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Management of Pelvic Inflammatory Disease in Selected US Sexually Transmitted Disease Clinics: Sexually Transmitted Disease Surveillance Network, January 2010–December 2011

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Abstract

Background: Pelvic inflammatory disease (PID) remains an important source of preventable reproductive morbidity, but no recent studies have singularly focused on US sexually transmitted disease (STD) clinics in relationship to established guidelines for diagnosis and treatment.

Methods: Of the 83,076 female patients seen in 14 STD clinics participating in the STD Surveillance Network, 1080 (1.3%) were diagnosed as having PID from 2010 to 2011. A random sample of 219 (20%) women were selected, and medical records were reviewed for clinical history, examination findings, treatment, and diagnostic testing. Our primary outcomes were to evaluate how well PID diagnosis and treatment practices in STD clinic settings follow the Centers for Disease Control and Prevention (CDC) treatment guidelines and to describe age group–specific rates of laboratory-confirmed *Chlamydia trachomatis* (*CT*) and *Neisseria gonorrhoeae* (*GC*) in patients clinically diagnosed as having PID in the last 12 months, inclusive of the PID visit.

Results: Among the 219 women, 70.3% of the cases met the CDC treatment case definition for PID, 90.4% had testing for *CT* and *GC* on the PID visit, and 68.0% were treated with a CDC-recommended outpatient regimen. In the last 12 months, 95.4% were tested for *CT* or *GC*, and

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positivity for either organism was 43.9% in women aged 25 years or younger with PID, compared with 19.4% of women older than 25 years with PID.

Conclusions: Compliance with CDC guidelines was documented for many of the women with PID, though not all. Our findings underscore the need for continued efforts to optimize quality of care and adherence to current guidance for PID management given the anticipated expertise of providers in these settings.

Pelvic inflammatory disease (PID) is a clinical disorder that results from an ascending infection from the cervix or vagina into the endometrium, fallopian tubes, and/or contiguous structures. Pelvic inflammatory disease remains a significant cause of morbidity among women and can result in adverse reproductive complications including infertility, ectopic pregnancy, and chronic pelvic pain.[1,2] Although PID is considered a polymicrobial infection,[3] the sexually transmitted pathogens *Neisseria gonorrhoeae* (*GC*) and *Chlamydia trachomatis* (*CT*) have frequently been identified as causal infections in PID. Risk factors for PID development are closely associated with those of sexually transmitted infection (STI) acquisition and transmission, with the highest PID and STI prevalence found in women aged 25 years or younger.[4–6]

The Centers for Disease Control and Prevention (CDC) recommends empiric treatment of PID in sexually active young women and other women at risk for STIs if they present with symptoms of pelvic or lower abdominal pain, and no cause for the illness other than PID can be identified and if one of the following minimum diagnostic criteria are present on physical examination: uterine tenderness, adnexal tenderness, or cervical motion tenderness.[7] The minimum diagnostic criteria were devised to have high sensitivity to detect as many cases of clinical disease as possible, thus potentially avoiding the long-term reproductive sequelae and economic costs associated with delayed diagnosis and lack of treatment. A nucleic acid amplification test for *GC* and *CT* is also recommended; although laboratory confirmation is not necessary to justify initiation of therapy for PID. Because PID may have other etiologies, broad-spectrum regimens that provide extended coverage of other likely pathogens are recommended.[3,8–11] Previous studies have examined the clinical management of PID and have found that PID diagnostic practices vary significantly from published recommendations.[12–19] However, little is known about how women with PID are diagnosed and treated in US sexually transmitted disease (STD) clinics, or how closely management guidelines are followed in this setting. Categorical STD clinics in the US typically serve clients at high risk for STIs. Our primary goals for this analysis were to (1) examine how closely PID diagnosis and treatment practices in STD clinic settings follow CDC-recommended guidelines and (2) describe age group–specific rates of laboratory-confirmed *CT* and *GC* in patients clinically diagnosed as having PID. Our secondary goal was to examine differences in *CT* and *GC* positivity in the sample of women with PID compared with a sample of women without a PID diagnosis.

METHODS

Study Design and Population

This is a retrospective cohort analysis conducted with data collected from January 1, 2010, through December 31, 2011, from the STD Surveillance Network (SSuN), a sentinel surveillance project that conducts facility-based surveillance in publicly funded, urban STD clinics run by state and local health departments. Five SSuN jurisdictions collected data on reported symptoms and physical examination findings related to PID and hence contributed data to this analysis: Birmingham (1 clinic), Baltimore (2 clinics), New York City (9 clinics), San Francisco (1 clinic), and Seattle (1 clinic). The STD Surveillance Network obtains demographic, clinical, and laboratory data from the medical records of all clients at participating clinics, including diagnoses of PID.

Of the 83,076 unique female patients evaluated by a clinician, 1080 (1.3%) were diagnosed as having PID in the 5 participating SSuN jurisdictions from 2010 to 2011. Because of a varying number of women diagnosed as having PID by jurisdiction, we sampled 50 records per SSuN jurisdiction for chart review using a random number generating function in SAS. One jurisdiction had a total of 24 patients identified as having a PID diagnosis; therefore, all women with a PID diagnosis from that jurisdiction were reviewed. Three patients received a diagnosis of PID on multiple visits during the time frame; however, this analysis was confined to the first episode of PID during the study period.

Data Collection

As part of the SSuN project, sites regularly electronically transmit a collaboratively identified set of data elements on all patient visits that are a part of the network. We examined the following data from these transmissions: age, race, HIV status and testing, and chlamydia and gonorrhea test results at the visit at which PID was diagnosed and during the 12 months prior. A structured abstraction tool was developed to collect additional data from the medical record not provided through electronic transmission, including reason for visit, symptoms, physical examination findings, antibiotic and duration of treatment, and history of PID. Reviewers, either an epidemiologist or clinical provider at each of the SSuN sites, completed the medical record abstract for each of the women in the random sample. Data on pregnancy testing were not available for this analysis.

Analysis

Demographic and clinical characteristics for the sample of PID cases were assessed, and the proportion of women who met the CDC's PID treatment case definition was determined. Data were reviewed for laboratory-confirmed *GC* or *CT* and were compared in younger (≤25 years of age) and older patients (>25 years of age). Treatment regimens were examined, and assessment of adequacy of therapy was based on a recommended outpatient regimen according to the 2010 CDC STD treatment guidelines.[7] Outpatient treatment of PID is described in the treatment guidelines as either (A) ceftriaxone 250 mg intramuscularly plus doxycycline 100 mg orally twice daily for 14 days or (B) cefoxitin 2 g intramuscularly and Probenecid, 1 g orally administered concurrently in a single-dose plus doxycycline 100 mg orally twice daily for 14 days, or (C) other parenteral third-generation cephalosporin (e.g.,

ceftizoxime or cefotaxime) plus doxycycline 100 mg orally twice a day for 14 days.[7] Any of the combinations above can be given with or without metronidazole. Appropriate follow-up, partner notification, and counseling for future PID prevention are integral components in the management of PID; however, this analysis was not designed to evaluate follow-up.

In addition, this analysis was not designed to compare women with a diagnosis of PID to women without a diagnosis of PID by all clinical and demographic characteristics. However, we did examine differences in *CT* and *GC* positivity by PID diagnosis. Control subjects, a sample of women who were not diagnosed as having PID, were randomly chosen from the same cohort (female patients attending SSuN STD clinics in the 5 jurisdictions during the 2-year time frame) and were matched by SSuN site, race/ethnicity, and age group. The ratio of women without PID compared with women with PID was 1:1. Using electronically transmitted SSuN data, laboratory records were reviewed to calculate *CT* and *GC* positivity in the 12 months before the last clinic visit, inclusive of that visit. Direct comparisons of chlamydia and gonorrhea laboratory information between women with PID and women without PID were made, and differences were assessed using chi square analyses. All statistical analyses were performed using SAS version 9.3 (SAS Institute Inc, Cary, NC).

RESULTS

In 2010 to 2011, 1080 women were diagnosed as having PID in the 14 participating SSuN STD clinics and 219 cases (20%) were randomly selected and reviewed. Four women had multiple cases of PID during that time frame; only their first visit of PID was reviewed. Table 1 summarizes the demographic and clinical characteristics of the sample by SSuN site. The age of women diagnosed as having PID ranged from 15 to 57 years, with a median age of 28 years. Overall, 198 (90.4%) of the 219 women diagnosed as having PID were tested for *CT* and *GC* at the visit where PID was diagnosed. Nucleic acid amplification tests accounted for 80.8% of the *CT* and *GC* tests performed, and the remaining test types were either unknown (9.1%) or culture (10.1%). One of the women in our sample was known to be HIV positive. Of those women not known to be HIV positive, 56% were tested for HIV during the PID visit, and none tested positive. Nearly one quarter had a history of PID and a third of the women were diagnosed as having bacterial vaginosis on the PID visit (data not shown).

Overall, 96.3% (211/219) women reported 1 or more symptoms. Among our sample, lower abdominal or pelvic pain was the most frequently reported symptom (73.1% [160/219]), followed by abnormal vaginal discharge (131 [(59.8%]) and symptoms of itching/odor (85 [38.8%]). Urinary symptoms and menstrual irregularity were less likely to be reported (41 [18.7%] and 18 [8.2%], respectively). On physical examination, 56.2% (123/219) of the women had cervical motion tenderness, 59.8% (131/219) had adnexal tenderness, and 53.4% (117/219) had uterine tenderness. All 3 criteria were documented in 14.6% (32/219) of the women; however, 95.4% (209/219) women had documentation of at least 1 sign of pelvic tenderness (either cervical motion, uterine, or adnexal) on physical examination. Of the 10 women without documented pelvic tenderness, 4 were examined in an outside health care setting, 4 had documented signs of lower genital inflammation only, and 2 had no documented signs consistent with PID. In our sample of 219 women with a clinical

diagnosis of PID, 70.3% (154/219) met the CDC treatment case definition for PID (lower abdominal or pelvic pain symptoms plus one of the minimum criteria noted on physical examination). Among the 160 women who reported lower abdominal/pelvic pain, 96.3% (154/160) met the CDC treatment case definition.

Of the women tested for *CT* or *GC* on the PID visit (n = 198), 13.2% were *CT* positive and 8.6% tested positive for *GC*. Infection with either organism was documented in 20.2% of women, and coinfection with both organisms was documented among a few women (1.1%). Looking at the 12-month period before and including the PID diagnosed visit, a total of 210 (95.9%) had been tested at least once for *CT* and/or *GC*. Of those, 21.1% had a positive *CT* test result, 11.0% had a positive *GC* test result, and 29.1% tested positive for either *CT* or *GC*. When the analysis was stratified by age group, *CT* and/or *GC* positivity for younger women (≤25 years of age) was higher than those in the older age group (>25 years of age; Fig. 1). Within the previous 12 months, almost half of the younger women with PID (43.9%) tested positive for *CT* and/or *GC*, compared with 19.5% of older women ($P < 0.05$).

A total of 219 women without a history of PID were randomly selected across the SSuN sites. The number of STD clinic visits was not statistically different between women with and without PID; however, a greater proportion of women from the PID group were tested for either *CT* or *GC* compared with women without PID (95.4 vs. 83.6%, $P < 0.05$). When compared with the random sample of women with a PID diagnosis during the same analytic time frame, *CT* or *GC* positivity was lower among women without PID. Among younger women (<25 years) without a diagnosis of PID, positivity in the last 12 months for either organism was 19.2%, compared with 43.9% positivity among the young women with a diagnosis of PID ($P < 0.05$). Similar differences were noted among older (>25 years) women (19.5% among older women with PID vs. 3.3% positivity among older women without a PID diagnosis ($P < 0.05$; Fig. 1).

The antibiotic regimens used were compared with CDC-recommended outpatient therapy. Among those who met the CDC treatment case definition (n = 154), 69.5% were treated with a recommended regimen of ceftriaxone 250 mg and doxycycline 100 mg twice daily for 14 days with or without metronidazole 500 mg twice daily for 7 to 14 days. Of the total sample of 219 women, a similar proportion of 68.0% received a recommended regimen, although this varied markedly by site. Three of the 5 jurisdictions obtained an 80% or greater compliance, and in the fourth site, 70% received a recommended regimen. In comparison, the compliance rate in the fifth site was quite a bit lower at 28.6%, and more than half of the remaining women received a fluoroquinolone-based regimen. Incidentally, 16 (7.3%) of the 219 women received a different ceftriaxone-based regimen. Of the women diagnosed as having PID and bacterial vaginosis (n = 74), all but 3 were treated with a regimen that included metronidazole.

A regimen containing azithromycin or fluoroquinolones, either as a single-agent or the primary agent in combination with other nonceftriaxone regimens, was prescribed for 11 (5.0%) and 32 (14.3%) of the women, respectively. However, including ceftriaxone regimens, 10% of the women received azithromycin. Three patients were either sent to the emergency department for additional evaluation or presented to the STD clinic for follow-up

from an emergency department visit, 6 were treated with other medications, and treatment information was not available for 2 of the patients.

DISCUSSION

In a sample of geographically diverse STD clinics participating in a sentinel surveillance system, we found that 70.3% of the female clinic patients given a diagnosis of PID had signs and symptoms consistent with the diagnostic criteria outlined in the CDC treatment guidelines, 90.4% were screened for both chlamydia and gonorrhea, and most (68.0%) but not all patients received a recommended treatment of PID. Although not meeting strict diagnostic criteria, 96.3% of the women had at least 1 physical examination finding of PID. In general, previous studies have documented poor provider adherence to recommended guidelines for the diagnosis and treatment of PID. For example, 2 studies found compliance with recommended diagnostic testing for *CT* and *GC* among women diagnosed as having PID to be between 54% and 77%.[15,16] Assessments similar to ours have been performed in sexual health clinics outside the United States and have also noted variation in adherence to national guidelines. A study of women diagnosed as having PID in the United Kingdom reported 44.5% adherence to recommended treatment.[18] Similarly, Kuchimanchi and McClean[19] in northern England reported that documentation of physical examination findings for diagnosis of PID was absent in 32.3% of records reviewed. Although it is encouraging that our findings demonstrate a greater adherence to CDC guidelines when compared with previous studies, ongoing efforts to minimize the overdiagnosis of PID and to reduce missed opportunities for STD/HIV testing and adherence to treatment guidelines are critical to effective disease intervention.

Pelvic inflammatory disease represents a spectrum of disease with a wide range of severity. However, the CDC guidelines are sufficiently broad to increase the sensitivity of the clinical examination, but at the expense of poor specificity. The challenge has always been to minimize sequelae of PID while not overdiagnosing and hence overtreating all women with genital tract symptoms with antimicrobials. Overdiagnosis is a possibility in our present study, but cervical motion tenderness or adnexal tenderness is not a subtle sign and 96% of the PID cases had at least 1 of the 3 physical examination findings and more than half of the PID cases had 2 of the 3 minimal criteria.

CT and/or *GC* have been shown to be causally associated with PID. However, recent studies suggest that the proportion of PID cases due to *CT* and/or *GC* is less than 50%.[9,20,21] Our analysis indicated an overall 29% positivity for either organism in the last 12 months. However, identifying the etiology is difficult given that several factors can impact the association of infection with PID. For example, *CT* and/or *GC* infection could have cleared the lower genital tract by the time testing took place, although *CT/GC* might have been the causative agent. Although the time from STI acquisition to PID development is unknown, we used a 12-month time frame to account for varying PID development time, consistent with previous modeling studies.[22,23] The association may also vary by age, as we found that younger women had a higher positivity rate for either organism in the past year compared with older women. Finally, our positivity rates likely underestimate the true proportion of

PID associated with *CT* or *GC*, as some women were not tested for *CT/GC* (had an undiagnosed infection) and some women were tested outside the STD clinic.

Overall, approximately two-thirds of the treatment regimens prescribed for the women with PID were given in accordance with recommended guidelines. However, the percent compliance with regimens varied considerably by individual SSuN jurisdictions, with one site in particular having a compliance rate of 28.6% and more than half of the remaining women receiving a fluoroquinolone-based regimen. Several factors may explain these findings including patient refusal, known allergies or other contraindications, or prescribing practices of a few providers. In addition, the 2010 CDC treatment guidelines were released in December 2010, during the middle of our study period. As has been previously reported, practice changes after guideline revisions are not always abrupt, even in some STD clinic settings.[24]

Approximately 5% of all of the cases received azithromycin as a single agent, and more was used in combination with other antimicrobials. Azithromycin is not listed in the recommended or alternative regimens for the treatment of PID, but several factors make this treatment option attractive, including its widespread use in treating chlamydia, once-a-day dosing schedule, and its tolerability, especially in adolescents.[25–27]

Although not a primary outcome, we did note a low acceptance rate of HIV testing among the women diagnosed as having PID. Although this varied across SSuN sites, this study did not collect data regarding factors that influenced their decision to participate in HIV screening. Possible reasons that may have contributed to this may be patient refusal, recent HIV testing, and/or locally defined clinic HIV testing policies.

This study was subject to several limitations. First, the results can be generalized only to women attending SSuN STD clinics and may not be representative of all women diagnosed as having PID in STD and non-STD clinic settings. In addition, given that some of the health department STD clinics are affiliated with academic centers, it is possible that the compliance we measured is higher than that which might be found in nonacademic STD clinics. Second, it is possible that cases of PID for this analysis were missed because there might have been women meeting the CDC treatment case definition, who were not given the diagnosis of PID.

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IMPLICATIONS

Sexually transmitted disease clinics may serve as the first point of entry into the health care system for women at high risk for STIs. Compared with previous research in other health care settings, we found that STD clinic practitioners demonstrate a higher adherence to national, generally accepted, clinical guidelines. However, given that a sizeable minority of women were not tested and treated according to evidence-based guidelines, our findings underscore the need for improved adherence to guidelines for the management of PID. Sexually transmitted disease clinics may be one of the only sites for care for many economically disadvantaged people, providing valuable safety net services. As such, strategies to optimize quality of care and adherence to current guidance for PID management are warranted given the anticipated expertise of providers in these settings. Continued efforts, including provider education, periodic chart audits to identify deficiencies in compliance, and/or other initiatives, can create a practice environment supportive of increased compliance.

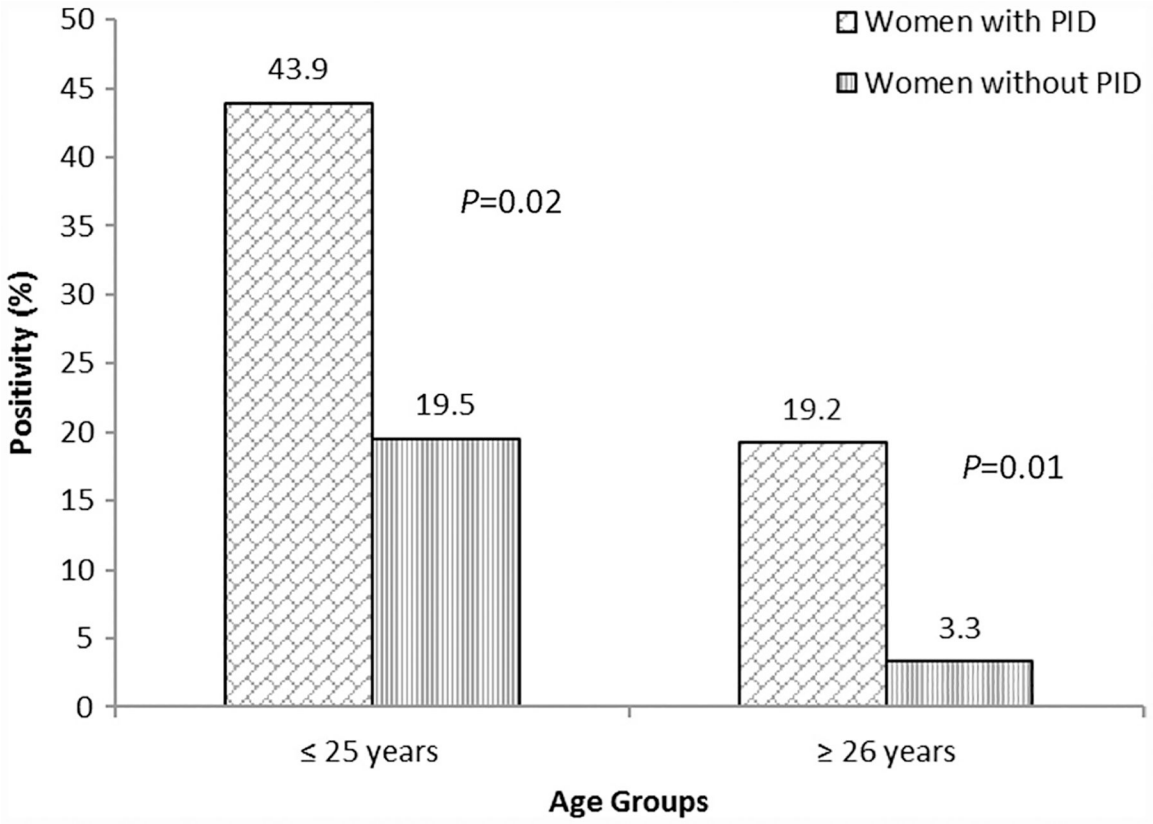

Figure 1.

Comparison of chlamydia and/or gonorrhea positivity over a 12-month period* among clinic patients diagnosed as having PID (n = 219) and clinic patients without a history PID (n = 219) by age group, 2010–2011.

TABLE 1.

Demographic and Clinical Characteristics Among 219 Randomly Selected PID Cases by SSuN Site, 2010–2011

	Birmingham (n = 24), n (%)	Baltimore (n = 49), n (%)	NYC (n = 47), n (%)	SF (n = 50), n (%)	Seattle (n = 49), n (%)	Total (n= 219), n (%)
Age, y						
≤25	9 (37.5)	13 (26.5)	21 (44.7)	17 (34.0)	27 (55.1)	87 (39.7)
>25	15 (62.5)	36 (73.5)	26 (55.3)	33 (66.0)	22 (44.9)	132 (60.3)
No. clinic visits						
1	4 (16.7)	13 (26.5)	14 (29.8)	18 (36.0)	17 (34.7)	66 (30.1)
2−4	8 (33.3)	27 (55.1)	18 (38.3)	19 (38.0)	22 (44.9)	94 (42.9)
≥5	12 (50.0)	9 (18.4)	15 (31.9)	13 (26.0)	10 (20.4)	59 (26.9)
Race						
Non-Hispanic white	3 (12.5)	5 (10.2)	8 (17.0)	9 (18.0)	15 (30.6)	40 (18.3)
Non-Hispanic black	18 (75.0)	39 (79.6)	24 (51.1)	17 (34.0)	21 (42.9)	119 (54.3)
Hispanic	3 (12.5)	3 (6.1)	11 (23.4)	17 (34.0)	4 (8.2)	38 (17.4)
Other	0	2 (4.1)	4 (8.5)	7 (14.0)	8 (16.3)	21 (9.6)
Missing	0	0	0	0	1 (2.0)	1 (0.4)
Tested for HIV on PID visit *						
No	7 (29.2)	18 (36.7)	15 (31.9)	33 (66.0)	23 (46.9)	96 (43.8)
Yes	17 (70.8)	31 (63.3)	32 (68.1)	17 (34.0)	26 (53.1)	123 (56.2)
History of PID						
No	21 (87.5)	35 (71.4)	39 (83.0)	39 (78.0)	37 (75.5)	171 (78.1)
Yes	3 (12.5)	14 (28.6)	8 (17.0)	11 (22.0)	12 (24.5)	48 (21.9)
Tested for *CT* on PID visit						
No	6 (25.0)	12 (24.5)	2 (4.3)	4 (8.0)	5 (10.2)	29 (13.2)
Yes	18 (75.0)	37 (75.5)	45 (95.7)	46 (92.0)	44 (89.8)	190 (86.8)
Tested for *GC* on PID visit						
No	6 (25.0)	6 (12.2)	1 (2.1)	4 (8.0)	4 (8.2)	21 (9.6)
Yes	18 (75.0)	43 (87.8)	46 (97.9)	46 (92.0)	45 (91.8)	198 (90.4)

NYC indicates New York City; SF, San Francisco.

* Of those not known to be HIV positive.