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Remote Health: Optimizing the Delivery of Sexual Health Care

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Remote health care, including telehealth or telemedicine, has slowly evolved since the 1800s with the advent of the telegraph and telephone.[1] Telehealth is the use of electronic information and telecommunication technologies to provide care when an individual and his/her/their health care provider are not in the same place at the same time.[2] For the purpose of this supplement, "remote health care" includes all the different modalities health care providers can use to remotely interact, diagnose, treat, and monitor their patients. Remote care takes a broader perspective to consider how new communication technologies can complement in-person communication in public health clinics. Promising uses of new technology include assessing symptomatic patients via telephone triage, offering remote testing and diagnosis (e.g., laboratory, pharmacy/retail clinic, at-home/mail-in) via self-collection of specimens and self-tests, Internet or text-based appointment reminders and test results (i.e., remote patient monitoring), or video appointments. In general, remote care encounters can occur synchronously (phone or video session) or asynchronously (patient communication separated in time and space through messaging platforms).[3] At its core, remote health is human-centric; it satisfies a patient's clinical needs, at his/her/their convenience, and removes barriers to the patient's health improvement. However, as with the introduction of any new technology or service, unintended consequences arise.[4]

State-specific regulatory issues, payment and reimbursement, privacy, and confidentiality concerns, among others, have posed substantial challenges to scaling up remote health care in our nation.[5] The SARS-CoV-2 (COVID-19) pandemic forced the US health care system to modernize its approach to delivering clinical care that did not involve in-person clinician assessments.

The COVID-19 response challenged the medical community to ensure continuity of services and care for people required to stay home in isolation, quarantine, or physical distance. In February 2020, the Centers for Disease Control and Prevention (CDC) released guidance

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advising health care providers and persons in areas affected by the COVID-19 pandemic to implement physical distancing practices and recommended that clinical services be offered through virtual means (e.g., telehealth).[6] Trends in telehealth encounters in October and November 2020 revealed that telehealth appointments were offered to approximately 64% of Medicare beneficiaries, whereas only 18% had been offered telehealth by their provider before the pandemic.[7] What was once not widely accepted or common among the medical community and insurers quickly became daily practice. Physicians who reported using telehealth nearly quadrupled from 22% in 2019 to 80% in 2020.[8] These findings indicated that continuing telehealth policy changes might provide increased access to acute, chronic, primary, and specialty care during and after the pandemic.[6]

Our nation's health care system has faced overwhelming and extraordinary obstacles during the pandemic; however, the subsequent solutions have provided us with an opportunity to harness and assimilate these practices to benefit public health. One area that has benefited from shifts in the delivery of clinical care during COVID-19 is sexual health services (e.g., sexually transmitted infections [STIs], including HIV). For 6 consecutive years, reported STIs have been on the rise in the United States, with little sign of slowing (Fig. 1).[9] New STIs total nearly $16 billion in direct medical costs (Fig. 2).[10,11] Societal and cultural stigma with the complex interplay of factors such as poverty, housing and food insecurity, medical mistrust, discrimination related to sexuality and gender identification, racism, access to care, education, and violence/trauma continues to hinder STI prevention and control. The opportunity to optimize remote sexual health care during the pandemic seemed timely amid global chaos.[12] During the pandemic, many STI programs pivoted toward remote service provision models such as phone triage or telemedicine, leveraged partnerships, community referrals, and explored online platforms for mail-in STI testing of self-collected samples.[13] The CDC promptly promulgated interim guidance aimed at ensuring quality STI care despite significant limitations in patient access to clinics and staffing and/or operations of those clinics.[14]

Approximately 2 years into the pandemic, we have opportunities to examine how remote health has been used to control STIs and provide continuity of care. We can explore its successes and limitations while determining the optimal balance of remote and in-person services to better design seamless sexual health care models and reach those missed through conventional methods.

REMOTE HEALTH AND COVID-19

In the United States, 97% of adults own a cell phone, 85% own smartphones, and approximately three-quarters have broadband Internet service at home,[15] so why have we been slower to scale up remote care options? Remote care offers many advantages: venue flexibility (e.g., at-home, laboratory), patient convenience and savings, ensured privacy and confidentiality, improved patient engagement and retention, and reduced costs to clinics. Added privacy and confidentiality may be especially appealing to sexual and gender minorities, individuals who cannot miss work, individuals who live where there may be only one provider, where accessing local care may be inhibited by privacy concerns, or

where travel time to a clinic may be lengthy.[16] Non–clinic-based visits can also economize staff resources and give providers more time toward symptomatic and difficult cases.

Despite these advantages, several key barriers existed pre–COVID-19 that have led to slower uptake of remote health care.

Regulatory Barriers

One of the main challenges to remote health pre–COVID-19 was regulatory issues. Each state operates differently and may, in fact, prohibit some forms of telehealth activity or require particular practices or standards for delivery of certain care or laboratory services.

Specifically, licensing and practice regulations were more rigid. Before the pandemic, there were requirements that out-ofstate providers be licensed in the state they provide services.[17] Since COVID-19, state declarations of emergencies allowed for flexibility in how medicine was practiced, allowing health care professionals to practice across state lines. Although several states are beginning to roll back flexibility and require adherence maintaining waivers, others are returning to pre-COVID standards.[18] Protection of privacy has been a major concern. Consent and confidentiality are governed by a complex mesh of laws, regulations, program rules, and routine practices; these vary by state. Remote health adds issues to an already complex system. During the pandemic, the Department of Health and Human Services and the Center for Medicare & Medicaid Services relaxed some of the enforcements to the Health Insurance Portability and Accountability Act.[19] For example, cybersecurity and privacy oversight loosened to allow providers to practice medicine using technologies that did not have the required safeguards in place.

COVID-19 has pushed many state and local health departments to explore at-home self-testing and self-collection, validation, and partnerships with public health laboratories and industry. However, regulatory requirements have historically presented challenges for the development, approval, and use of at-home self-testing and/or self-collection options[i] for STI diagnostics.[20] The only rapid Federal Drug Administration (FDA)–cleared STI test for self-testing at home on the US market is OraQuick^{R} HIV antibody self-test (OraSure Technologies, Inc.).[20] The FDA has regulatory authority over devices. All self-collection and diagnostic kits must be approved or cleared, and registered with the FDA. This is a long and expensive process for industry. Single laboratories have used laboratory-developed tests (LDT) that have not gone through FDA clearance; however, regulatory compliance of the Center for Medicare & Medicaid Services–administered LDT validation process has been the subject of ongoing review by prevailing authorities, including the Department of Health and Human Services and the FDA, and in fact is the subject of a pending legislation, for example, the VALID Act.[21] The validation process for laboratories to demonstrate good performance of the LDT is time-consuming, is costly, and only applies to the single

[i]An at-home specimen self-collection kit is defined as a collection device that is meant for use at home or away from a medical provider facility without in-person guidance by a medical provider. The self-collected specimen is then shipped to a laboratory for processing, and results are communicated at a later time. A self-test is defined as a device that an individual can obtain with prescription or over-the-counter, possibly by mail. The package insert indicates self-testing as the intended use. The individual then conducts specimen collection and performs the test on their own using instructions from the insert and gets immediate results without shipping anything to a laboratory or waiting for results.[20]

laboratory that has developed the test, although it can accept patient specimens from tests ordered by providers in other states under prescribed circumstances.

Reimbursement and Payment

Reimbursement flexibility for remote care is critical to its adoption and continued use. Providers and laboratory operators have struggled to bill and be reimbursed for remote care; some have lacked understanding on how to bill, and others have lacked the staffing capacity to do so.[22] In most cases, unclear state and federal guidelines allow insurance plans to restrict guaranteed services to their predefined network.[23]

Many settings have avoided billing altogether given perceived and real institutional compliance challenges to be met before the acceptance of patient insurance when such is available. Although many providers were able to quickly adopt technology for remote visits, inadequate procedure codes and/or network coverage for remote visits and diagnostics have significantly hampered frontline health care innovation.[22]

Furthermore, the creation of procedure codes for remote care services and diagnostics, needed to facilitate successful billing for services, has yet to be devised and broadly accepted, limiting the full—or even partial—recovery of costs associated with innovative services.[22,23] For the uninsured and underinsured, unclear guidance and/or procedural codes present a special challenge for provision of all forms of care and particularly remote care dependent upon expensive technology, both for service providers and patients.[22]

The US Digital Divide

Broadband access is key to telemedicine access. The Federal Communications Commission estimate that more than 21.3 million people in the United States lack access to broadband Internet. However, an independent research group focused on broadband in America suggests that the Federal Communications Commission data are flawed and estimate that 42 million lack access to broadband.[24] Specifically, older adults, those with lower levels of education, and racial/ethnic minorities are less likely to have broadband.[25] Digital redlining, when “major network providers systematically exclud[e] low-income neighborhoods from broadband service—deploying only sub-standard, low-speed home Internet,” impacts these groups.[26] Financial barriers are commonly reported as a barrier among nonbroadband users: 45% of nonusers report it being too expensive.[24] This is not surprising when 2.2 million people in the United States do not have access to basic water or plumbing.[27] Almost 40% report difficulty paying their most basic needs (e.g., housing, utilities, food, or medical care).[28]

Geographically, people located in rural parts are more prone to having limited or no Internet options. Urban residents are 3 times more likely to have access to next-generation broadband than those in rural areas; approximately 15 million people in the United States, primarily in rural communities, do not have access to entry-level broadband at home.[29] Of particular concern is the overlap of technology gaps with service deserts, specifically those areas in which specialty STI services are missing.[30,31] In these geographic areas, bridging technology deficits may be more feasible and cost-effective to providing care, especially as

remote care becomes more accepted and standards of practice evolve to reflect best practices in each care.

COVID-19: POTENTIATING REMOTE CARE

Although disruptive, the COVID-19 pandemic has presented the public health community with enormous opportunity.

Multiple Doors of Entry and Platforms

Patients now have a variety of platforms to access sexual health care: telephone, online, smart applications, and alternative settings such as pharmacies/retail health clinics. Even vending machines can offer medication and condom dispensing.[32,33] Innovation in sexual health care delivery is all around us. The United Kingdom's Dean Street Clinic under the National Health System is perhaps the criterion standard of innovative sexual health care, with a special focus on providing care to men who have sex with men.[34] The clinic offers self-testing/collection for HIV and other STIs, easy access to HIV postexposure and preexposure prophylactics (PrEP), and behavioral advice and support. It was the first National Health System clinic to offer rapid HIV testing and an onsite Cepheid GeneExpert® Infinity machine, allowing for HIV/STI test results within 6 hours.

In the United States, similar innovations are occurring outside the public health setting. There are more than 10 platforms that offer STI services via telemedicine with some offering at-home testing options and PrEP prescriptions.[35,36] However, some STI programs have had success at introducing home-based self-collection during the pandemic, on their own or in partnership with nonprofit or commercial providers.[13] Increasing the availability of home-based self-collection and testing adds another level of privacy for some patients, which may help empower patients to continue testing. With non–clinic-based testing, we also have an opportunity to enhance partner services (e.g., test kits for sex partner(s) make recommended testing for PrEP users more convenient) and ensure adherence and follow-through of best practices for chlamydia/gonorrhea rescreening, nontreponemal follow-up testing and prenatal testing in syphilis care, and operationalizing test of cure for pharyngeal gonorrhea and STI treatment with nonrecommended regimens.[37,38] Considerations should be given to how to make these services available to the unstably housed, how to make home-based testing affordable, and how best to market these services to those with higher risk factors for STIs.

Diversification of Types of Providers and Settings

Opportunity also exists to diversify health care settings and types of providers for the delivery of sexual health care. Non–clinic-based testing has advantages in novel venues such as youth drop-in centers, shelters, and outdoor venues where people who are underserved and unhoused may be found. Pharmacies may also be well positioned to increase and improve the delivery of STI/HIV testing and treatment. There is a long history of public health engaging pharmacies in tuberculosis testing, hepatitis vaccination, HIV management and care, safe syringe programs, and more recently PrEP services for HIV prevention.[39] Some pharmacy practices have moved to more patient-centered care approaches and trained

providers to deliver counseling and offer clinical referrals for a variety of health conditions. Research supports this approach. Several studies found that when pharmacists deliver direct patient care, patient health is improved, care is less fragmented, and costs are reduced.[40–43] Pharmacist-prescriber collaborative practice agreements, enabling an array of patient care services, are permitted in 49 states.[44] Pharmacy partnerships may also contribute to better community-based STI surveillance. Data sharing could help monitor trends in STI therapies and their sequalae.

More Inclusive Surveillance

Non–clinic-based testing platforms and alternate venues present an opportunity for surveillance to be more inclusive, but coordination and building trust will be necessary to ensure adequate surveilling, reporting, and linkage to care. Without good surveillance, we cannot track trends and detect emerging threats and outbreaks. Technology systems and integration will also be critical to the success of remote sexual health care. Public-private partnerships, particularly between innovative commercial providers and local and state public partners, including STI programs, clinics, and public health laboratories, to drive awareness of and responsibility for necessary public health-centric information sharing would be beneficial.

Improved Patient Access Via Smartphone Technology

Although we are still struggling to close the digital divide, there is evidence that it is narrowing by age, race, and ethnicity. Approximately 95% of adults (18–49 years) report owning a smartphone; most STIs occur in these age groups.[9,15] Similarly, 83% to 85% of Black, White, and Hispanic Americans report owning a smartphone.[15] These data suggest that remote health and smartphones could be leveraged to deliver more segmented messaging and culturally competent care. We also need to ensure that there are alternatives to smartphone-based technologies, especially in older age groups. Smartphone-based care need not be the only alternative, but serving the 7 in 8 people with smartphones more efficiently might free up clinical resources to serve those without access to smartphones. Providing smartphones to people without them could support access to prevention information and services; such a program might increase equitable access to digital interventions and could be a cost-effective move for high-risk clients not getting care or monitoring.[45]

Enhance the Patient Experience

Remote health has the potential to positively impact the patient experience, reduce STI-related stigma and privacy concerns, and provide more patient-centered care. Earlier research showed youth, sexual and gender minorities, persons with childcare responsibilities, persons in rural areas, and established patients as early adopters of remote health.[16] Of note, individuals accessing care via remote health strategies reported acceptance and, moreover, increased satisfaction and engagement in sexual health care services.[46] Remote health provides an opportunity to embrace a more holistic approach to sexual health and treat the whole person by providing avenues to support other health and wellness issues and social determinants of health. However, we must consider that, because more providers have been licensed during this state of emergency, they may not be optimally trained in

specialty STI care and best practices to deliver quality clinical sexual health care, especially regarding emerging and pressing concerns such as drug resistant gonorrhea, syphilis in pregnant women, and pathogens such as *Mycoplasma genitalium*. More sensitivity, cultural competency, and basic sexual health training (e.g., risk assessment, behavioral counseling, screening recommendations) will be needed among those licensed who may encounter patients with sexual health needs. Technology may aid in achieving best practices in STI care, such as automating test of cure and rescreening workflows, facilitating recommended testing in non–clinic-based settings, increasing participation, and helping expedite provider training and education.

CHALLENGES FOR CONSIDERATION

Remote health care will not fully replace in-person care. Clinical standards in medicine require in-person, patient-centered interactions between a patient and a clinician. Established physician visits are often needed for care to be transferred elsewhere. In-clinic patient visits also allow more control over specimen collection, immediacy of results when innovative Clinical Laboratory Improvement Amendment-waived point-of-care platforms are available, and delivery of directly observed and/or recommended parenteral therapy. Given at-home self-collect testing typically relies on a shipping service in at least one direction, result disclosure may be delayed by the patient, transit, or laboratory processes, creating lags that interrupt treatment, partner therapy, and surveillance.[13,36] Such delays must be weighed against the reality that a subset of patients testing at home would not otherwise be tested at all. Hence, there is a need for quality standards and to consider what opportunity costs arise for STI prevention through offering testing outside of the clinic setting. Patient perspective costs (e.g., travel, time off, childcare), health system cost, and societal costs all must be weighed.

Notwithstanding the past or current availability of certain STI tests as LDTs, a major hurdle impeding wider availability and routine reimbursement is FDA approval/clearance of such test systems, as well as whether Medicaid will cover a portion of these costs. Although one state recently has legislated that at-home self-collect STI tests must be covered by insurance,[47] routine reimbursement pegged to actual cost of testing is elusive and many procedural hurdles to full reimbursement remain. Research indicates that acceptability of at-home STI testing is high. Most men who have sex with men and young adults (65%–74%) are willing to spend between $10 and $20 on test kits.[48,49] However, privatized STI test kits online cost anywhere from $24 to $522.[35,36] For sustainability, kits must be affordable and accessible to those most in need of them. Further support will be needed to explore the cost and cost-effectiveness of these different models because costs of remote health interventions may be more difficult to collect than traditional care.

Concerning the current at-home testing regulatory challenges discussed, balance also needs to be found between meeting the needs of a population and achieving the most sensitive and reliable testing method for STI self-collection outside of the clinic setting. Self-collection methods should continue to be assessed for performance characteristics, reliability, stability of shipped specimens, and user comprehension of collection requirements. Health departments and public health laboratories are starting to engage in these partnerships and

working to balance needs and capacity. Communities of practice will be necessary for sharing emerging models and successful strategies. Regulatory discussions should consider that broader coverage of remote care screening tests with slightly less sensitive tests might identify and care for more clients than a limited option for in-clinic tests with higher sensitivity. Test performance must be clearly understood by the clinical users, and a marginal loss of sensitivity should be balanced by potentially enhanced reach, especially considering that many people with the highest risks for STIs might have substantial barriers to attending in-clinic care.

Are we reaching enough individuals at greatest risk of poor STI/HIV outcomes? We will need to ensure it is not only the worried-well and low-risk using remote health services and use creative and inviting approaches to make sure that remote health services reach those who need them most. Once found, are we relating to them and supporting them in a holistic manner? Patient satisfaction with remote care could lead to sustainability, but will it improve equity? A *New England Journal of Medicine* analysis suggested that telehealth leaves the most vulnerable behind: non-English speakers, older patients, and Medicaid recipients.[50] However, virtual care obviates the need to access facilities that may deter patients who feel stigmatized accessing STI care. Moreover, how do we ensure equitable access to remote health given the cost of Internet, cell phones, and broadband deserts?

We must also consider that there is a segment of the population unwilling to adopt technology: 71% of nonbroadband users are not interested in having Internet at home.[15] Digital literacy on remote health will be essential, and generally, health literacy will need to be improved in certain communities where there is a lack of understanding about what preventive care is and why it is important. We are also faced with the challenge of integrating emerging tools into underfunded public health settings and unintegrated surveillance and reporting systems. Further burden is placed on both patients and providers when systems are not integrated, and platforms overlap. Integration or linkage to electronic health records is an opportunity to set standards for platform interoperability and data sharing, as well as safeguard privacy and confidentiality. Finally, who will implement and champion remote care innovations, point toward opportunities for health equity, and ensure technology advancements are developed through a health equity lens?

MOVING FORWARD

Although this special issue will not solve all these problems, it is a starting point for a review of opportunities and successful approaches for providing high-quality remote sexual health care and how they may be modified, improved, and scaled with fidelity. Like the technology that fuels it, remote health will continue to evolve and become an omnipresent component of our health care experiences. As we saw during the COVID-19 pandemic, remote health removed barriers and provided multiple doors of entry, but there is no one-size-fits-all approach. Remote care may very well offer an important complement to and substitute for in-person STI/HIV services. With increases in digital health funding, there is more support from the federal level to accelerate progress in this realm (e.g., point-of-care home-based tests, broadband expansion, Medicaid coverage, complementary prescription delivery).[12,40]

Remote care provides us with the opportunity to embrace a more holistic and practical approach to sexual health, treating the whole person where they are. Perspectives, experiences, and support from health departments, academia, industry, the CDC and FDA, payors, and, of course, the communities and patients themselves are needed to ensure equitable progress and movement in these areas. Throwing technology at a problem is never a solution, nor will it overcome all disparities in access, affordability, and usability. Trust and understanding of the need for technology will need to be built within communities that can benefit the most. Remote health technologies, communications, and interventions must be designed and developed through a health equity lens—diminishing and not accentuating disparities—with input from communities disproportionately impacted by STIs.

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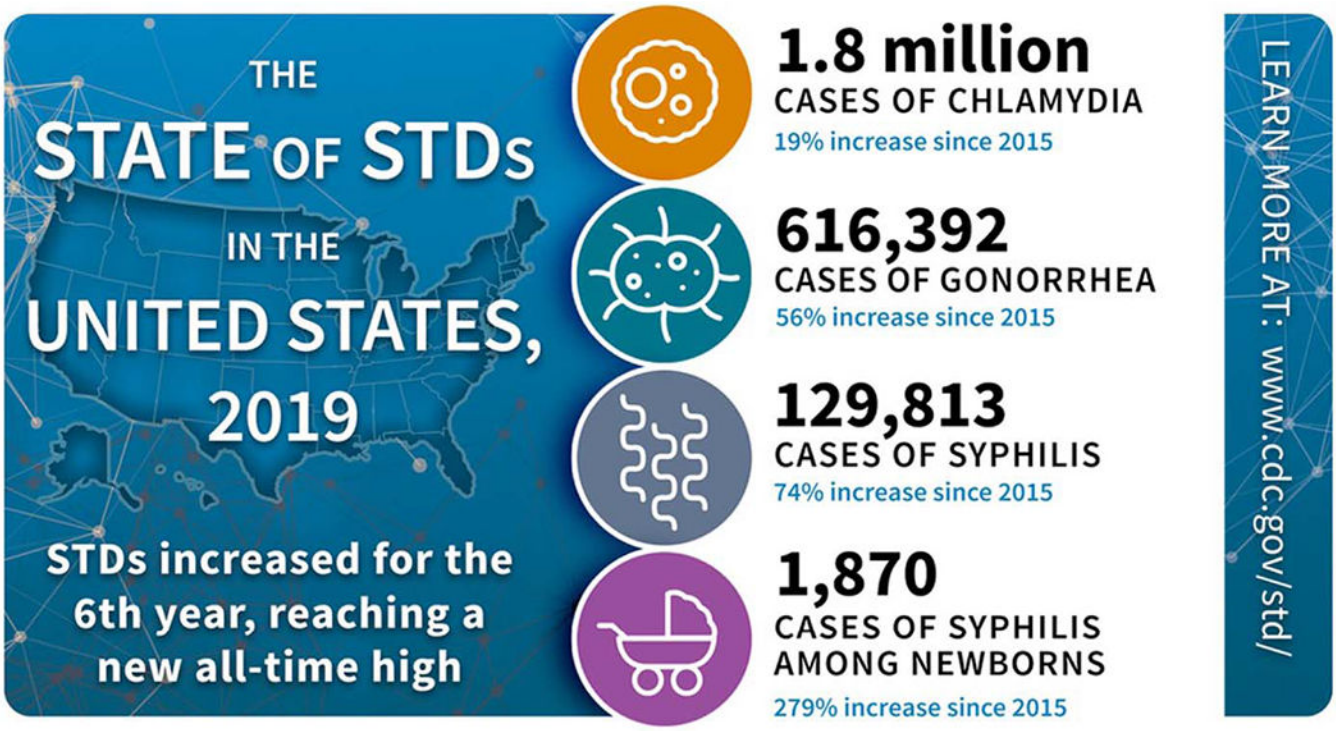

Figure 1.
The state of STDs in the United States, 2019. Source: CDC.

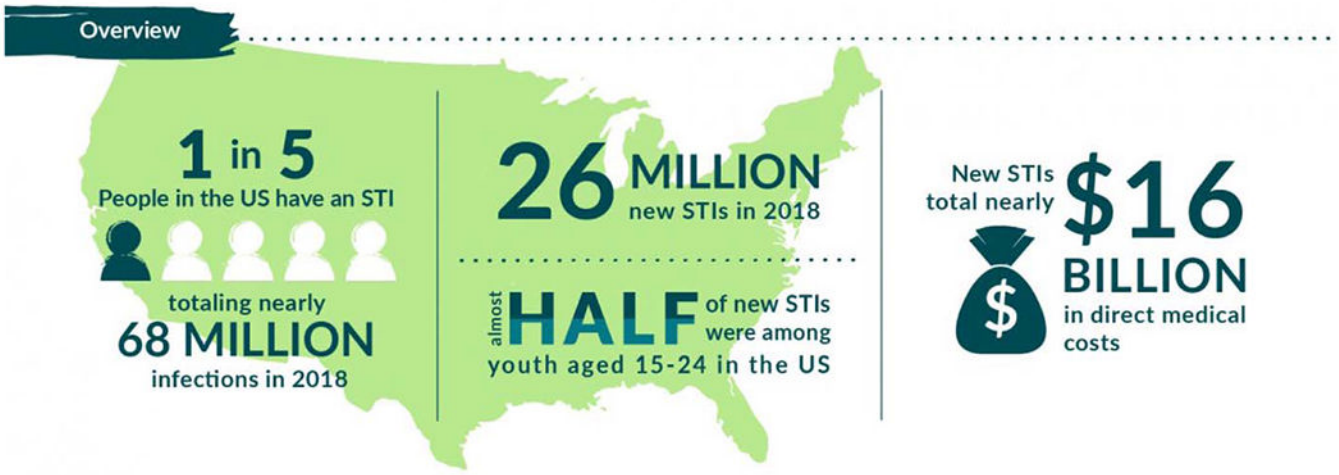

Figure 2.
Overview of STIs prevalence, incidence, and cost estimates in the United States. Source: CDC, 2021.