment and services, including simpler therapies like intrauterine insemination. For these patients, they may incur significant financial consequences due to lost wages in addition to the cost of treatment. Patient requests to minimize travel and lost wages at times lead to changes in the practice standard if the patient-friendly alternative is felt to be of a similar success rate and requested by the patient. For example, a patient may request to forego a sonohysterogram to avoid an additional trip to the office or opt for ovulation predictor kits despite clinical indication for ultrasound monitoring of her cycle. Partnering with local gynecology clinics (or as appropriate, radiology departments) may provide access to ultrasound monitoring for ovulation induction patients or diagnostic testing.

The broad application of telehealth due to the COVID-19 pandemic demonstrated that telehealth can be a powerful method to improve access to care. A retrospective cohort study of patients seeking care at a university-based fertility

prior to the COVID-19 pandemic demonstrated that patients who utilized telehealth for initial infertility consults were more likely to live farther from the clinic compared to patients choosing in-person visits. Importantly, patients seen via telehealth had a similar likelihood of pursuing treatment compared to patients who had in-person consults [21]. Utilizing the telehealth model, many ART centers have transformed to telemedicine-only for visits not requiring in-person examinations. All new patient visits and all follow-up visits have been conducted by telemedicine-only for the last 2 years to limit staff and patient exposure to potential viral transmission. Patient volumes as measured by new patient consults and IVF cycles have increased, and patient satisfaction scores as measured by Press-Ganey have exceeded 95% on likelihood to recommend the clinical provider. Outcome measures, in terms of livebirth rates per cycle start, remain comparable (personal communication).

A retrospective cohort study done on infertility patients prior to the COVID-19 pandemic by Mikhael and colleagues addressed both patient satisfaction and patient outcomes in infertility patients. Telehealth patients had their diagnostic studies and ovarian stimulation monitoring done by their local gynecologist and presented to the ART center for oocyte retrieval and embryo transfer. Live birth rates were equivalent among the telehealth and clinic patients (44% versus 47%). Satisfaction rates were high, with 56% of patients reporting being extremely satisfied and an additional 17% moderately satisfied [22]. Remote monitoring is a promising concept, as it not only provides convenience, but allows the patient to have continuity with their primary gynecologist throughout their fertility journey, a provider who may have awareness of local social and cultural nuances specific to the community to which the patient belongs. The potential downside to remote monitoring is discrepancy between follicle measurement techniques on ultrasound and differences in hormonal assays between labs. Because of the COVID-19 pandemic, emergency policies were enacted that allowed for physicians to be reimbursed for seeing out-of-state patients; however, this is not permitted outside of a state of emergency. The result is that many patients who would otherwise have insurance coverage for an evaluation may have to be seen in-person, potentially requiring significant travel. Practical factors such as technical difficulties are also encountered. Due to the need for privacy, a practice offering telemedicine would also need to invest in applications that ensure security. Remote monitoring is not a new concept, and many ART centers offer this option. What is unique and interesting about the Mikhael study is the partnership with rural gynecologists and the demonstration of equivalent live birth rates when utilizing monitoring services of a non-ART practice. One intriguing proposal is the use of home urine hormonal monitoring for ART [23]; however, extensive validation would be required prior to broad application of this program. Another retrospective cohort study investigated the use of telehealth versus face-to-face meetings and found similar clinical pregnancy rates; however, the telehealth group had a higher rate of preimplantation genetic testing as their indication for IVF, which may have skewed results (48.2% vs. 20.6%) [24]. As reproductive endocrinologists share a common goal with their referring gynecologists, a treatment plan as outlined in the Mikhael study is an excellent opportunity for partnership to improve patient access to fertility care without sacrificing patient satisfaction or reproductive outcomes.

Low-cost fertility centers aimed at closing the disparities gap employ simplified embryo culture techniques and offer a narrower breadth of ART services. The Walking Egg Project is an example of this, and they have described their model for opening a new practice [25, 26]. Some clinics have developed mobile clinics for testing and monitoring. Mobile fertility clinics may improve access to infertility services; however, the logistics of providing the highly timing-dependent service of fertility treatment to geographically underserved patients would be a challenge, and the original problem of poor access to fertility treatment exists. Moreover, a mobile ART lab would potentially have suboptimal outcomes mainly due to the effects of movement and air quality on embryos in culture.

For rural patients who do access care, one can extrapolate that they are less likely to have in their community support system individuals who have undergone ART, which may potentially compound the emotional distress of fertility treatment. Patients traveling a great distance will also have financial expenditures that are not covered by insurance such as lodging, transportation costs, and lost wages.

Improving Affordability and Access to Advanced Reproductive Technology

The median income of a household in the USA is approximately $52 k per year [27], and the cost of ART is approximately one-quarter of that at on average $12 k per cycle [20]. The financial burden of ART is prohibitive for many patients. It is estimated that just 24% of the need for ART is being met in the USA, suggesting an unmet need of 76%. Unmet need for fertility services is much lower in countries with public funding for ART such as Denmark, Belgium, and Sweden [28].

In a study of an urban low-resource hospital, infertility patients were more likely to be immigrants, of a younger age, and have a longer duration of infertility compared to patients in a private clinic. The patients in the low-resource hospital also had a higher rate of anovulation, a condition that can often be treated by a general obstetrician-gynecologist [29]. A study of a fellow-run fertility clinics with low-cost

services has shown promising outcomes [30]; however, the fellow-run fertility clinics described in the literature are in urban settings despite serving resource poor patients [30, 31].

Lack of insurance coverage also provides a barrier to equitable fertility care. Interestingly, the density of fertility clinics is higher in states with mandated coverage for infertility services [32]. Only four states mandate comprehensive fertility coverage, with fifteen more mandating some fertility coverage. The expenditures for patients living in states with mandated coverage for fertility care have been shown to be higher than for patients living in states without mandated coverage for fertility care ($12,337 compared with $11,422 adjusted annual mean expenditures) in a retrospective study of insurance claims data [33]. Fertility treatment insurance coverage, including fertility preservation, seems to impact premiums only minimally [34]. Furthermore, it has been proposed that insurance coverage would decrease the number of multiple births and therefore ART-related healthcare costs due to obstetric complications. There is suggestion that patients with insurance coverage are more likely to accept single embryo transfer based on a study of hypothetical insurance coverage scenarios given to patients [35]. Insurance companies in states with mandated coverage may encourage or require single embryo transfer, thereby reducing multiple gestations. Data from society for assisted reproductive technology (SART) demonstrates an approximately 6% decrease in multiple births in states with mandated insurance coverage for ART, a figure which has implications for public health and healthcare expenditures [36]. The total cost of pregnancy and infancy care has been calculated at over $20 k per singleton, $100 k per twin, and $400 k per triplet or higher-order live birth resulting from ART [37], making clear the advantage of singleton pregnancy. As embryo transfer guidelines have become more weighted toward single embryo transfer in recent years, it is possible that this trend will become less pronounced due to changes in practice patterns.

For patients without insurance coverage, there are opportunities to manage costs for patients. Many centers have adopted global fees which provides a typically lower rate for bundle ART services. For patients who are predicted poor responders to ovarian stimulation for ART (such as patients with poor ovarian response to prior gonadotropin stimulation or diminished ovarian reserve), minimal stimulation techniques ("mini-stim") may have equivalent results to high-dose gonadotropins and this could be considered for cost efficiency [38].

Conservative practices are also imperative to improving disparities in access to fertility care by controlling costs. ASRM Ethics Committee guidance on disparities in fertility care calls on physicians to engage in evidence-based efforts to develop simplified and lower-cost methods of treatment, stating "the cost savings, in turn, should be passed along to patients so that the financial burden of infertility care is reduced [28]." With this in mind, to avoid upward drifting costs over time, physicians should also evaluate the clinical efficacy of new technology (e.g., sperm DNA fragmentation testing, preimplantation genetic testing for aneuploidy in young patients), as their usage may not be cost effective for all patients and in some cases, may not improve outcomes.

Summary

Affordability of fertility care is complex and is impacted by insurance mandates, the costliness of the healthcare system, and on a smaller scale, ART center practices. In addition to high costs, access to high-quality infertility treatment managed by reproductive endocrinology subspecialists is limited by the geographic distribution of infertility centers. Disparities in access to fertility care exist for socioeconomic status, geographic area, and ethnic background, as well as any conditions that impede a patient participating in a complex care plan that requires actions on their part. Improvement in insurance coverage for infertility may reduce the healthcare costs and public health concerns of multiple gestations associated with ART. Importantly, increases in insurance coverage for fertility treatment would likely increase proximity of ART centers to previously underserved areas as well as reduce the indirect costs of treatment accrued by patients traveling for care.

Increased innovation to improve patient access to fertility care such as ART is critical for ensuring equity. Remote monitoring is frequently performed by ART centers, but partnership with local gynecologists has also been demonstrated to be an effective ART monitoring method. Telehealth is now in mainstream use and the continued application to reduce geographic barriers to infertility patients is imperative. Partnerships between local gynecologists and reproductive endocrinology and infertility specialists may improve patient access to fertility care and provide the unique benefits of continuity and ongoing local social support.

Data Availability Not applicable.

Code Availability Not applicable.

Declarations

Ethics Approval Not applicable.

Consent to Participate Not applicable.

Consent for Publication Not applicable.

Competing Interests The authors declare no competing interests.

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