

Telemedicine and ART: Is it Really Worth it to be Using Telemedicine to do Reproductive Medicine and ART? A Patient's Perspective on the Indications and his or her Experience with Reproductive Health Care

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Abstract

Covid-19 is a novel coronavirus disease that has created havoc and has disturbed the “normal” way of life. It has caused the government to restrict travel, implement social distancing, and enforce the mandatory use of face masks. For these reasons, the adoption of telemedicine is re-emerging as a powerful tool in the treatment of various diseases. This literature review aims to identify whether telemedicine can be adopted for the treatment of male infertility and whether it would be helpful during *in vitro* fertilization (IVF). From our review of available literature, we see that telemedicine can be partially used in the treatment of male infertility and IVF. It drastically reduces the number of in-person consultations which is mainly attributed to counseling patients during every step of their fertility journey. Since we are now in a digital age, and almost every aspect of life is simplified with the use of electronics, more patients in the middle class may prefer to experience healthcare digitally. However, what about patients from lower economic classes? They may find it difficult and intimidating to adopt telemedicine in their daily lives as some of them may not even be educated or familiar with using electronic devices. So, the implementation of telemedicine needs to be reviewed based on every patient that presents to a fertility clinic and should be used wherever possible. Our research acts as a base to encourage as many patients as possible and fertility clinics to adopt the use of telemedicine during these worrying times..

Keywords: Telemedicine; ART; Infertility; Counseling; IVF; ICSI

Introduction

Since Covid-19 was labeled as a pandemic by the world health organization (WHO) in March 2020 [1], numerous methods have been adopted to reduce the spread of the virus, and avoid infected patients coming into close contact with healthy individuals. To try and contain the virus, government authorities have banned unnecessary travel, and have implemented certain strict rules such as people following social distancing whenever applicable. Apart from this, the temperature must be checked at the entrance to any building including hospitals, and the use of a good quality facial mask be implemented. The adoption of telemedicine is a growing trend amongst many healthcare centers, as it adopts the use of treating individuals and providing necessary health care, without the need for in-person consultations [2]. This form of medicine is now widely employed in the treatment of different health concerns during the Covid-19 pandemic [2], which helps in the reduction of patients catching the virus at the hospital. All that telemedicine requires is a strong internet connection and home technology for communication with healthcare providers, which limits the spread of the virus to other people [1]. By using telemedicine, doctors can virtually examine and treat patients that are in home isolation or far-off rural places [3].

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Due to the widespread of severe acute respiratory coronavirus 2 (SARS-CoV-2), many fertility clinics are closed and treatment of infertility has been put on hold to avoid the spread of the virus. So, the question arises about introducing telemedicine to help treat infertile couples? This review aims to highlight the benefits of employing telemedicine for reproductive treatment like IVF/ICSI during the Covid-19 era.

Telemedicine

With the ever-growing advance in technology, the use of tools like video conferencing is emerging and shows promise to be a good tool in telemedicine. The exchange of information through the internet and the different methods of interactions between individuals have strengthened the use of telemedicine in today's world [1,4]. Adopting telemedicine in some disciplines of medicine like diabetes has revolutionized the healthcare system by reducing costs of hospital visitations while simultaneously making it more available for even patients in remote areas to receive high-class health advice from renowned doctors [5].

A systematic review (containing 93 randomized control trials) published in 2015 by 'The Cochrane Effective Practice and Organisation of Care' group, compared in-person consultations with consultations through telemedicine ways like video conferencing, to show the acceptability, effectiveness, and reduced costs thanks to interactive telemedicine. From the 93 RCTs, most of them looked at chronic comorbidities like diabetes and heart failure, and were used to monitor these conditions, and supply relevant advice, and design treatment plans. From the data presented in this report, it was shown that the utilization of telemedicine for the management of heart failure could possibly give similar outcomes when compared to in-person consultations. Further, data on telemedicine for diabetes reveals that blood glucose levels can be controlled using this method for consultations and management. From this study, it can be seen that telemedicine is emerging and can prove to be an effective method in the management of different diseases [6,7].

Moreover, with the increase in individuals owning smartphones, even in remote and low-income countries, adapting telemedicine could be the new norm in the coming years. It has been reported that the adoption of telemedicine could prove to be the fastest and cheapest way to seal the gaps in healthcare, in rural and urbanized developing countries [8]. Monitoring of patients using telemedicine should be designed for patients who require them [8].

Classification of telemedicine:

1. **Interactive telemedicine/telehealth:** Physicians and patients are allowed to communicate in real-time using video conference or telephone conversations at the ease of their own homes or by using specially designed medical kiosks [9].
2. **Tele-monitoring/remote patient monitoring:** Patients are monitored at home using specialized devices that have the ability to determine blood pressure, heart rate, temperature, blood sugar levels [9].
3. **Asynchronous telemedicine/store-and-forward:** Health care providers are able to share patient information, like blood reports or scans with other healthcare provider [9].

Advantages of telemedicine in fertility clinic

The question then arises if this form of medicine is effective and reliable. Telemedicine is associated with many advantages, some of which are below:

1. Patients are not required to attend an appointment in person and can attend the appointment in the comfort of their own houses. This reduces travel time, time taken to attend the appointment, fuel expenses, and stress before appointments amongst other things.

2. Patients require a telecommunication device and internet access, which allows people living in rural area and far off places to gain medical advice when required. This is particularly helpful in patients who have just undergone surgery, as there is less stress involved in arriving for an appointment in person.
3. This form of medicine also reduces the chances of patients cancelling their appointments last minute, and acts as a cheaper form of medicine.

Disadvantages of telemedicine in fertility clinic

Telemedicine possesses its own disadvantages that are listed below:

1. In some cases, where physical examination is required to prescribe medications, in person consultations are necessary.
2. There could be additional costs to set up a good telecommunication system in hospitals.
3. There is always a risk to cyber security, in which cases patients personal and medical data can be hacked and leaked.
4. May require the download of expensive software for monitoring and treatment of diseases.

Steps implored during in vitro fertilization (IVF) or intracytoplasmic sperm injection (ICSI)

A couple presenting to an infertility center will go through the following steps while undergoing an IVF/ICSI treatment:

1. Initial Consultation: Couple's history, assessment of previous reports or fertility treatment, designing an optimal fertility plan for the couple.
2. Evaluation: Pre-screening tests like blood tests, ultra-sonography, semen analysis, hysteroscopy, hysterosalpingography (HSG), etc.
3. Treatment planning: Based on all the reports, a proper treatment regime is planned along with counselling the patient and clearing their queries about their treatment plan.
4. Starting the treatment: Controlled ovarian hyper-stimulation requires daily hormonal injections to be taken, and periodic ultra-sonography to assess the follicular development.
5. Pre-pick up counselling: Also includes semen freezing and trigger injection appointment.
6. Ovum pick-up: The oocyte retrieval procedure and counselling about the number and quality of oocyte(s) retrieved.
7. Fertilisation: After fertilisation, informing patients about the total number of embryos formed and its quality.
8. Embryo transfer preparation: Endometrium assessment, progesterone blood report and finalising the embryo transfer date.
9. Embryo transfer (ET): Counselling about the number and quality of embryo(s) transferred, post ET precautions and follow up counselling.
10. Post ET consultation: Post 14 days of the embryo transfer, the patient is tested for pregnancy using a pregnancy kit and via b-HCG blood test. Post result counselling is done for further follow ups.

As per the different stages of IVF/ICSI treatment, a majority of the hospital visits require patient counselling and assessment of reports, which do not require the patient to physically be present. These consultations can be done via a telemedicine system and there can be avoidance of frequent visits to the fertility clinic. The couple can then only visit the clinic as per scheduled test or procedures minimising unnecessary visits and exposure to clinic staff. At later stages, the couple can assess their records and test results through a telemedicine system and can resolve their queries by setting up video conferences. Thus, a proper telemedicine program will help couples too easily navigate the process of evaluation, diagnosis, and treatment. This kind of system will allow fertility clinics to treat patients living in remote and far areas by reducing their hospital visits, which can be time consuming and a burden to the couple.

Telemedicine in fertility treatment

Due to the fact that several fertility clinics are closed because of the rapid spread and concerns associated with SARS-CoV-2, many patients who have presented to the clinic for treatment of infertility, have been put on hold to avoid the spread of the virus. This causes a delay in fertility treatment which decreases positive fertility outcomes, especially in women of advanced maternal age, as the number of follicles available is reduced (low ovarian reserve is associated with advanced maternal age) [10]. In such situations, adopting telemedicine can prove to be beneficial. Fertility treatments that incorporates IVF/ICSI, is a long and tedious process that requires the couple to visit the fertility clinic multiple times. From the initial consultation of the couple to ovulation induction and IVF, and finally to embryo transfer requires extensive routine evaluation and assessment. Sub-fertile couples need sufficient counselling during each step of their fertility journey which increases hospital visits. Apart from this, there is a need of routine blood tests, and constant monitoring of follicle development and maturation.

Numerous fertility clinics insist that couples postpone their fertility treatment to avoid viral infection by SARS-CoV-2. The number of IVF cases has decreased drastically and gynaecologists are promoting simpler techniques such as ovulation induction with timed intercourse instead of more complex procedures like IVF/ICSI. The main concern for this is that the couple's fertility journey gets delayed, which reduces the chances of a viable pregnancy in women aged 40 plus years [10] and causes psychological burden like the increase of stress levels in these patients [11]. In such scenarios, telemedicine proves to be a ray of hope for these couples, as it requires two main things: communication technology and an internet connection. This allows patients to interact with their fertility doctors without the need of leaving their houses.

Given the current lockdown situation, fertility specialists can guide patients to prepare for their fertility journey by advising patients on important topics that would enhance their chances of a clinical pregnancy like diet, maintaining an optimal body mass index (BMI), yoga and meditation [12]. Couples could also be educated on the different types of fertility options available for them and resolve any queries they may have. This would help in reducing their visits to the clinic post lockdown, as well as reduce their fertility related stress, and prepare them physically and mentally for their IVF/ICSI treatment. Even post lockdown, frequent clinical visits can be avoided by the introduction of telecommunications in medicine, and this may reduce the stress of frequent hospital visits, by having consultations in the comfort of one's home. Telemedicine will allow patients to virtually meet their fertility doctors for consultations, testing and monitoring via video conferencing. It is also cost effective and reduces time for patients to speak to healthcare workers in non-emergency cases.

Telemedicine and andrology: where are we?

Routine semen analysis involves determining parameters such as concentration, motility, and morphology using a counting chamber and a microscope to determine the fertility status of male patients. The analysis is user dependent, subjective, and labour intensive, which involves manually determining these semen parameters to assess for fertility. Due to social stigma, and increased stress levels in producing a semen sample in a hospital setting, at home semen analysis devices have been developed. These devices also provide a more objective method for determining fertility while being less prone to error [13,14]. Testing of certain semen parameters at home proves to

be cost-effective, while providing instant, objective results without the hassle of going to a fertility center to be tested. This is especially useful in men who are hesitant in seeking a medical evaluation, by providing them with a raw idea of their fertility status [13].

There are many different devices available in the market today to quantify different semen parameters at the comfort of ones home: at-home, paper-based, and micro-fluidic sperm analysis kits [14]. These devices however have their own limitations, the biggest one being that these devices provide a rough idea of male fertility but should not act as the main tool for determining fertility status in males. Apart from this, these devices can shed light on information of only one or more semen parameters at a time. They do not give information of the overall fertility of male patients and should not be used as a replacement for determining male infertility by fertility specialists in patients.

Conclusion

Telemedicine has seen many advances in the previous years, however its implications in hospital settings were not routinely used, but this form of medicine is now growing as a preferred method of use in cases of non-emergent situations. A study conducted by Mishra showed that patients prefer telemedicine as opposed to face-to-face consultations during the Covid-19 pandemic [15]. Implementing telemedicine in today's Covid-19 positive world will result in increased utilisation of this method of medicine in a post covid-19 world. The reduction in cost of frequent medical visits, reduced travel time, and comfort of attending appointments at home, are all points that encourage patients to implore telemedicine. However, the use of advanced machines and the internet may pose to be difficult in lower class people, especially those who reside in rural areas, where there is no proper connectivity. This shows that telemedicine needs to be catered based on personal needs and it should be noted that each case be delivered based on the presenting patient. As the world is evolving, and we are in the current technological age, at home consultations is increasing. Over the next couple of years, telemedicine may become the new norm in treating patients. We believe that more fertility clinics should adopt this kind of practice even post Covid-19.

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