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Pediatric Emergency Provider Sexually Transmitted Infection Screening Practices in Adolescents with Oropharyngeal or Anorectal Chief Complaints

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Abstract

Objectives—Sexually transmitted infections (STIs) may present with oropharyngeal or anorectal symptoms. Little is known about the evaluation of adolescents with these complaints in the pediatric emergency department (PED). This study aimed to determine the frequency of and factors associated with STI consideration and testing in this population.

Methods—Retrospective chart review of patients aged 13 to 18 years who presented to an urban PED with oropharyngeal or anorectal chief complaints between June 2014 and May 2015. STI consideration was defined as: sexual history documentation, documentation of STI in differential diagnosis, and/or diagnostic testing. Multivariate logistic regression models were used to identify factors associated with consideration.

Results—Of 767 visits for oropharyngeal (89.4%), anorectal (10.4%), or both complaints, 153 (19.9%) had STI consideration. Of the 35 visits (4.6%) that included gonorrhea and/or chlamydia testing, 12 (34.3%) included testing at the anatomic site of complaint. Of those 12 tests, 50.0% were the incorrect test. Patients with older age (aOR 1.5, 95% CI 1.3–1.7), female sex (aOR 1.6, 95% CI 1.03–2.5) or anorectal complaints (aOR 2.4, 95% CI 1.3–4.3) were more likely to have STI consideration.

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Conclusions—In an urban PED, only 20% of visits for adolescents with oropharyngeal or anorectal symptoms included STI consideration. Testing was performed in only 5% of cases and often at an inappropriate anatomic site or with the incorrect test. Interventions to increase awareness of appropriate STI consideration and testing for individuals presenting with possible extragenital complaints may help reduce STIs among adolescents.

Keywords

adolescent; sexually transmitted diseases; HIV and STI testing; non-genital STIs; emergency medicine

Introduction

A disproportionate number of sexually transmitted infections (STIs) occur among adolescents and young adults in the United States, with 50% of new STIs and 26% of new human immunodeficiency virus (HIV) infections occurring in this age group annually [1, 2]. In 2015 alone, there were over 75,000 reported cases of *Neisseria gonorrhea* (GC) and over 400,000 reported cases of *Chlamydia trachomatis* (CT) in youth 19 and younger [3]. In addition, there were 1,723 new cases of HIV diagnosed among children aged 13 to 19 [4]. STIs often present with genitourinary symptoms; however, most, including HIV, GC and CT, can also present with oropharyngeal or anorectal manifestations [5]. Although the prevalence of oropharyngeal and anorectal STIs or STI manifestations among adolescents is unknown, two recent screening studies of adolescents and adults found an association between younger age and extragenital GC and/or CT in females [6, 7], which suggests that adolescents may be at heightened risk. Further, with urogenital screening only, which is the most common practice, there is evidence that a large number of STIs are missed and the CDC recommends testing with NAAT at the anatomic site where symptoms occur [5, 7].

Adolescents accessing the emergency department (ED) for care may do so in lieu of other healthcare settings, forgoing routine care, and may engage in higher risk behaviors [8, 9], indicating that this population may be at increased risk of contracting STIs. However, adolescents presenting to the pediatric ED (PED) with typical STI-related genitourinary symptoms do not always receive STI testing [10]. To our knowledge, no prior study has examined the frequency of pediatric emergency medicine (PEM) clinician consideration of STI in adolescents presenting with possible oropharyngeal or anorectal manifestations. The primary objective of this study was to estimate the frequency with which adolescents presenting to the PED with oropharyngeal and anorectal chief complaints that could represent symptoms of an STI were evaluated for these infections. Secondary objectives included identification of factors associated with consideration of STI and description of STI testing practices among those evaluated for STI.

Materials and Methods

Study Design and Population

This was a retrospective electronic health record (EHR) review of all visits for adolescents aged 13 to 18 that presented to a large, tertiary, urban, academic, freestanding PED (with

annual volume over 90,000 visits) between June 2014 and May 2015 with oropharyngeal or anorectal chief complaints that could be consistent with extragenital manifestations of an STI. This study was approved by the hospital's institutional review board and a waiver of informed consent was granted.

Visit Identification

All ED visits of adolescents aged 13 to 18 occurring during the study period of June 1, 2014 through May 31, 2015 that had at least one eligible standardized Reason for Visit (RFV) or International Classification of Disease (ICD)-9 code possibly pertaining to an oropharyngeal or anorectal chief complaint and that were triaged as anything other than the highest severity level (Emergency Severity Index (ESI) 1) were initially identified by the institution's Clinical Reporting Unit. RFV codes are institution-specific codes based on patient chief complaint assigned during triage while ICD-9 codes are standardized diagnosis codes assigned at discharge. The study team developed a purposely broad list of codes to query for all visits that may have been for oropharyngeal or anorectal chief complaints (See Appendix 1 for list of all eligible RFV and ICD-9 codes). Because visits were used as the unit of analysis, patients were eligible to be included more than once.

A list of medical record numbers, encounter dates, and anonymized clinician codes for each visit identified was shared with the study team. Anonymized clinician codes referring to the most senior clinician(s) who treated the patient at the visit were used during data analysis to adjust for potential individual provider thresholds for evaluating STIs when determining factors associated with STI consideration. The study team next reviewed each visit for eligibility using inclusion and exclusion criteria. Identified visits were first reviewed for appropriateness of ICD-9 and RFV codes and ESI as well as EHR completeness. Potentially eligible visits were then further assessed for eligibility based on the chief complaint as reported in clinician documentation, with any of the following chief complaints considered eligible: sore throat, throat pain, or other complaint related to throat irritation; pharyngitis or tonsillitis; diarrhea; tenesmus; and anal or rectal pain, itch, discharge, bleeding, abscess, or lesion. Eligible chief complaints were chosen to reflect the wide variety of oropharyngeal and anorectal symptoms possible with STIs, including but not limited to oropharyngeal and anorectal GC/CT infection as well as acute HIV infection and secondary infections in the setting of HIV.

Visits were excluded from analysis if patients were severely ill (ESI=1); if patients had coinciding genitourinary symptoms that made consideration of STI more likely (symptoms included dysuria in both sexes; genital or urethral pain, discharge, lesions, itching, or bleeding in both sexes; and pelvic pain in females); if patients already had a clear diagnosis that fully accounted for the chief complaint (i.e. hemorrhoid for a chief complaint of rectal bleeding; mononucleosis and strep throat diagnoses were purposely not excluded as it was thought these patients could have a coinciding STI); if patients had an injury that explained the chief complaint; or if patients had a pre-existing condition or diagnosis that either accounted for the chief complaint, caused the patient to be immunocompromised, limited the provider's ability to obtain a sexual history, or influenced providers to consider STI outside of chief complaint alone (diagnoses included: inflammatory bowel disease (for anorectal

chief complaints), cystic fibrosis, intellectual disability, cerebral palsy, any current oncologic diagnosis, pregnancy and HIV). Among visits for patients with diarrhea, those with coinciding constipation and/or vomiting as well as those with a final diagnosis of gastroenteritis were excluded.

Chart Abstraction

For eligible subjects, demographic and patient characteristic variables at the time of visit were manually abstracted from the EHR, including date of birth, sex, age, race, ethnicity, and insurance status. Race and ethnicity were self-reported and recorded in the EHR by administrative staff and were collapsed by the study team into “white” or “non-white” and “Hispanic” or “non-Hispanic”, respectively. Race and ethnicity were considered in this study due to prior literature suggesting differential rates of STI testing among persons of different races [11]. Visit characteristics were also manually abstracted, including date of encounter, acuity (measured through ESI), clinician-documented chief complaint free text, and chief complaint category (anorectal, oropharyngeal, or both). STI consideration characteristics were also abstracted, including whether there was a sexual history documented, whether STIs were documented in the differential diagnosis or medical decision making, and whether testing was performed. Visits with any form of sexual history documented were further classified based on the documented sexual activity status of the patient, with classifications including currently sexually active, not currently sexually active, or insufficient documentation to determine current sexual activity status. If testing was performed, the types of testing performed and the results of such testing were also abstracted. Study data were collected and managed using Research Electronic Data Capture (REDCap), a secure, web-based application designed to support data capture for research studies [12].

Outcome Measures

The primary outcome measure of this study was consideration of STI diagnosis which was defined as at least one of the following: documentation of sexual history, documentation of consideration of STI in the differential diagnosis or medical decision making, or STI testing. STI testing was defined as clinician ordered GC/CT, HIV, herpes simplex virus (HSV), syphilis, or trichomonas testing during the ED visit. Visits that included documentation of the adolescent health educator at the bedside or documentation of plan to test either at an outpatient visit or at the current ED visit in the absence of STI testing orders or results in the EHR were also given credit for having had STI consideration. The definition of STI consideration used in this study was purposely broad to allow for identification of all possible instances of STI consideration.

Secondary outcome measures in this study were frequency of STI testing and, when applicable, appropriateness of GC and CT testing. Appropriateness of testing was determined in regards to both anatomic site of testing and type of test performed (GC culture versus GC/CT nucleic acid amplification test (NAAT)). Testing site was considered appropriate if it occurred at the anatomic site of chief complaint given the known possibility of discordance between genitourinary, oropharyngeal and anorectal testing and CDC 2010 and 2015 recommendations to test at site of complaint [5, 13]. Testing type was considered appropriate if the GC/CT NAAT was used as this is the preferred test for GC/CT diagnosis

of the oropharynx and anorectum in our institution given that our hospital laboratory has met Clinical Laboratory Improvement Amendment (CLIA) regulatory requirements as discussed in the CDC 2010 and 2015 guidelines [5, 13].

Data Analysis

Demographic, visit, and STI consideration and testing variables were summarized using descriptive statistics, including means and standard deviations (SD) for continuous variables and frequencies and percentages for categorical variables. To determine differences between visits with STI consideration versus those without, the chi-squared test was used to compare categorical variables and the two sample t-test was used to compare continuous variables.

Simple and multivariable logistic regression models were used to identify factors associated with STI consideration and STI testing. In model building, patient visits rather than individual patients served as the unit of analysis. For patients with more than one eligible visit, visits were considered repeat visits if they occurred within two weeks and were for the same chief complaint; this visit characteristic was analyzed as a variable potentially associated with STI consideration. The final multivariable model included age, sex, white or non-white race, visit acuity and visit chief complaint type. Age, sex, and race were adjusted for a priori; variables significant in bivariable analyses were also included (visit acuity and chief complaint; see Results). Ethnicity was not used in a priori adjustments given overall low number of Hispanic patients in the study population (only 32 visits were for Hispanic patients). A mixed effects multivariable logistic regression was performed to adjust the final multivariable model for the impact of individual clinician thresholds for STI evaluation on associations identified. Visits with multiple senior clinicians were excluded from model building, as was one visit for both oropharyngeal and anorectal chief complaints. Data were analyzed using Stata 13.0 (Stata Corp, College Station, TX). Relationships were considered significant at $p < 0.05$ using two-sided hypothesis testing.

Results

Seven hundred sixty-seven visits for 715 unique patients seen by 79 unique clinicians met inclusion criteria (Figure 1). Forty-four subjects had two eligible visits while 4 subjects had three eligible visits. Subjects had a mean age of 15.4 ($SD \pm 1.6$) years old and the majority were female, of non-white race and non-Hispanic ethnicity, and publicly insured. Of the 767 visits, the majority were for oropharyngeal chief complaints (Table 1).

STI consideration

STI consideration occurred at 153 of 767 visits (19.9%) for 148 of 715 patients (20.7%) (Table 1). Three visits with STI consideration were at a repeat visit within two weeks of first presentation. A sexual history was documented at 138 visits (18.0%). Sixty-eight sexual histories included an endorsement of sexual activity (49.3%). STI consideration was documented in the differential diagnosis at 33 visits (4.3%). Some form of STI testing occurred at 37 visits (4.8%).

In unadjusted analyses, female sex, older age, lower ESI (higher acuity), and anorectal chief complaint were independently associated with increased likelihood of STI consideration. In

the mixed effects multivariable model adjusted for sex, age, race, acuity, chief complaint, and clinician, female sex (adjusted odds ratio (aOR) 1.6, 95% Confidence Interval (CI) 1.03–2.5); older age (aOR 1.5, 95% CI 1.3–1.7); and anorectal chief complaint (aOR 2.4, 95% CI 1.3–4.3) were associated with increased odds of STI consideration (Table 2).

STI testing practices

Thirty-seven visits included some form of STI testing (4.8%). In unadjusted analyses, older age (odds ratio (OR) 1.6, 95% CI 1.2–2.0) and STI consideration besides STI testing (OR 55.7, 95% CI 16.7–185.7) were associated with STI testing in the PED. STI testing was more likely when current sexual activity was documented or there was no indication of whether the patient was sexually active as compared to visits where it was documented that the patient was not sexually active (OR 29.7, 95% CI 3.8–229.6 and OR 27.0, 95% CI 2.4–302.2, respectively).

Of the 687 visits for oropharyngeal chief complaints, 31 included any form of STI testing (4.5%); nine included HIV testing, 29 included GC testing, 25 included CT testing, 4 included syphilis testing, 2 included trichomonas testing, and 2 included HSV testing. Two of the 25 tested for CT were positive; all other tests were negative.

Of the 81 visits for anorectal chief complaints, 6 included any form of STI testing (7.4%); one included HIV testing, 6 included GC and CT testing, 2 included syphilis testing, and 2 included trichomonas testing. One of the 6 tested for CT was positive; all other tests were negative.

STI testing appropriateness and GC/CT prevalence among those tested

Among those with oropharyngeal chief complaints, 11 of the 29 tested for GC (37.9%) and 6 of the 25 tested for CT (24.0%) were appropriately tested at the oropharynx. Of the 11 tested for GC and/or CT at the oropharynx, 6 received the appropriate GC/CT NAAT (54.5%) while 5 received the GC-only culture (45.5%). Two of the 25 visits with oropharyngeal complaints that were tested for CT had positive CT testing (8.0%); both of these patients received genitourinary only testing and were not tested for CT at the oropharynx. None of the GC tests were positive.

Among those with anorectal chief complaints, 1 of the 6 tested for GC (16.7%) and none of the 6 tested for CT were appropriately tested at the anorectum. The subject that received GC testing of the anorectum received a GC-only culture rather than the appropriate GC/CT NAAT. One of the 6 visits that were tested for CT had positive CT testing (16.7%); this patient received genitourinary only testing and was not tested for CT at the anorectum. None of the GC tests were positive.

Overall, 12 of 35 tested for GC (34.2%) and 6 of 31 tested for CT (19.4%) were tested at the appropriate anatomical site, with only 6 of the 12 tested for GC or GC/CT (50.0%) receiving the appropriate GC/CT NAAT test. Three of the 31 visits tested for CT (9.7%) had positive genitourinary CT testing but lacked CT testing at the anatomical site corresponding to the visit chief complaint.

Discussion

In this study, only 20% of visits for adolescents presenting to the PED with chief complaints related to possible oropharyngeal or anorectal manifestations of STIs had documented STI consideration, while less than 5% included STI testing. Among the small number tested for GC and/or GC/CT, nearly two-thirds did not receive testing at the anatomical site of their complaint, and among the one-third who did receive testing at the correct anatomical site, only half received the appropriate NAAT test.

Given that adolescents often seek care in the ED for STI-related complaints, adolescents using the ED may engage in higher risk sexual behaviors, and adolescents using the ED may be doing so in lieu of primary care [9, 14, 15], it is concerning that 80% of adolescents presenting with chief complaints that could be consistent with symptoms of an extragenital STI did not have any documented consideration of STI. This is especially true given two recent screening studies that reported higher rates of extragenital STIs among the youngest female cohorts in their studies (under 19 and under 26, respectively) [6, 7]. However, the low rates of STI consideration in this population are not surprising given previous literature demonstrating that even among female adolescents with typical genitourinary symptoms of STI presenting to a single PED, 20% did not have a sexual history documented [10].

An unanticipated finding of this study was that among the few patients tested for GC/CT, testing often was not performed at the anatomical site corresponding to the chief complaint and that, among patients tested at the correct anatomical site, the inappropriate GC-only culture was frequently used. In about two-thirds of patients tested for GC/CT, patients were only tested with the genitourinary GC/CT NAAT test. This is concerning given recommendations to test at the site of symptoms and evidence that a patient's test results can be discordant between different anatomical sites [5–8, 13, 16–20]. Patients in this study with negative genitourinary testing that were not tested at the anatomical site corresponding to their chief complaint may have had positive site-specific testing and therefore represent missed opportunities for STI diagnosis and treatment. In half of the visits in which patients were appropriately tested at the anatomical site corresponding to their chief complaint, patients received the GC-only culture testing, which does not assess for CT and is not the appropriate or most accurate testing modality available at our institution which, similar to most commercial laboratories, has a CLIA waiver allowing use of the optimal GC/CT NAAT at the oropharynx and anorectum in accordance with CDC guidelines [5, 13]. Therefore, those that received the GC-only culture test represent further possible missed opportunities for STI diagnosis and treatment.

In this study, older age, female sex, and anorectal chief complaint were associated with STI consideration in adjusted analyses. The relationship between age and clinician consideration is not surprising given higher rates of STIs among older adolescents [8], but may represent missed opportunities for screening and diagnosis among younger adolescents who may be less likely to seek or be offered STI testing by clinicians [10]. The lower rate of consideration among males is also concerning given the disproportionate burden of HIV infection among young men who have sex with men and its association with anorectal STIs [21, 22]. Further, this disparity by sex is inconsistent with data showing similar risk of

oropharyngeal infection among males and females presenting to EDs [19, 23]. The association of anorectal chief complaints with increased likelihood of consideration of STI suggests that physicians may be more aware of anorectal manifestations of STI; regardless, visits for both anorectal and oropharyngeal chief complaints had overall low rates of consideration (37% and 18%, respectively).

There were several limitations to this study. Since this study was conducted at a single, tertiary urban PED generalizability may be limited. A multi-institutional study could help establish whether the practices observed are occurring in multiple PEDs. Additionally, the retrospective chart review methodology used may have resulted in misclassification bias: clinicians may have taken a sexual history or considered and ruled out an STI without documenting it, leading to under-identification of consideration. Regardless, the low rates of testing and the association between other markers of STI consideration and testing suggests that in an overwhelming number of patients, clinicians likely did not consider STI. The lack of consideration of STI regardless of documentation is further supported by post hoc analyses in which visits for oropharyngeal chief complaints with known mononucleosis or strep throat infection were not any less likely to have STI consideration documented than those without a known current infection (OR 0.9, 95% CI 0.6–1.6). Another limitation exists in that only a small portion of subjects had anorectal symptoms (n=81) compared to oropharyngeal symptoms; however, in both groups STI consideration occurred at the minority of visits, suggesting that PEM clinicians need to increase STI consideration among adolescents presenting with both oropharyngeal and anorectal chief complaints. A larger study at multiple institutions or over a longer timeframe could identify more patients with anorectal chief complaints and allow for a larger sample.

In this study, we demonstrate that in a single academic urban PED, PEM clinicians are not commonly considering STI in adolescents who present with possible oropharyngeal and anorectal symptoms and that those performing testing in this population are not consistently testing in the appropriate manner. Future studies should attempt to understand why rates of STI consideration and testing are so low in adolescents presenting to the ED with possible oropharyngeal or anorectal symptoms of STIs. Additional research is also needed to understand the true prevalence of symptomatic oropharyngeal and anorectal STI manifestations, which can help increase awareness of symptomatic extragenital manifestations of STIs as well as inform guidelines as to how to approach adolescents with these complaints. Finally, future efforts should focus on educational interventions to improve rates of appropriate screening and testing for STIs among adolescents presenting with possible extragenital symptoms, such as EHR best practice alerts, which may help reduce the high burden of STIs among adolescents.

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Appendix 1

Eligible Reason for Visit (RFV) and International Classification of Disease Version 9 (ICD-9) Codes

Table 1

Emergency Department Reason For Visit Codes

Code	Label
5202	Abscess
35	Diarrhea (BLOOD IN STOOLS)
3029	GI Bleed
0	Other
284	Rash (RASH)
82	Sore Throat (PAIN)

Table 2

ICD-9 Codes

Code	Label
001.0–001.9	cholera
002.0–002.9	typhoid and paratyphoid fevers
003.0	salmonella gastroenteritis
003.20	localized salmonella infection, unspecified
003.29	other localized salmonella infections
003.8	other specified salmonella infections
003.9	salmonella infection, unspecified
004.0–004.9	shigellosis
005.0–005.9	other food poisoning (bacterial)
006.0	acute amebic dysentery without mention of abscess
006.1	chronic intestinal amebiasis without mention of abscess

Code	Label
006.2	amebic nondysenteric colitis
006.8	amebic infection of other sites
006.9	amebiasis, unspecified
007.0–007.9	other protozoal intestinal diseases
008.00–008.8	intestinal infections due to other organisms
009.0–009.3	ill-defined intestinal infections
034.0	streptococcal pharyngitis/tonsillitis
041.41–041.49	E. coli infection in conditions classified elsewhere and of unspecified site
041.82	bacteroides fragilis
041.83	other specified bacterial infections in conditions classified elsewhere and of unspecified site, Clostridium perfringens
042	HIV
054.10	genital herpes, unspecified (includes anal manifestations)
054.19	other genital herpes (includes anal manifestations)
054.2	herpetic gingivostomatitis
054.79	herpes simplex with other specified complications (includes acute herpes simplex pharyngitis)
054.8	herpes simplex with unspecified complication
054.9	herpes simplex without mention of complication
074.0	herpangina
078.5	cytomegaloviral disease
075	infectious mononucleosis
078.0	molluscum contagiosum
078.10–078.19	viral warts
078.88	other specified diseases due to chlamydiae
079.4	human papillomavirus in conditions classified elsewhere and of unspecified site
079.88	other specified chlamydial infection
079.98	unspecified chlamydial infection
091.1	primary anal syphilis
091.2	other primary syphilis (includes primary syphilis of tonsil and extragenital chancre)
091.3	secondary syphilis of skin or mucous membranes (includes secondary syphilis of anus, mouth, pharynx, tonsils)
091.7	other forms of secondary syphilis
095.8	other specified forms of late symptomatic syphilis: syphilitic gumma of palate/pharynx
097.0	late syphilis, unspecified
097.9	syphilis, unspecified
098.6	gonococcal infection of pharynx
098.7	gonococcal infection of anus and rectum
098.89	other gonococcal infection of other specified sites
099.50	other venereal diseases due to Chlamydia trachomatis, unspecified site
099.51	other venereal diseases due to Chlamydia trachomatis, pharynx

Code	Label
099.52	other venereal diseases due to Chlamydia trachomatis, anus and rectum
099.59	other venereal diseases due to Chlamydia trachomatis, other specified site
099.8	other specified venereal diseases
099.9	venereal disease, unspecified
112.0	candidiasis of mouth
112.84	candidal esophagitis
112.89	other candidiasis of other specified sites
112.9	candidiasis of unspecified site
122.3	echinococcus granulose infection, other
122.4	echinococcus granulosa infection, unspecified
122.6	echinococcus multilocularis infection, other
122.7	echinococcus multilocularis infection, unspecified
122.9	echinococcus, other and unspecified
123.0	taenia solium infection, intestinal form
124	trichinosis
126.0–126.9	ancylostomiasis and necatoriasis
127.0–127.9	other intestinal helminthiasis
128.0–128.9	other and unspecified helminthiasis
129	intestinal parasitism, unspecified
131.8	trichomonas specified site not otherwise classified (NEC)
131.9	trichomoniasis, unspecified
136.0–136.9	other and unspecified infectious and parasitic diseases
460	acute nasopharyngitis
462	acute pharyngitis
463	acute tonsillitis
464.00–464.51	acute laryngitis and tracheitis
465.0–465.9	acute upper respiratory infections of multiple or unspecified sites
472.1	chronic pharyngitis
472.2	chronic nasopharyngitis
474.00–474.02	Chronic tonsillitis and adenoiditis
474.8	other chronic disease of tonsils and adenoids
474.9	unspecified chronic disease of tonsils and adenoids
475	peritonsillar abscess
476.0–476.1	chronic laryngitis and laryngotracheitis
478.20–478.29	other diseases of pharynx not elsewhere classified
478.9	other and unspecified diseases of upper respiratory tract
487.1	influenza with other respiratory manifestations
487.8	influenza with other manifestations
488.01	influenza due to identified avian influenza virus with other respiratory manifestations

Code	Label
488.09	influenza due to identified avian influenza with other manifestations
488.12	influenza due to identified 2009 H1N1 influenza virus with other respiratory manifestations
488.19	influenza due to identified 2009 H1N1 influenza virus with other manifestations
488.82	influenza due to identified novel influenza A virus with other respiratory manifestations
488.89	influenza due to identified novel influenza A virus with other manifestations
555.0–555.9	regional enteritis
556.0–556.9	ulcerative enterocolitis
558.1–558.9	other and unspecified noninfectious gastroenteritis and colitis
564.1	irritable bowel syndrome
564.5	functional diarrhea
564.6	anal spasm
564.81–564.89	other specified functional disorders of intestine
564.9	unspecified functional disorder of intestine
565.0–565.1	anal fissure and fistula
566	abscess of anal and rectal regions
569.0–569.9	other disorders of intestine
578.1	blood in stool
578.9	hemorrhage of gastrointestinal tract, unspecified
579.0–579.9	intestinal malabsorption
680.5	carbuncle and furuncle of buttock
682.6	cellulitis and abscess of buttock
685.0–685.1	pilonidal cyst
686.8	other specified local infections of skin and subcutaneous tissue
686.9	unspecified local infection of skin and subcutaneous tissue
698.0	pruritis ani
698.2	prurigo
698.8	other specified pruritic conditions
698.9	unspecified pruritic disorder
784.1	throat pain
784.99	other symptoms involving head and neck
787.60–787.63	incontinence of feces
787.7	abnormal feces
787.91	diarrhea NOS
787.99	other symptoms involving digestive system
789.9	other symptoms involving abdomen and pelvis
792.1	nonspecific abnormal findings in stool contents
796.70–796.79	abnormal cytologic smear or anus and anal HPV

Figure 1. Visit Selection Flow Diagram

^aICD-9/RFV, International Classification of Disease-9/Reason for Visit; ^bESI, emergency severity index; ^cEHR, electronic health record; ^dcc, chief complaint; ^eIBD, inflammatory bowel disease; ^fHIV, human immunodeficiency virus; ^gCP, cerebral palsy; ^hCF, cystic fibrosis

Patient and Visit Characteristics of Encounters According to whether Clinician Considered STI^a**Table 1**

Variable	Overall Visits ^b (n=767)	STI Consideration ^b (n=153)	No STI Consideration ^b (n=614)	p-value
Age (mean, standard deviation)	15.5 (1.5)	16.2 (1.5)	15.3 (1.5)	<.001
Sex				
Female	495 (64.5%)	112 (73.2%)	383 (62.4%)	.01
Race ^c				
non-white	609 (79.5%)	111 (72.6%)	498 (81.2%)	.01
non-Hispanic	735 (96.0%)	149 (97.4%)	586 (95.6%)	.32
Insurance				
No Insurance	69 (9.0%)	13 (8.5%)	56 (9.1%)	.65
Public Insurance	461 (60.1%)	88 (57.5%)	373 (60.8%)	
Private Insurance	237 (30.9%)	52 (34.0%)	185 (30.1%)	
Emergency Severity Index				
2	53 (6.9%)	14 (9.2%)	39 (6.4%)	.002
3	221 (28.8%)	61 (39.9%)	160 (26.1%)	
4	464 (60.5%)	74 (48.4%)	390 (63.5%)	
5	29 (3.8%)	4 (2.6%)	25 (4.1%)	
Chief Complaint Type				
Oropharyngeal	686 (89.4%)	123 (80.4%)	563 (91.7%)	<.001
Anorectal	80 (10.4%)	30 (19.6%)	50 (8.1%)	
Both	1 (0.1%)	0	1 (<0.1%)	
Repeat Visit				
Yes	18 (2.4%)	3 (2.0%)	15 (2.4%)	.72

^a STI: Sexually transmitted infection^b Each data point is written as total number (column percentage) unless otherwise noted.^c Race and ethnicity categories include one patient each who refused categorization.

Table 2Patient and Visit Characteristics that Predicted Clinician Consideration of STI^a in Logistic Regression Models^b

Variable	Independent bivariate models (OR, 95% CI)	Multivariable model (aOR, 95% CI)	Mixed effects multivariable model (aOR, 95% CI) ^c
Female Sex	1.5 (1.01–2.3) *	1.5 (1.01–2.4) *	1.6 (1.03–2.5) *
Age	1.5 (1.3–1.7) *	1.4 (1.3–1.7) *	1.5 (1.3–1.7) *
Anorectal Chief Complaint	3.1 (1.9–5.2) *	2.3 (1.3–4.1) *	2.4 (1.3–4.3) *
Emergency Severity Index	0.6 (0.5–0.8) *	0.7 (0.5–1.004)	0.7 (0.5–1.02)
Non-white Race ^d	0.6 (0.4–1.001)	0.9 (0.6–1.5)	1.0 (0.6–1.6)
Non-Hispanic Ethnicity ^d	1.4 (0.5–4.2)		
Insurance (reference = no insurance)	Public	0.9 (0.5–1.8)	
	Private	1.0 (0.5–2.1)	
Repeat Visit	0.6 (0.1–2.7)		

^aSTI: Sexually transmitted infection^b37 visits with multiple clinicians and 1 with both oropharyngeal and anorectal chief complaints were excluded; 139 of the remaining 729 visits had STI consideration (19.0%).^cp=0.16 for the mixed effects model adjusting for clinician.^dRace and ethnicity categories include one patient each who refused categorization.

* Statistically significant at p<0.05.