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The Implementation of Strengthening the US Response to Resistant Gonorrhea in the Emergency Department Setting: Successes and Lessons Learned in 2 Jurisdictions

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Abstract

Background: *Neisseria gonorrhoeae* (NG) continues to develop antimicrobial resistance (AR), and treatment options are limited. ARNG surveillance aids in identifying threats and guiding treatment recommendations but has traditionally been limited to sexually transmitted infection (STI) clinics. Large portions of STI care is delivered outside of STI clinics, such as emergency departments (EDs). These facilities might provide additional venues to expand surveillance and outbreak preparedness.

Methods: Through the Strengthening the US Response to Resistant Gonorrhea program, Greensboro, NC, and Indianapolis, IN, identified 4 EDs in high-morbidity areas to expand culture collection. Patient demographics, culture recovery rates, and antimicrobial susceptibility results between EDs and local STI clinics were compared along with lessons learned from reviewing programmatic policies and discussions with key personnel.

Results: During the period 2018–2019, non-Hispanic Black patients were the most represented group at all 6 sites (73.6%). Age was also similar across sites (median range, 23–27 years). Greensboro isolated 1039 cultures (STI clinic [women, 141; men, 612; transwomen, 3]; EDs, 283 [women, 164; men, 119]). Indianapolis isolated 1278 cultures (STI clinic, 1265 [women, 125;

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men, 1139; transwomen, 1]; ED, 13 all male). Reduced azithromycin susceptibility was found at the Indianapolis (n = 86) and Greensboro (n = 25) STI clinics, and one Greensboro ED (n = 8).

Implementation successes included identifying an on-site "champion," integrating with electronic medical records, and creating an online training hub. Barriers included cumbersome data collection tools, time constraints, and hesitancy from clinical staff.

Conclusions: Partnering with EDs for ARNG surveillance poses both challenges and opportunities. Program success can be improved by engaging a local champion to help lead efforts.

Rates of *Neisseria gonorrhoeae* (NG) continue to rise across the United States, with large increases in both men and women from 2015 to 2019 (60.6% and 43.6%, respectively).[1] Concerningly, NG has continued to develop resistance to multiple antimicrobial classes.[2] Because of the threat of resistance and limited antimicrobial options, the Centers for Disease Control and Prevention (CDC) has classified antimicrobial-resistant (AR) NG as an urgent public health threat.[3] The Strengthening the US Response to Resistant Gonorrhea (SURRG) project was designed to build local capacity for rapid detection and response to this emerging threat through expanded culture collection and antimicrobial susceptibility testing (AST) at the local level.[4] Currently, AST requires gonococcal isolation from culture specimens, with routine culture collection traditionally limited to sexually transmitted infection (STI) clinics. As more NG is diagnosed using nucleic acid amplification testing (NAAT), robust availability of NG culture and AST have been diminished, which has limited the ability to effectively develop surveillance for ARNG.

Data from the CDC 2019 STD Surveillance Report highlight that a large portion of STI care is delivered outside of traditional STI clinic settings.[1] Pearson et al.[5] identified a 38.6% increase in STI-related visits to emergency departments (EDs) between 2011 and 2013 when compared with 2008 to 2010. Recently published data from a large health registry in central Indiana showed an increase in the number of ED visits for gonorrhea between 2005 and 2014, accounting for 27.4% of all diagnosed female gonococcal infections outside of the STI clinic.[6] In 2019, data from the North Carolina Department of Health and Human Services identified more cases of gonorrhea diagnosed in Guilford County ED/Urgent Care settings (32.7%) than STI clinics (23.9%).

Emergency department settings might provide an opportunity to conduct ARNG screening and surveillance, thus expanding local public health capacity to detect infections with reduced antibiotic susceptibility and quickly respond to outbreaks. This article aims to describe the epidemiology of gonorrhea cases identified through NG culture collection in local EDs in Indianapolis, IN (IND), and Greensboro, NC (GRB), and compare patient demographics and AST results from EDs with those from local STI clinics. We also provide a qualitative description of facilitators, barriers, and promising practices learned about implementing SURRG activities in an ED setting through key informant interviews.

MATERIALS AND METHODS

ED Selection

The Indianapolis STI clinic is located in downtown Indianapolis and is the city's only full-service STI clinic. In 2019, the clinic diagnosed 1267 cases of gonorrhea. The STI clinic located in Guilford County North Carolina comprises 2 STI clinic facilities, with the main site located in Greensboro and an additional site located in High Point, hereafter collectively referred to as the Greensboro STI clinic. In 2019, Greensboro diagnosed 499 cases of gonorrhea at the STI clinic. Indianapolis and Greensboro each identified 2 EDs within their respective jurisdictions that were in high-gonorrhea-morbidity areas. Both EDs in Indianapolis (labeled hereafter as IND-ED1 and IND-ED2) had a preexisting collaborative relationship with the local health department and were onboarded into SURRG activities between December 2017 and June 2018. Both Indianapolis EDs reported relatively high gonorrhea morbidity in 2019 to make them prime sites to expand ARNG surveillance (IND-ED1, 502 cases; IND-ED2, 309 cases). In Greensboro, the local health department established new collaborative relationships with 2 EDs (labeled hereafter GRB-ED1 and GRB-ED2); sequential onboarding of the EDs occurred between May 2017 and May 2018. Similarly, Greensboro EDs reported relatively high gonorrhea morbidity in 2019 (GRB-ED1, 262 cases; GRB-ED2, 124 cases).

Leadership Selection

To establish participating EDs as sites for expanded NG culture collection, both states determined the need for champions to promote and support operations. A "champion" in this case was someone who met most of the qualities reviewed by Miech et al.,[7] as they (1) worked within the organization or directly related to it, (2) were interested and committed to furthering AR gonorrhea knowledge, and (3) were sufficiently enthusiastic and personable to motivate others to participate. This project Champion would be the liaison between project leadership and the ED team to motivate the staff and troubleshoot issues.[8]

Specimen Selection

All Indianapolis and Greensboro sites (STI clinics and EDs) had similar screening criteria when selecting patients and specimen types for SURRG.[9,10] *N. gonorrhoeae* culture collection was encouraged from patients of all genders who (1) presented with mucopurulent genital discharge from suspected gonorrhea, (2) had a recent (<60 days) and untreated diagnosis of gonorrhea, or (3) were a recent sex partner (<60 days) of a person with a gonorrhea diagnosis.

Collection of specimens from all exposed anatomic sites was encouraged. In Indianapolis, the ED providers were required to collect one swab or urine sample for NAATs and a separate swab for culture. Local protocols included prioritizing urethral specimen collection for any male patient seen for any STI-related visits (otherwise, a patient would have to wait 1 hour after urinating to submit a viable culture specimen). Greensboro ED sites used swabs collected for NAAT as a source for culturing.

Once a specimen was collected, IND-ED1 had the clinical staff streak across a Remel JEMBEC Thayer Martin agar plate (Biomed Diagnostics, White City, OR). Specimen collection was later changed in Indianapolis sites to the BBL Charcoal-Suspension Swab, with all plating and isolation done at the public health laboratory to reduce workload in the ED; IND-ED2 began collecting after this change. Greensboro sites streaked samples using the InTray (BioMed Diagnostics, White City, OR) system. The inoculated culture plates were incubated at 35°C to 37°C until being transported to the local public health laboratory via daily courier pickup. All ED agar plates relied on CO_2 tablets placed within the agar medium to sustain the bacteria, whereas their STI clinic counterparts had incubators that provided a CO_2-enriched environment.

At the local public health laboratory, AST was performed on all gonococcal isolates via E-test (bioMérieux, Marcy-l'Étoile, France), for ceftriaxone, cefixime, and azithromycin.[11] The Clinical and Laboratory Standards Institute defines isolates as nonsusceptible to azithromycin when azithromycin minimum inhibitory concentrations (MICs) of >1 μg/mL and nonsusceptible to ceftriaxone or cefixime with MIC of ≥0.25 μg/mL.[12] We programmatically defined reduced susceptibility (RS) as azithromycin MICs ≥2 μg/mL, ceftriaxone MICs ≥0.125 μg/mL, or cefixime MICs ≥0.25 μg/mL.

Data Collection

Patient consent, registration, and laboratory information in both IND-ED1 and IND-ED2 was collected by ED staff from patients on a packet of physical paper, including a small questionnaire that elicited symptoms, sex of sex partners, and number of recent sex partners. The paperwork packet accompanied the specimen to the health department where the registration and questionnaire were entered by staff. In GRB-ED1 and GRB-ED2, health care providers who collected the culture specimen recorded key variables on labels that were placed directly on the InTray, including medical record number, name, age, date of birth, sex, gender, sex of sex partner, date of specimen collection, and anatomic source. To minimize missing data, the Greensboro hospital information technology (IT) departments also extracted data from the electronic medical record (EMR) for secure electronic data transmission to health department staff.

Analysis

We analyzed data from patients who had specimens collected for NG culture at 2 STI clinics and 4 EDs during the period 2018–2019. We compared patient demographics (race, ethnicity, and age), culture results, and antimicrobial susceptibility results using patient encounter data. Differences between those presenting to STI clinics and those presenting to EDs were highlighted. In addition, we synthesized programmatic data from the 2 jurisdictions to identify possible promising practices in the implementation and management of ED-based ARNG culture collection and surveillance based on the experiences of the authors. The CDC's institutional review board reviewed the SURRG protocol and determined the project to be a public health activity and not human subject research.

RESULTS

Epidemiologic Findings

During the period 2018–2019, specimens for culture were collected from 64 people in the 2 participating Indianapolis EDs and from 4702 people in the 2 Greensboro EDs. During this period, specimens were collected from 1785 STI clinic patients in Indianapolis and 13,587 STI clinic patients in Greensboro (Table 1). The Greensboro sites collected a large proportion of culture specimens from women (GRB-STI clinic, 61.7%; GRB-ED1, 89.5%; GRB-ED2, 91.6%). The Indianapolis STI clinic and IND-ED1 predominately collected culture specimens from men, but 11 of 18 (61%) patients from whom culture specimens were collected by IND-ED2 were women. Ages were also relatively similar across all 6 sites, with a median range by site of 23 to 27. Patients identifying as non-Hispanic Black were the most represented group overall (73.6%) and at each site (44.4%–82.6%). The populations seen at the Indianapolis STI clinic and EDs were similar, although it may be hard to compare with such a small sample size. A slightly higher proportion of patients included from GRB-ED1 and GRB-ED2 were White (17.0% and 20.1%, respectively) than from the Greensboro STI clinic (10.9%). The median number of recent sex partners within the last 60 days ranged by health care setting from 1.0 to 2.5 but varied greatly among individuals (range, 0–100).

Isolate Recovery and AST

In aggregate, GRB-ED1 and GRB-ED2 isolated NG from a total of 283 culture specimens, 27.2% of total cultures in Greensboro (n = 1040). IND-ED1 isolated NG from 13 of 47 specimens, 1.0% of total cultures in Indianapolis (n = 1278). There was no isolation from the 18 specimens collected by IND-ED2. Similar demographics in patients with isolated cultures, primarily Black men, were seen at both Indianapolis's ED and STI clinic. In Greensboro, a higher proportion of isolated cultures came from women visiting GRB-ED1 and GRB-ED2 (52.2% and 74.0%, respectively) compared with the STI clinic (18.2%) (Table 2). Although women were most of the screened patients at the Greensboro EDs (Table 1), the proportion of isolated genital samples from men and women was much closer, although cervical/vaginal isolates were still the most common (Table 2).

Urethral swabs had the highest positivity within the STI clinics (IND, 81.2%; GRB, 19.0%) and EDs (IND-ED1, 36.1%; GRB-ED1, 28.5%; and GRB-ED2, 17.0%) (Figs. S1 and S2, respectively, http://links.lww.com/OLQ/A741). Vaginal swab positivity varied greatly between the Greensboro STI clinic and the EDs (13.5%, 3.5%, and 4.3%, respectively). No rectal or pharyngeal swabs from IND-ED1 or IND-ED2 demonstrated growth; Greensboro EDs isolated NG from a single rectal and a single pharyngeal swab (GRB-ED1 and GRB-ED2, respectively).

One isolate (collected from the Indianapolis STI clinic) demonstrated reduced ceftriaxone and cefixime susceptibility via local Etest. Both programs found isolates with azithromycin-RS (IND, n = 86; GRB, n = 33), primarily at the STI clinic. All 13 isolates from the Indianapolis ED were azithromycin susceptible. Among isolates collected by the Greensboro program that demonstrated azithromycin-RS, 24.2% (8 of 33) were from specimens

collected by GRB-ED1. Six of these 8 (75%) were from male urethral specimens, 2 were from endocervical specimens from women, and all were from Black, non-Hispanic patients. The other 25 Greensboro isolates with azithromycin-RS were from specimens collected in the STI clinic. Most of these were from pharyngeal and rectal specimens (18 of 25 [72%]).

Implementation Lessons Learned

In selecting a champion, IND-ED1 chose an onsite physician who provided insight into the interests of other physicians and partnered with charge nurses, who would coordinate specimen collection and complete the required enrollment paperwork and laboratory orders. IND-ED2 identified a public health program manager to function as the champion within their facility, the only nonclinical champion chosen. SURRG specimen collection was incorporated into an HIV screening program run by nonclinical staff. As part of this program, when patients presented with symptoms consistent with gonorrhea, culture specimens were collected by clinical staff, and public health personnel completed required paperwork and specimen handling. Neither champion in the Indianapolis EDs was funded directly, so participation was voluntary and in addition to their other responsibilities.

Greensboro recruited an ED physician to serve as the site champion supporting both Greensboro EDs. This provider was embedded in the main ED (GRB-ED1) serving as the Community ED Education Director, a collaborative role working indirectly with the other in-jurisdiction ED (GRB-ED2). This champion strengthened the collaboration between nursing leadership, clinicians, and key health department personnel (including SURRG program staff) to promote culture collection. This champion was the lead contact for nursing supervisors and ED directors at all Greensboro ED sites and coordinated STI education with providers, specimen collection training with nursing staff, and monthly data reports with the hospital IT department. In addition, this champion was partially funded to coordinate within and between the EDs and allot specific time to maintain relevant project information, including instructional sheets, protocols, training videos, and GC resources for providers on a central Web-based ED educational hub for all Greensboro ED providers participating in SURRG.

Both health departments created training materials for nurses, other ED staff, and patients to further encourage specimen collection. Materials included simple diagrams for patients about how to self-collect swabs and educational talking points for staff about ARNG. Health department staff provided in-service presentations of findings, ARNG trends, specimen collection criteria and processes, and CDC treatment recommendations to providers during ED staff meetings. The Indianapolis health department completed trainings and shadowing semiannually. The Greensboro health department supplemented annual in-service trainings with quick access instructions for specimen collection in pelvic examination carts in the ED in addition to posting protocols and simple specimen collection instructional videos on the central Web-based ED educational hub for ED provider ease of access.

The time required for culture specimen collection and handling was a large concern raised by staff. Overall inexperience with culture plating and use of culture specimen collection kits was a large hurdle for staff in the EDs for several reasons, including timing and workflow changes. The time required to streak and label the agar plates, seal the transport

media, and store it in the proper incubators was burdensome. An unanticipated barrier to successful implementation of culture specimen collection in the Indianapolis EDs was strong pushback by health care providers on the use of urethral swabs for specimen collection from men. There were concerns for the comfort of the patients with clinician-collected urethral swabs. Providers were concerned that patient discomfort may adversely impact the patients' willingness to return for future care. Collection of discharge from the outside of the penis for culture was proposed for symptomatic patients as a compromise, although never locally validated.

Demographic and risk factor data collected from patients presenting to EDs were relatively limited compared with the data collected from patients in STI clinics. The Indianapolis' packet of paperwork was cumbersome for staff to complete. The paper-work was initially designed for patients to complete themselves, with limited clinical staff documentation (i.e., anatomic site sampled and treatment administered), but ED staff found they needed to guide patients through the packet or complete the paperwork themselves, increasing the time spent in each instance. The Greensboro ED partnership with the IT department of each hospital provided electronic means to better facilitate the process of ordering laboratories and creating data reports for postvisit extraction. Both Greensboro EDs used the same EMR platform, creating some uniformity, although data quality and missing or incomplete data remained a problem.

DISCUSSION

Indianapolis, IN, and Greensboro, NC, introduced expanded NG culture collection into EDs to increase the capacity for local jurisdictions to detect emerging resistance. Although EDs often provide health care to younger, more non-White patients who may be at risk for STI acquisition,[5] they present several difficulties in implementing feasible STI screening programs.[13] Because of the ongoing threat of ARNG, there is a need to expand local capacity for culture and AST and to develop rapid response plans should an outbreak occur. Emergency departments by design deliver time-sensitive services and are well positioned to respond to ARNG outbreaks, if properly supported. Through careful review of surveillance data, both programs were able to identify areas of high gonorrhea morbidity and onboard ED partners to participate in SURRG. The 2 programs recruited EDs to not only expand the reach of ARNG detection but address several questions: (1) is there a difference in the population sampled in the ED setting versus an STI clinic, (2) are AST patterns different within an ED versus an STI clinic, and (3) what can we learn about NG culture collection in an ED setting?

When comparing populations seen between the STI clinics and EDs, populations were relatively similar. Non-Hispanic Black patients were the greatest proportion of samples collected at both STI clinics and all EDs; this mirrored local morbidity data. In general, Indianapolis saw similar men and women between sites, although numbers are low. Greensboro screened more women at all 3 locations, with the EDs providing an even higher proportion of female patients. However, isolation of NG was the most successful from male urethral samples (Figs. S1 and S2, http://links.lww.com/OLQ/A741). The low positivity of culture specimens from vaginal/endocervical and extragenital sites may limit the feasibility

for culture-based ARNG surveillance; use of molecular assays for resistance determinations, once reliable and commercially available, may be a more robust approach.

Both the Greensboro STI clinic and ED1 detected azithromycin-RS in mostly non-Hispanic Black men. GRB-ED1 identified 8 (24.2%) of the azithromycin-RS isolates detected locally, potentially highlighting the value of ARNG surveillance within an ED. Because of the small number of samples collected in Indianapolis, it is difficult to extrapolate any conclusions. There were no azithromycin-RS isolated detected at Indianapolis EDs, although the demographics of the ED patients were similar to the local STI clinic, which detected 86 isolates with azithromycin-RS, so it is possible with more time and more samples that RS may have been detected.

In establishing expanded NG culturing in EDs, strong leadership via an in-house champion, streamlined specimen collection protocols, use of EMRs to aid data collection, and accessible training materials that individuals can review on-demand were all promising practices. Barriers included (1) implementing specimen collection practices that staff found unfamiliar and uncomfortable and (2) the time commitment necessary to complete the culture collection and processing. Table 3 further details common strategies the programs implemented, barriers encountered, and promising practices for the future.

Strong leadership from within the facility was critical to Greensboro successfully completing sustained and consistent culture specimen collection. Indianapolis was unable to gain the traction needed on this project. Champions within a facility can more quickly address questions and concerns and are familiar with the changing priorities an ED may encounter, such as increased ED traffic due to seasonal viral infections, and the high-stress, high-volume environments of an ED. Champions face multiple challenges and need to balance multiple responsibilities. Financial incentives, even if modest, may allow champions to dedicate specific time to programs such as SURRG. Greensboro took such an approach, and this likely contributed to the greater number of specimens collected in Greensboro EDs compared with the Indianapolis EDs.

In addressing specimen collection frustrations, Indianapolis implemented specimen collection with BBL charcoal-suspension swabs requiring ED staff to simply collect the specimen and place the swab into the collection kit. Streaking of the agar plates was moved to laboratory staff, reducing the specimen handling burden on clinical staff. Feedback from the ED staff about the change was very positive, and in the months following, slightly increased specimen collection. Laboratory staff were comfortable streaking the plates and embraced the process for quality control. Future efforts to implement culture collection in ED settings may benefit from preliminary discussions on provider comfort with the collection techniques or validation of less-invasive specimen collection, such as culture isolation from urine.

Although implementation of SURRG data collection into the local EMR aided in eliminating some clinician-collected data, more work and planning is needed for increased completeness of data. The EMR shared by the Greensboro EDs did not have dedicated fields for SURRG data extraction; thus, variables that were inconsistently documented in

the EMR were missing in the data extraction. Treatment data were particularly cumbersome to review and extract because of the many potential locations in the EMR and how it may be charted. Future efforts to collect data in EDs as part of ARNG surveillance will likely require sustained and creative solutions to overcome barriers.

The success in using EDs as a source of NG culture specimen collection has yet to be fully realized. Emergency departments are complicated environments with many competing priorities, and introducing new public health projects requires flexibility and likely requires on-site champions to be successful. As stated before, both sites identified key characteristics of a champion for this project as someone working directly or indirectly in the organization with an enthusiastic interest in ARNG and personable traits to motivate others to participate. Greensboro saw success in the use of a single champion for ED sites with monetary resources to ensure dedicated time for participation was allotted. Indianapolis encountered many logistic hurdles that prevented operating at full capacity, despite high levels of reported gonorrhea in the ED environment.

As gonococcal resistance emerges, establishing local capacity to culture and conduct AST, including in settings other than traditional STI clinics, can bolster preparedness and capacity to respond to ARNG outbreaks.[14] As more individuals continue to use non-STI clinic settings as a source of STI care, a local program that can successfully incorporate these facilities into local ARNG response capacity will be better prepared in the event of an ARNG outbreak.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE 1.

Characteristics of Patients Attending STI Clinics and EDs From Whom *N. gonorrhoeae* Cultures Were Collected, Strengthening US Response to Resistant Gonorrhea (SURRG), Indianapolis, IN, and Greensboro, NC (2018–2019)

	Indianapolis, IN Sites Participating in SURRG, n (%) Unless Specified			Greensboro, NC, Sites Participating in SURRG, n (%) Unless Specified		
Characteristics	**IND STI Clinic (n = 1792)**	**IND-ED1 (n = 47)**	**IND-ED2 (n = 19)**	**GRB-STI Clinic (n = 13,585)**	**GRB-ED1 (n = 3354)**	**GRB-ED2 (n = 1350)**
Reported gender						
Male	1451 (80.9)	38 (80.9)	7 (36.8)	5188 (38.2)	350 (10.4)	114 (8.4)
Female	340 (19.0)	9 (19.1)	12 (63.2)	8376 (61.7)	3001 (89.5)	1236 (91.6)
Transgender [*]	1 (0.1)	0	0	18 (0.1)	2 (0.1)	0
Refused/Unk	0	0	0	2 (0.01)	0	0
Pregnant	6	0	0	157	0	0
Age, median (IQR), y	27 (23–34)	23 (19–27)	25.5 (20–32)	26 (22–32)	26 (21–34)	27 (22–34)
Race/Ethnicity						
Black, non-Hispanic	1172 (65.4)	39 (83.0)	9 (47.3)	10292 (75.7)	2366 (70.5)	956 (70.8)
White, non-Hispanic	440 (24.5)	8 (17.0)	5 (26.3)	1475 (10.9)	569 (17.0)	271 (20.1)
Hispanic	125 (7.0)	0	1 (5.3)	1346 (9.9)	237 (7.1)	60 (4.4)
Other/Unk	55 (3.1)	0	4 (21.1)	472 (3.5)	182 (5.4)	63 (4.7)
No. partners [†], median (range)	1.0 (0–100)	1.0 (0–6)	2.5 (2–5)	1.0 (0–40)	1.0 (0–2)	‡
Anatomic site	n = 2699	n = 47	n = 20	n = 16,887	n = 3544	n = 1377
Urethra	1192 (44.2)	36 (74.5)	6 (30.0)	2486 (14.7)	348 (9.8)	106 (7.7)
Cervix/vagina	304 (11.3)	10 (21.3)	12 (60)	342 (2.0)	3182 (89.8)	1265 (91.9)
Throat	878 (32.5)	0	1 (5.0)	12,431 (73.6)	8 (0.2)	5 (0.4)
Rectum	325 (12.0)	1 (2.1)	1 (5.0)	1628 (9.6)	6 (0.2)	1 (0.1)

[*] Transgender patients reporting at IND-STI: 1 MTF; GRB-STI: 14 MTF and 4 FTM; GRB-ED1: 1 MTF and 1 FTM.

[†] Recent sex partners within ≤60 days from specimen collection.

[‡] Data were not collected.

ED indicates emergency department; FTM, female-to-male; GRB, Greensboro; IND, Indiana; IQR, interquartile range; MSM, men who have sex with men; MSMW, men who have sex with men and women; MSW, men who have sex with women; MTF, male-to-female; STI, sexually transmitted infection; Unk, unknown.

TABLE 2.

Characteristics of Patients Attending STI Clinics and EDs From Whom *N. gonorrhoeae* Was Isolated by Culture, Strengthening US Response to Resistant Gonorrhea (SURRG), Indianapolis, IN, and Greensboro, NC (2018–2019)

	Indianapolis, IN Sites Participating in SURRG*, n (%) Unless Specified		Greensboro, NC, Sites Participating in SURRG, n (%) Unless Specified		
Characteristics	**IND-STI Clinic (n = 1180)**	**IND-ED1 (n = 13)**	**GRB-STI Clinic (n = 699)**	**GRB-ED1 (n = 206)**	**GRB-ED2 (n = 73)**
Reported gender					
Male	1070 (90.7)	13 (100)	570 (81.7)	100 (47.9)	19 (26.0)
Female	109 (9.2)	0	127 (18.2)	109 (52.2)	54 (74.0)
Transgender (MTF)	1 (0.1)	0	1 (0.1)	0	0
Refused/unknown	0	0	0	0	0
Race/ethnicity					
Black, non-Hispanic	820 (69.5)	10 (76.9)	522 (87.6)	176 (85.9)	65 (86.7)
White, non-Hispanic	256 (21.7)	3 (23.1)	49 (8.2)	19 (9.2)	9 (12.0)
Hispanic	68 (5.8)	0	18 (3.0)	6 (2.9)	1 (1.3)
Other	36 (3.0)	0	7 (1.2)	4 (2.0)	0
Age, median (IQR), y	28 (23–35)	24 (18.5–28.5)	25 (22–31)	24 (20–30)	26 (22–31)
Anatomic site	n = 1265	n = 13	n = 757	n = 210	n = 73
Urethra	968 (76.5)	13 (100)	473 (62.5)	99 (47.1)	18 (24.7)
Cervix/vagina	90 (7.1)	0	46 (6.1)	110 (52.4)	54 (74.0)
Throat	101 (8.0)	0	185 (24.4)	0	1 (1.3)
Rectum	106 (8.4)	0	53 (7.0)	1 (0.5)	0

*No data are presented for IND-ED2 because no cultures were isolated.

ED indicates emergency department; GRB, Greensboro; IND, Indiana; IQR, interquartile range; MSM, men who have sex with men; MSMW, men who have sex with men and women; MSW, men who have sex with women; MTF, male-to-female; STI, sexually transmitted infection.

TABLE 3.

Site Experiences in Antimicrobial Resistant GC Surveillance in EDs

Strategies Used	Barriers to Overcome	Successes
- Used local surveillance data to identify EDs in high-morbidity areas	- Reliant on surveillance systems that allow for detailed and accurate reporting	- Sites with high GC reporting and representative local morbidity were used for SURRG
- Recruited and partnered with on-site “champions” to serve as the point of contact for the health department and oversee operations within the ED	- Sustaining staff investment in a process involving high time commitment - Heavily reliant on the Champion to motivate staff and provide updates to the health department	- Provide minimal financial assistance directly to Champions via SURRG funding to promote continuous and invested participation - Allot dedicated time for Champions to develop materials and resources
- Used physical paperwork and EMR extraction to obtain patient data including risks	- Physical paperwork burden at time of specimen collection may stall the clinicians’ progress and workflow - Incomplete or inconsistent data capture through EMR	- Use abbreviated data collection tools placed directly on specimens to decreased paperwork - Cooperate with IT staff to design specific reports for postvisit data extraction
- Generalized specimen collection criteria to cast a wide net and simplify the screening process, and ensure all possible isolates were collected	- Overscreening can occur - Low positivity with extragenital and endocervical/vaginal samples - Urethral samples were a concern of ED staff due to lack of familiarity and patient comfort - The unpredictable nature of the ED environment made collecting during high-traffic times (i.e., seasonal flu) an extra stressor on staff	- Improved understanding of community GC burden and trends in antimicrobial resistance may limit the screening criteria - Implementing specimen collection processes that staff are already familiar with may decrease general hesitancy
- Designed in-person trainings, simple diagram tools, and procedures that were tailored to the ED staff workflow and preferences - Shadowed staff to anticipate future problems and areas of concern	- Visibility of instructional material was limited at both sites (i.e., pelvic carts and pelvic rooms and storage closets)	- Designed Web content for SURRG sites available in a shared environment for other EDs in the area - Materials developed have potential to benefit other sites outside of the ED setting that may increase future screening and surveillance

ED indicates emergency department; EMR, electronic medical record; GC, gonorrhea; IT, information technology.