

Building Bridges: Innovation in Telemedicine Use for the Provision of Reproductive Health Care

Telemedicine, the use of telecommunications technology to deliver health services to patients remotely, is one of the most significant innovations in health care in the last century. While telemedicine has been around for 40 years, it has gained in prominence and use over the last decade and is expected to continue to grow exponentially in the coming years.ⁱ In 2015 alone, more than 15 million Americans received some kind of medical care remotely.ⁱⁱ An important reason for this accelerated growth is the potential for telemedicine to improve the quality, access to, and affordability of health careⁱⁱⁱ and to alleviate workforce shortages in many areas of health care.^{iv}

There is no single “mode” of telemedicine service delivery. Rather it can take many forms from video chatting with a provider from the comfort of home to visiting a local doctor’s office and using telecommunications to consult a specialist. While telemedicine involves only the provision of *clinical* care, the closely related term “telehealth” refers to the provision of both clinical and non-clinical care (such as patient and public health education, provider training, and medical education).^v

Creative use of telemedicine for reproductive health services such as contraception, abortion, prenatal, and sexual health services can improve access, reduce costs and improve health outcomes. This paper highlights some of the ways in which telemedicine is already being used to improve access to reproductive health care and suggests some areas for expansion to increase positive health outcomes.

Contraception

Thousands of Americans, especially those with fewer financial resources, struggle to access contraception for a myriad of reasons. These include lack of insurance coverage, confusion surrounding family planning due to a lack of comprehensive counseling and education, and the difficulty meeting the costs associated with traveling to and from a health care provider (as required for many methods of contraception). While nearly all American women aged 15-44 who have had sexual intercourse have used at least one contraceptive method,^{vi} approximately half have not used contraception at times and/or used it inconsistently or incorrectly – placing them at high risk for unintended pregnancy.^{vii} Indeed, 41% of the 3.1 million unintended pregnancies that occur each year are due to this inconsistent or incorrect use.^{viii} Of US women surveyed who had a gap in their use of contraception, 5% said their non-use was due to a lack of time for medical visits to get a method and 5% reported difficulties paying for a method.^{ix} Another survey found that 20% of women reported that the cost of a doctor’s visit was an obstacle to obtaining a prescription contraceptive.^x Telemedicine can remedy or reduce many of these reported barriers, such as lack of time for medical visits or inability to pay for the cost of and transportation to an in-person visit.

In the realm of reproductive health care, where privacy and discretion can be of utmost importance, the internet and smartphones have paved the way for greater access to contraception, especially given that leading medical groups agree that pelvic and breast exams are not medically necessary for the initiation of hormonal contraception.^{xi} Accordingly, providers have already begun to integrate these technologies into their practice.

Planned Parenthood, for instance, has designed a phone app called “Planned Parenthood Care,” which allows patients to use their smartphone to video conference with a provider, discuss their medical history, and then decide which method of contraception (the pill, patch, or vaginal ring) would be best for them.^{xii} Following the video conference, Planned Parenthood sends the selected method through the mail in discreet packaging. Alternatively, the patient may pick up the contraception at their local brick-and-mortar pharmacy.

This system is ideal for young people or others with privacy concerns, busy parents short on time, women in rural areas far from clinics, employees who would have difficulty taking time off from work, or individuals unable to travel. The program saves women not only the cost and time of having to travel to an in-person doctor’s appointment, but also the expenses of travel, which may include lost income, childcare, and transportation costs.

Other telemedicine platforms allow users to purchase contraception online without having to talk to a provider via phone or video. Nurx, for example, is a startup company offering contraception through its website or phone app to anyone in California or New York.^{xiii} Nurx offers users a choice between the pill, patch, and vaginal ring. To begin, users answer questions about their age, smoking habits, medical history, blood pressure, menstrual cycle, and pregnancy status in order to determine which method is best for them. The responses are forwarded to the company’s physicians, who review them for any contraindications. If the physicians see no serious medical risks, Nurx sends the patient’s contraception in the mail overnight with no shipping costs. Moreover, patients can receive up to three months’ supply of their method at a time. Other companies that use a similar model to prescribe contraception include Lemonaid Health, Maven, the Pill Club, and Project Ruby.

Because Nurx can provide automatic refills and renewals, the company eliminates the need for in-person doctor’s visits or pharmacy pickups. In the future, Nurx hopes to utilize a courier service to deliver birth control to women’s doors within hours of submitting an order online.^{xiv}

Abortion

Although the rates of unintended pregnancy have decreased in recent decades due in large part to improved access to contraceptives, the unintended pregnancy rate in the US is still high compared to other developed countries.^{xv} Nearly half of all pregnancies

in the US are unintended, and 42 percent of those end in abortion,^{xvi} making it one of the most common medical services sought by women of reproductive age.

Many of the women who have limited access to health care in general—women in historically underserved communities such as poor and low-income people, people of color, immigrants, linguistically and culturally diverse communities, and people living in rural areas—also have the greatest difficulty accessing abortion care.^{xvii}

In addition, in many locations, access to abortion can be difficult due in part to a shortage of providers. Eighty-nine percent of all US counties have no identifiable abortion provider and almost 40 percent of women of reproductive age live in counties with no abortion provider.^{xviii} As a result, some women must travel hundreds or even thousands of miles to obtain an abortion.

Telemedicine holds the promise of removing many of these barriers to abortion care by enabling women to remotely obtain a medication abortion - administration of pharmaceutical pills (typically mifepristone followed by misoprostol).

A multi-year study of telemedicine abortion from Iowa showed that it is safe and effective, preferred by many women, and can improve access for underserved populations, especially rural women.^{xix}

For instance:

- In the first year of implementation, the number of sites offering abortion services in Iowa increased from six to 17.^{xx} A similar expansion occurred in Maine where the number of locations for obtaining abortion jumped from three to 20 after Maine Family Planning Association started providing telemedicine abortion.^{xxi}
- In Iowa, 99 percent of telemedicine patients had a successful abortion. Serious complications such as going to the emergency room or needing a blood transfusion were rare, occurring in less than one percent of patients.^{xxii} Moreover, after the telemedicine program launched, women were 46 percent more likely to have an abortion at or before thirteen weeks and the proportion of abortions performed after thirteen weeks decreased.^{xxiii}
- 94 percent of the women in the Iowa study who chose telemedicine said they were very satisfied with the encounter, compared to 88 percent of face-to-face patients.^{xxiv} Moreover, patients who utilized telemedicine abortion were more likely to report that they would recommend the service to others.^{xxv}

Healthcare providers and researchers are already piloting ways to streamline the process of telemedicine abortion and seeking to improve its use, acceptance, and efficiency by patients and providers. A pilot study in the US of direct-to-patient provision of medication abortion recently began.^{xxvi} With this model, an eligible patient video conferences with a healthcare provider and then the medication is sent to the patient by overnight mail.^{xxvii} This model is similar to a model used in Australia that has safely served hundreds of women.^{xxviii}

Despite these important innovations and potential for expansion, avoidable barriers limit progress. Restrictions directed at medication abortion as well as general limits on the use of telemedicine hamper broader access to abortion via telemedicine. For instance, nineteen states have effectively banned the use of telemedicine for abortion by requiring that the prescribing clinician be in the physical presence of the patient when dispensing the medication.^{xxix}

Another significant barrier to medication abortion generally and wider adoption of telemedicine abortion specifically is the Risk Evaluation and Mitigation Strategy (REMS) for mifepristone established by the FDA. Among other things, the REMS requires that providers dispense the drug in a clinic, medical office, or hospital. This requirement is medically unnecessary. Under the FDA protocol, a patient does not have to be with her healthcare provider when she takes the drug (only when she receives it), so the requirement serves no valid medical purpose. But the result of this requirement is that mifepristone is not available through pharmacies nor can it be distributed through mail-order pharmacies.

This is yet another reason why telemedicine abortion is so necessary. The inability to obtain mifepristone from a pharmacy or purchase mifepristone in a drugstore combined with the lack of medical providers certified to offer mifepristone and the lack of abortion clinics greatly restricts access. Until women can obtain mifepristone in pharmacies or from any local health care provider of their choosing, telemedicine will be necessary help overcome these obstacles.

Prenatal care

Adequate and timely prenatal care can improve the health of both the pregnant person and the developing fetus. Women report many barriers to prenatal care, including “long wait times, the location and hours of the clinic, language and attitude of the clinic staff and provider, the cost of services, and the lack of child-friendly facilities.”^{xxx} In fact, a US Department of Health and Human Services report found over 17% of recent mothers were not able to access prenatal care as early as they wanted, with young women and women of color reporting the highest delays in accessing care.^{xxxi} Approximately 38% reported that they could not get appointments when desired, 20% reported they were too busy, 14% lacked transportation to a clinic or doctor’s office, 10% could not take time off work or school, and 8% needed childcare to make it to their appointment.^{xxxii} These responses indicate a need for more accessible, affordable, and convenient prenatal care.

Telemedicine can be utilized in countless ways to provide prenatal care, resulting in better pregnancy outcomes for the woman and developing fetus. The Antenatal Neonatal Guidelines, Education, and Learning System (ANGELS) network, based at the University of Arkansas (U of A), for instance, connects patients with neonatal, maternal, and fetal specialists. Women with high-risk pregnancies receive a variety of services, including access to a 24/7 information hotline, virtual real-time medical consultations with specialists, and follow-up care.^{xxxiii} Because of the program’s ability to provide

referrals for high-risk rural women, more low birthweight babies were safely delivered under the U of A's specialized care after the program's implementation than before,^{xxxiv} reducing the 60-day infant mortality rate by 0.5%.^{xxxv}

The U of A is even using telemedicine to provide remote care to incarcerated pregnant women. Prenatal care in US prisons and jails is often poor quality or nonexistent and the Pulaski County Regional Detention Facility in Little Rock has been no exception. A lawsuit by seven incarcerated women stated that the jail routinely ignored pregnant women's prenatal health and denied their requests for care.^{xxxvi} Incarcerated women reported that the jail's physician was only available for appointments on certain days and the nurses were not sufficiently trained nor equipped to provide prenatal care.^{xxxvii} The jail saw three miscarriages and the death of a newborn over the course of seventeen months.^{xxxviii} After a \$200,000 settlement, the jail partnered with the U of A to create options for virtual prenatal care for incarcerated women. The University plans to provide nurses who specialize in high-risk pregnancies to perform weekly prenatal exams and doctors to examine the women remotely from their offices. To facilitate these visits, the jail invested in interactive video equipment, a fetal heart rate monitor, and an ultrasound machine. While the program is only in its initial stages, there have been no fetal deaths at the jail since 2013.^{xxxix}

Pregnant women are also turning to their smartphones for convenient, personal, and reliable answers to questions about their pregnancies. For instance, Maven, self-described as "the first digital clinic for women," virtually connects users through a video chat interface to doctors, nurse practitioners, specialists, and doulas in order to assist women in accessing affordable and personalized maternal health care. Users pay a predetermined fee per appointment and can receive medical consultations and prescriptions.

The app allows a woman who may have full-time job, a disability that makes travel difficult, or has trouble affording the costs of in-person clinical care to speak with a medical professional about topics such as fertility, pregnancy, childcare, breastfeeding, and prenatal and postnatal care. Maven's doulas provide "emotional and educational support for expecting mothers"^{xl} and offer video conferencing with patients on subjects such as physical discomfort during pregnancy, lactation, birth planning, and childbirth education.

Other innovations, such as the FDA-approved Sense4Baby™ by Airstrip®, connect health care providers to pregnant women right in their own homes. The handheld monitoring device attaches to a woman's body, observing both maternal and fetal vitals. The results are then wirelessly transmitted to her smartphone or tablet via the Airstrip® app and then to her doctor. Apple has even collaborated with Airstrip® to allow the Apple Watch to perform the same monitoring as the handheld device. Moreover, the watch can monitor the developing fetus while the woman is in labor, allowing the patient to "get up and move around without having to worry about being tethered to monitoring equipment."^{xli}

The Sense4Baby™ system also allows pregnant women to self-administer non-stress tests (NST), a common prenatal test used to monitor a fetal heartbeat or a woman's contractions. The information is then uploaded into a private, HIPAA-compliant cloud server where a doctor can monitor the results. Without the Sense4Baby™, the NST must be performed in person by a technician and takes 20-60 minutes. While the price of this product is prohibitive for many, those who can afford it are spared the need to take hours off work multiple times a week for in-person services. The technology also increases a provider's capacity and flexibility,^{xlii} allowing them to see more patients. Today, one in six babies born in the US is monitored with AirStrip®^{xliii} and the product has been used to monitor more than four million pregnant women.^{xliv}

Sexual health

The World Health Organization defines sexual health as “a state of physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity.”^{xlv} In addition to contraception, abortion, and prenatal care discussed above, sexual health care includes:

- Prevention and treatment of HIV, viral hepatitis, and other sexually transmitted infections (STIs);
- Cervical and breast cancer screenings;
- Screening and counseling for domestic and interpersonal violence; and
- Confidential and culturally competent services related to sex and sexuality that take into account factors such as race, ethnicity, gender, socioeconomic status, sexual orientation, gender identity, age, HIV/AIDS status, disability, and incarceration.^{xlvi}

Unfortunately, Americans face numerous barriers to sexual health care. These include stigma around sex, lack of sex education, a shortage of culturally competent care, high costs and lack of insurance coverage, and politically motivated governmental funding cuts to health clinics. The effects of a lack of access to sexual health care can be drastic and can include unintended pregnancy, unhealthy relationships, infertility, disease, or even death. To highlight, 19.7 million new STI cases are reported every year in the US,^{xlvii} 41% of high school students reported not using a condom the last time they had sex,^{xlviii} and 13% of women and 6% of men have experienced sexual coercion at some time in their lives.^{xlix}

Cervical Cancer Screening – Telecolposcopy

Since the invention of the Pap smear 40 years ago, cervical cancer rates have plummeted 70% nationwide.ⁱ Although cervical cancer is one of the few cancers that are largely preventable, it still plagues a significant number of women in the US. According to the US Centers for Disease Control and Prevention (CDC), in 2012, 12,042 women were diagnosed with cervical cancer and 4,074 women died of the disease.ⁱⁱ

After an abnormal Pap, providers usually perform a colposcopy, an examination of the cervix, vagina and vulva using a microscope, and a biopsy. Rural and underserved communities often lack the medical experts needed to diagnose and treat cervical cancer. To address this problem, providers have begun using teleconferencing and cloud-based systems to allow experts to view patient history and data; digital images from colposcopies; and cytology, laboratory, and pathology reports.^{lii} In Arkansas, for example, there was only one provider group as of 2013 capable of conducting the follow-up procedures required after an abnormal Pap: the University of Arkansas for Medical Sciences.^{liii} This lack of providers put follow-up care geographically out of reach for many of the state's women. Accordingly, the U of A collaborated with the Center for Distance Health to develop a program in which patients who have had an abnormal Pap can receive follow-up care through telemedicine. Using video conferencing, an obstetrician-gynecologist supervises an advanced practice nurse or nurse practitioner to perform the colposcopy and biopsy, if needed.

Researchers found that the colposcopies performed via telemedicine were just as effective at predicting cervical cancer as traditional colposcopies.^{liv} Likewise, patients reported high levels of satisfaction with the telecolposcopy. Indeed, when the pilot's patients were given the option of traveling to have the colposcopy performed at the university or having it done via telemedicine, almost all chose telemedicine.^{lv}

Not only is the innovation safe and effective, but cost saving as well.^{lvi} It is clear that without the program, thousands of cases of cancer could go undetected: 74% of the patients involved in the pilot program reported that without the U of A's telecolposcopy program, they would have waited at least six months or not sought care at all;^{lvii} 61% said they would have waited at least twelve months or not sought care at all.^{lviii}

STI Prevention and Treatment

STIs are widespread in the US and providers across the country see telemedicine as a useful tool to prevent, screen for, and treat them. Like the "Planned Parenthood Care" app for contraceptive services, the "Planned Parenthood Direct" app offers chlamydia and gonorrhea screening. Unlike the birth control app, however, Planned Parenthood Direct does not use video conferencing, making it an attractive option for individuals with privacy concerns. The app allows users to request an at-home STI testing kit that screens for chlamydia and gonorrhea. The kit, along with instructions for use, is mailed discreetly to the user's home where the patient takes a urine sample and mails it back to Planned Parenthood. After the clinic tests the specimen, results are sent back to the patient through the app. If the patient tests positive for an STI, a Planned Parenthood clinician sends an oral antibiotic prescription to the patient's local pharmacy. In the case of gonorrhea, a patient has to visit a local clinic to receive an antibiotic injection in addition to the oral antibiotic. The program is currently being piloted in California and will expand to other areas if successful.^{lix}

Barriers to HIV/AIDS care can be even more challenging. People living below the poverty line are more likely to live with HIV/AIDS^{lx} and the monthly out-of-pocket costs

of treatment can range from \$2,000 to \$5,000 per patient.^{lxi} Lack of transportation, unstable housing, stigma, discrimination, and privacy concerns further deter people from seeking care. The combination of such factors can cause a person living with HIV to develop full-blown AIDS.^{lxii} In addition, barriers to care have a disproportionate impact on people of color: the HIV prevalence rate for blacks is more than eight times the rate of whites and the rate for Hispanics is three times the rate of whites.^{lxiii} Compared to other racial groups, black people living with HIV in the US are “the least likely to receive ongoing care and effective treatment.”^{lxiv} The HIV/AIDS epidemic is even more devastating in the South, where proper care is harder to find and where stigma, homophobia, and discrimination against people living with HIV can be high.^{lxv} While Southern states comprise about one-third of the overall US population, the region accounts for an estimated 44% of all people living with HIV in the US^{lxvi}

To help address the nation’s HIV/AIDS epidemic, providers have been using telemedicine to expand access to HIV care in both rural and urban settings. For instance, the Urban HIV Telemedicine Program at the University of California San Francisco (UCSF) allows UCSF HIV experts to connect with patients who have limited ability to meet in person. Established in 2010, the program is the first of its kind in the US and serves four clinics in the San Francisco Bay area. At a clinic, patients interact with UCSF staff through a two-way videoconferencing system. The experts offer HIV primary care (which includes HIV testing, treatment, and Pre-Exposure Prophylaxis or PrEP), nutrition counseling, pharmacist services, and mental health services. 79% of the program’s patients stated that they would prefer a telemedicine appointment to an in-person visit for their next appointment.^{lxvii}

Similar programs have been established in rural areas. For example, Medical AIDS Outreach in Montgomery, Alabama allows specialists based in the city to videoconference with patients at clinics in 47 Alabama counties and provides services similar to those at UCSF.^{lxviii} The program’s creator received the 2015 HIV Practice Award from the American Academy of HIV Medicine and the Institute for Technology in Health Care for his innovation.^{lxix} Although it is not a silver bullet, telemedicine can help eliminate significant obstacles to HIV care by reducing the burden and cost of traveling to specialists, while also allowing specialists to treat more people than would normally be possible.

Conclusion

Telemedicine has already proven to be a huge success in the field of reproductive health care, creating platforms to screen for cervical cancer, reduce miscarriage rates, improve birth outcomes and prevent unintended pregnancies and STIs. Such platforms have improved access, reduced costs and improved patient outcomes.

Policymakers, medical practitioners, and health advocates should continue to work to expand access to reproductive health services via telemedicine. Effective models should be replicated and innovations pursued. These efforts would result in greater convenience and cost savings for patients and providers, providers treating more patients, and expanded access to specialists.

Nevertheless, because of stigma around many reproductive health services – from HIV care to abortion – restrictions on improved access to services through telemedicine is in jeopardy in some areas. Reproductive health care is an essential part of a person’s physical and mental well-being. Restrictions on such care that are not based on evidence and best practices are an attack on the medical community at large. When politicians substitute their medical judgment for that of trained medical professionals, they jeopardize patient health and undermine the doctor-patient relationship.

For the promise of telemedicine to be fully realized, reproductive services should be a fully integrated part of telemedicine services. Experts in the field of telemedicine should partner with the reproductive health community to reduce barriers, increase evidence-based research, and collaborate on strategies to improve and streamline the overall provision of reproductive care via telemedicine. Patients, not politics, must prevail.

- ⁱ For instance, the global telemedicine market is expected to expand at a compound annual growth rate of 14.3 percent through 2020. Five Telemedicine Trends Transforming Health Care in 2016 <https://www.foley.com/five-telemedicine-trends-transforming-health-care-in-2016/> (last viewed September 23, 2016).
- ⁱⁱ Melina Beck, “How Telemedicine Is Transforming Healthcare,” *The Wall Street Journal*, June 26, 2016 <http://www.wsj.com/articles/how-telemedicine-is-transforming-health-care-1466993402> (last viewed November 2, 2016). The global telemedicine market is expected to expand at a compound annual growth rate of 14.3 percent through 2020. Five Telemedicine Trends Transforming Health Care in 2016 <https://www.foley.com/five-telemedicine-trends-transforming-health-care-in-2016/> (last viewed September 23, 2016).
- ⁱⁱⁱ American Telemedicine Association, *What are the Benefits of Telemedicine?* <http://www.americantelemed.org/about-telemedicine/what-is-telemedicine#.V-QXHpMrLOE> (last viewed September 22, 2016).
- ^{iv} National Conference of State Legislatures, *LegisBrief, Telehealth and Licensing Interstate Providers*, Vo. 24, No. 25 (July 2016).
- ^v “What is telehealth? How is telehealth different from telemedicine?” HealthIT.gov, accessed June 20, 2016, <https://www.healthit.gov/providers-professionals/faqs/what-telehealth-how-telehealth-different-telemedicine>.
- ^{vi} Guttmacher Institute, “Fact Sheet: Contraceptive Use in the United States,” October 2015, http://www.guttmacher.org/pubs/fb_contr_use.html.
- ^{vii} Sneha Barot, “Making the Case for a ‘Contraceptive Convenience’ Agenda,” *Guttmacher Policy Review* 11, no. 4 (2008), <https://www.guttmacher.org/pubs/gpr/11/4/gpr110411.html>.
- ^{viii} Guttmacher Institute, “Fact Sheet: Unintended Pregnancy in the United States,” March 2016, <http://www.guttmacher.org/pubs/FB-Unintended-Pregnancy-US.html>.
- ^{ix} Jennifer J. Frost, Susheela Singh, and Lawrence B. Finer, “US Women’s One-Year Contraceptive Use Patterns, 2004,” *Perspectives on Sexual and Reproductive Health* 39, no. 1 (2007): 52, <http://dx.doi.org/10.1363/3904807>.
- ^x Sharon Cohen Landau, Molly Parker Tapias, and Belle Taylor McGhee, “Birth Control Within Reach: A National Survey on Women’s Attitudes Toward and Interest in Pharmacy Access to Hormonal Contraception,” *Contraception* 74, no. 6 (2006): 465, <http://dx.doi.org/10.1016/j.contraception.2006.07.006>.
- ^{xi} Felicia Stewart et al., “Clinical Breast and Pelvic Examination Requirements for Hormonal Contraception: Current Practice vs. Evidence,” *Journal of American Medicine* 285, no. 17 (2001): 2238, <http://dx.doi.org/10.1001/jama.285.17.2232> (summarizing medical literature and policy statements on the issue).
- ^{xii} Currently, people in Hawaii, Washington, Idaho, Alaska, and Minnesota may use the app, although Planned Parenthood hopes to expand the pilot program into more states. “Hello. We’ll see you now,” Planned Parenthood Federation of America, accessed June 20, 2016, <https://www.plannedparenthood.org/get-care/online/video-visit>.
- ^{xiii} Nurx, <https://app.nurx.co/>.
- ^{xiv} Kristen Brown, “There’s Finally an Uber for Birth Control,” *Fusion*, January 19, 2016, <http://fusion.net/story/256143/nurx-is-making-birth-control-on-demand/>.
- ^{xv} Susheela Singh, Gilda Sedgh, and Rubina Hussain, “Unintended Pregnancy: Worldwide Levels, Trends and Outcomes,” *Studies in Family Planning* 41, no. 4 (2010): 241–250.
- ^{xvi} Lawrence B. Finer and Mia R. Zolna, “Declines in Unintended Pregnancy in the United States, 2008–2011,” *New England Journal of Medicine* 374, no. 9 (2016): 843–852, <http://nejm.org/doi/full/10.1056/NEJMsa1506575>.
- ^{xvii} Heather Boonstra, “Abortion in the Lives of Women Struggling Financially: Why Insurance Coverage Matters,” *Guttmacher Policy Review*, vol. 19, July 14, 2016 <https://www.guttmacher.org/about/gpr/2016/07/abortion-lives-women-struggling-financially-why-insurance-coverage-matters> (last viewed September 26, 2016).
- ^{xviii} Rachel K. Jones and Jenna Jerman, “Abortion Incidence and Service Availability in the United States, 2011,” *Perspectives on Sexual and Reproductive Health* 46, no. 1 (2014): 3–14, <http://dx.doi.org/10.1363/46e0414>.
- ^{xix} Daniel A. Grossman et al., “Changes in Service Delivery Patterns After Introduction of Telemedicine Provision of Medical Abortion in Iowa,” *American Journal of Public Health* 103, no. 73 (2013): 75, <http://dx.doi.org/10.2105/AJPH.2012.301097>.
- ^{xx} Lisa Rapaport, “Telemedicine Could Expand Access to Medical Abortions,” *Reuters Health*, March 28, 2016, <http://www.reuters.com/article/us-health-abortions-telemedicine-idUSKCNOWU1N4>.
- ^{xxi} Liss-Schultz, “Tech Fix that Makes Abortions a Lot Easier to Get.”

- ^{xxii} Ibid.
- ^{xxiii} Daniel A. Grossman et al., “Changes in Service Delivery Patterns After Introduction of Telemedicine Provision of Medical Abortion in Iowa,” *American Journal of Public Health* 103, no. 73 (2013): 75, <http://dx.doi.org/10.2105/AJPH.2012.301097>.
- ^{xxiv} Ibid.
- ^{xxv} Ibid.
- ^{xxvi} Telabortion The Telemedicine Abortion Study, Frequently Asked Questions, <http://telabortion.org/faq/> (last viewed September 26,2016).
- ^{xxvii} TelAbortion, The Telemedicine Abortion Study <http://telabortion.org/> (last viewed September 21, 2016).
- ^{xxviii} Molly Redden, “Abortion without the clinic on offer with revolutionary new US program,” *Guardian*, March 31, 2016 (noting that a direct to patient model operates in Australia by the Tabbot Foundation and has served hundreds of women) <https://www.theguardian.com/world/2016/mar/31/new-us-program-abortion-without-clinic-mifepristone-mifeprex> (last viewed September 26, 2016); Elizabeth Raymond, et al “Increasing Access to Abortion With Telemedicine,” *JAMA Intern Med* (March 28, 2016) (doi:10.1001/jamainternamed.2016.0573).
- ^{xxix} Guttmacher Institute, Medication Abortion, Sept 2016 (www.guttmacher.org/state-policy/explore/medication-abortion) (accessed Sept 7, 2016). The states are: AL, AZ, AR, ID, IN, KS, LA, MI, MS, MO, NE, NC, ND, OK, SC, SD, TN, TX, WI. Iowa’s ban on telemedicine abortion is permanently enjoined.
- ^{xxx} Julia Phillippi, “Women’s Perceptions of Access to Prenatal Care in the United States: A Literature Review,” *Journal of Midwifery & Women’s Health* 54, no. 3 (2009): 219-25, doi:10.1016/j.jmwh.2009.01.002.
- ^{xxxi} US Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau, “Barriers to Prenatal Care,” *Child Health USA 2013*, (2013), <http://mchb.hrsa.gov/chusa13/health-services-utilization/p/barriers-to-prenatal-care.html>.
- ^{xxxii} Ibid.
- ^{xxxiii} Curtis Lowery et. al., “ANGELS and University of Arkansas for Medical Sciences Paradigm for Distant Obstetrical Care Delivery,” *American Journal of Obstetrics and Gynecology* 196, no. 6 (2007): 534.e1-.e9, <http://dx.doi.org/10.1016/j.ajog.2007.01.027>.
- ^{xxxiv} Curtis Lowery et. al., “ANGELS and University of Arkansas for Medical Sciences Paradigm for Distant Obstetrical Care Delivery,” *American Journal of Obstetrics and Gynecology* 196, no. 6 (2007): 534.e1-.e9, <http://dx.doi.org/10.1016/j.ajog.2007.01.027>.
- ^{xxxv} “Best Practices Archives - Arkansas’s ANGELS Program,” Center for Connected Health Policy, accessed June 15, 2016, <http://cchpca.org/best-practices-archives-arkansas-angels-program>.
- ^{xxxvi} Complaint, *Hernandez v. Holladay*, no. 60CV-14-618 (E.D. Ark. 2014); “Pulaski County Jail to Open New Clinic for Pregnant Inmates,” *TheCabin.net*, November 27, 2015, <http://thecabin.net/news/2015-11-27/pulaski-county-jail-open-new-clinic-pregnant-inmates#.VrTmm7lrLIU>.
- ^{xxxvii} Complaint, no. 60CV-14-618.
- ^{xxxviii} Simone Weichselbaum, “Could Virtual OBGYN Services Help Stop Miscarriages? One Arkansas Jail Hopes So,” *The Marshall Project*, November 10, 2015, <https://www.themarshallproject.org/2015/11/10/could-virtual-obgyn-services-help-stop-miscarriages>.
- ^{xxxix} Simone Weichselbaum, “Could Virtual OBGYN Services Help Stop Miscarriages? One Arkansas Jail Hopes So,” *The Marshall Project*, November 10, 2015, <https://www.themarshallproject.org/2015/11/10/could-virtual-obgyn-services-help-stop-miscarriages>.
- ^{xl} “Our wide range of providers meet any and all of your needs,” Maven, accessed June 24, 2016, <https://www.mavenclinic.com/our-practitioners>.
- ^{xli} Michelle Stein, “Apple’s New Fetal Monitoring System Will Amaze You,” *BabyCenter Blog*, September 10, 2015, http://blogs.babycenter.com/mom_stories/apples-new-fetal-monitoring-system-will-amaze-you/.
- ^{xlii} “AirStrip Sense4Baby System Receives FDA Clearance for Patient Self-Administration,” *PR Newswire*, April 1, 2015, <http://www.prnewswire.com/news-releases/airstrip-sense4baby-system-receives-fda-clearance-for-patient-self-administration-300059149.html>.
- ^{xliii} “AirStrip Sense4Baby System Receives FDA Clearance for Patient Self-Administration,” *PR Newswire*, April 1, 2015, <http://www.prnewswire.com/news-releases/airstrip-sense4baby-system-receives-fda-clearance-for-patient-self-administration-300059149.html>.
- ^{xliv} “West Health-Developed Sense4Baby in Apple’s New Product Launch with AirStrip,” *West Health*, September 11, 2015, <http://www.westhealth.org/news/west-health-developed-sense4baby-in-apples-new-product-launch-with-airstrip/>; Airstrip® <http://www.airstrip.com/videos/airstrip-one%C2%AE-over-4-million-babies-and-counting> (last viewed November 10,2106).
- ^{xliv} “Defining Sexual Health,” World Health Organization, accessed January 13, 2016, <http://www.who.int/reproductivehealth>

/topics/sexual_health/sh_definitions/en/.

^{xlvi} Sexuality Information and Education Council of the United States, "Ensuring Equitable Access to High-Quality Sexual Health Care Services," December 2014, <http://www.siecus.org/index.cfm?fuseaction=document.viewDocument&documentid=465&documentFormatId=528>.

^{xlvii} "Statistics," American Sexual Health Association, accessed January 13, 2016, <http://www.ashasexualhealth.org/stdsstis/statistics/>.

^{xlviii} Specifically, of the US high school students surveyed in 2013, 34% had sexual intercourse during the previous three months, and, of these, 41% did not use a condom the last time they had sex. "Sexual Risk Behaviors: HIV, STD, & Teen Pregnancy Prevention," US Centers for Disease Control and Prevention, Division of Adolescent and School Health, last modified April 15, 2016, <http://www.cdc.gov/healthyyouth/sexualbehaviors/>.

^{xliv} "Sexual Violence: Facts at a Glance," US Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2012, <http://www.cdc.gov/violenceprevention/pdf/SV-DataSheet-a.pdf>.

ⁱ Wilbur C. Hitt et al., "Telemedical Cervical Cancer Screening to Bridge Medicaid Service Care Gap for Rural Women," *Telemedicine and E-Health* 19, no. 5 (2013): 403-08, <http://dx.doi.org/10.1089/tmj.2012.0148>.

ⁱⁱ "Cervical Cancer Statistics," US Centers for Disease Control and Prevention, last modified August 20, 2015, <http://www.cdc.gov/cancer/cervical/statistics/>.

ⁱⁱⁱ "University of Virginia Cancer Center Begins Using New Telemedicine Technology for Cervical Cancer Screenings," Collaborative Medical Technology Corporation, July 1, 2013, <http://www.cmtcorp.com/about-us/press/university-of-virginia-cancer-center-begins-using-new-telemedicine-technology-for-cervical-cancer-screenings/>.

^{liii} Hitt et al., "Telemedical Cervical Cancer Screening," 404.

^{liii} *Ibid.*, 406-07.

^{liii} *Ibid.*, 407.

^{liii} *Ibid.*

^{liii} *Ibid.*, 406.

^{liii} *Ibid.*

^{lix} Rebecca Ruiz, "New App Lets Users Get STD Test through Mobile Device," *Mashable*, June 16, 2015, <http://mashable.com/2015/06/16/std-test-app/#fphavTY2S8qg>.

^{lx} Alexandra Cawthorne, "Poverty Is Driving an HIV Epidemic: CDC Study Shows that Combating HIV Means Combating Poverty," Center for American Progress, July 21, 2010, <https://www.americanprogress.org/issues/poverty/news/2010/07/21/8101/poverty-is-driving-an-hiv-epidemic/>.

^{lxi} "Cost of Treatment Still A Challenge For HIV Patients In US," Jessica Camille Aguirre, *All Things Considered*, aired July 27, 2012, on National Public Radio, <http://www.npr.org/sections/health-shots/2012/07/27/157499134/cost-of-treatment-still-a-challenge-for-hiv-patients-in-u-s>.

^{lxii} "Cost of Treatment Still A Challenge For HIV Patients In US," Jessica Camille Aguirre, *All Things Considered*, aired July 27, 2012, on National Public Radio, <http://www.npr.org/sections/health-shots/2012/07/27/157499134/cost-of-treatment-still-a-challenge-for-hiv-patients-in-u-s>.

^{lxiii} Paul Denning and Elizabeth DiNenno, "Communities in Crisis: Is There a Generalized HIV Epidemic in Impoverished Urban Areas of the United States?" US Centers for Disease Control and Prevention, last modified June 23, 2015, <http://www.cdc.gov/hiv/group/poverty.html>.

^{lxiv} "HIV in the United States: The Stages of Care," US Centers for Disease Control and Prevention, July 2012, http://www.cdc.gov/hiv/pdf/research_mmp_stagesofcare.pdf.

^{lxv} "HIV in the Southern United States," US Centers for Disease Control and Prevention, updated May 2016, <http://www.cdc.gov/hiv/pdf/policies/cdc-hiv-in-the-south-issue-brief.pdf>.

^{lxvi} "HIV in the Southern United States," US Centers for Disease Control and Prevention, updated May 2016, <http://www.cdc.gov/hiv/pdf/policies/cdc-hiv-in-the-south-issue-brief.pdf>.

^{lxvii} "Urban HIV Telemedicine Program," University of California San Francisco, UCSF Wellness Center, accessed June 24, 2016, <http://360.ucsf.edu/content/urban-hiv-telemedicine-program>.

^{lxviii} Kym Klass, "Rural HIV Patients Linked to Medical Care," *Montgomery Advertiser*, April 30, 2014, <http://www.montgomeryadvertiser.com/story/news/local/alabama/2014/04/22/states-rural-hiv-patients-link-care/8035399/>.

^{lxix} "Technology Awards Go to HIV Telemedicine and a Primary Care Program," *POZ*, March 24, 2014, http://www.poz.com/articles/hiv_technology_awards_1_26989.shtml.