



Original article

National Trends in Pelvic Inflammatory Disease Among Adolescents in the Emergency Department

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 A B S T R A C T

Purpose: In 2002, the Centers for Disease Control and Prevention (CDC) broadened the pelvic inflammatory disease (PID) diagnostic criteria to increase detection and prevent serious sequelae of untreated PID. The impact of this change on PID detection is unknown. Our objectives were to estimate trends in PID diagnosis among adolescent emergency department (ED) patients before and after the revised CDC definition and to identify factors associated with PID diagnoses.

Methods: We performed a retrospective repeated cross-sectional study using the National Hospital Ambulatory Medical Care Survey from 2000 to 2009 of ED visits by 14- to 21-year-old females. We calculated national estimates of PID rates and performed multivariable logistic regression analyses and tests of trends.

Results: During 2000–2009, of the 77 million female adolescent ED visits, there were an estimated 704,882 (95% confidence interval [CI], 571,807–837,957) cases of PID. After the revised criteria, PID diagnosis declined from 5.4 cases per 1,000 United States adolescent females to 3.9 cases per 1,000 ($p = .03$). In a multivariable model, age ≥ 17 years (odds ratio, 2.14; 95% CI, 1.25–3.64) and black race (odds ratio, 2.04; 95% CI, 1.36–3.07) were associated with PID diagnosis.

Conclusions: Despite broadened CDC diagnostic criteria, PID diagnoses did not increase over time. This raises concern about awareness and incorporation of the new guidelines into clinical practice.

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 IMPLICATIONS AND
 CONTRIBUTION

This is the first study to evaluate the impact of the broadened CDC PID diagnostic criteria on adolescent PID diagnosis rates. Rather than finding an increase, we found a decrease in PID diagnoses. This raises concern about awareness and incorporation of the new guidelines into clinical practice.

Of the almost 1 million cases of pelvic inflammatory disease (PID) diagnosed annually, 20% are estimated to occur in adolescents [1–3]. Although PID is highly preventable with timely diagnosis and treatment of sexually transmitted infections (STIs), it is associated with significant morbidity, including infertility, ectopic pregnancy, tubo-ovarian abscess, pelvic adhesion, dyspareunia, and chronic pelvic pain [2,4,5].

Adolescents with PID are more likely to present to emergency departments (EDs) rather than primary care or obstetrics and gynecology clinics [6]. Because abdominal and genitourinary problems are the most common reasons for ED visits among adolescent females [7], it is critical that ED providers consider PID as a potential diagnosis when evaluating these patients. However, the diagnosis of PID can be difficult because the clinical presentation of PID may mimic other pelvic and abdominal processes, including but not limited to appendicitis, ovarian torsion, urinary tract infection, and constipation. Given the difficulty of diagnosis and the morbidity associated with disease,

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the Centers for Disease Control and Prevention (CDC) recommends that health care providers maintain a low threshold for the diagnosis of PID. In fact, in 2002 the CDC broadened PID diagnostic criteria in an effort to increase diagnostic sensitivity after data suggested that the 1998 CDC criteria would miss more than 15% of true cases of upper genital infection [8]. With this change, the CDC began to recommend the empiric treatment for PID in sexually active women if they experienced lower abdominal pain and had cervical motion tenderness or uterine/adnexal tenderness, as opposed to having *both* present on examination per the prior recommendations [9].

To our knowledge, there have been no studies that have specifically investigated the impact of the CDC diagnostic change in the ED diagnosis of PID. Therefore, we sought to estimate trends in PID diagnosis among adolescent ED patients before and after the 2002 revised CDC diagnostic guidelines. Our secondary objective was to determine factors associated with PID diagnosis.

Methods

Study design

We conducted a retrospective, repeated, cross-sectional analysis of the National Hospital Ambulatory Medical Care Survey (NHAMCS) from 2000 to 2009. This study was considered exempt from formal review by our institutional review board.

Data source and study population

The NHAMCS is an annual, national probability sample survey of hospital EDs conducted by the National Center for Health Statistics branch of the CDC. The survey is conducted during a randomly assigned 4-week data period using a stratified and clustered design for selection of geographic primary sampling units, hospitals within primary sampling units, EDs within hospitals, and patient visits within EDs. Each visit represents a larger number of patients in the population. The National Center for Health Statistics provides probability weights that are equal to the inverse probability of any visit being sampled, and allow for the generation of nationally representative estimates using data collected in the NHAMCS.

The eligible study population included all sampled ED visits by females between 14 and 21 years of age during 2000–2009.

Outcome measures

Our outcome variable was diagnosis of PID. We captured PID cases by International Classification of Diseases–Ninth Revision codes 098.10, 098.16, 098.17, 098.19, 098.86, 099.56, 614.0, 614.2, 614.3, 614.5, 614.8, 614.9, 615.0, and 615.9 (Appendix). Covariates of interest included year of ED visit, patient age, race and ethnicity, insurance status, disposition, and ED geographic location based on prior literature, as well as authors' hypotheses that these covariates may be related to PID diagnosis. Patient race and ethnicity were categorized as: white (non-Hispanic), black or African American (non-Hispanic), Hispanic, or Other. Insurance status was categorized as private, public, or no insurance.

Data analysis

We used descriptive statistics with survey weighting to perform all analyses. Annual census data was used as the

denominator for all rate calculations. We employed nonparametric trend analysis to evaluate trends in PID diagnosis by year, and also to compare trends in diagnosis before and after the CDC PID diagnostic criteria change. Finally, we performed logistic regression modeling to identify factors associated with PID diagnosis. For our multivariable model, we included all variables with $p < .1$ on bivariate analysis.

Results

During 2000–2009, there were 22,866 sampled patient visits, representing 77.3 million female adolescent ED visits. Of these, there were an estimated 704,882 (95% confidence interval [CI], 571,807–837,957) diagnosed cases of PID. Pelvic inflammatory disease comprised 1.0% of all female adolescent ED diagnoses and 3.3% of diagnoses among those presenting with lower abdominal pain or genitourinary problems.

Figure 1 illustrates the incidence of ED diagnosed cases of PID per 1,000 persons per year over a United States population of adolescent females, based on yearly census data. We found no change in PID diagnosis rates over time (p for trend = .67). However, when we compared PID visit rates before and after introduction of the 2002 CDC diagnostic guideline change, we found a modest decline, from 5.4 (95% CI, 2.7–8.1) per 1,000 persons in 2000–2002 to 3.9 (95% CI, 1.5–6.3) per 1,000 persons in 2003–2009 ($p = .03$).

Table 1 compares demographics of the total population with the population diagnosed with PID. Table 2 displays the unadjusted and adjusted models for factors associated with PID diagnosis. On bivariate analysis, geographic region had no statistically significant association with PID diagnosis ($p = .6$); therefore, it was not included in our final multivariable model. In a fully adjusted model, age 17–21 years (odds ratio, 2.14; 95% CI, 1.25–3.64) and black race (OR, 2.04; 95% CI, 1.36–3.07) remained significantly associated with PID diagnosis.

Discussion

This analysis represents the first population-based assessment of trends in ED-based PID diagnosis before and after the CDC diagnostic criteria were broadened in 2002. Despite the broadening of the CDC diagnostic criteria, we did not find an increase in PID diagnosis rates in adolescent ED patients.

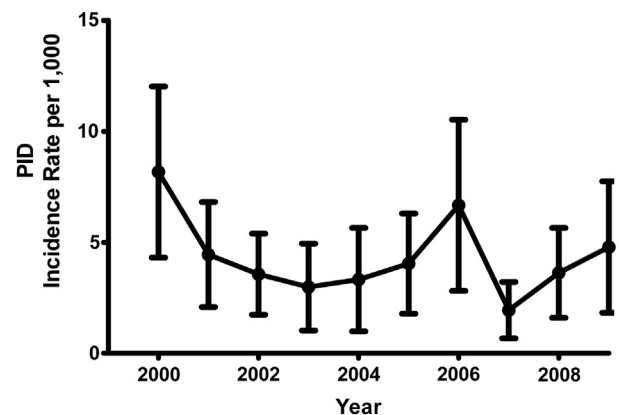


Figure 1. Incidence of ED diagnosed PID cases per 1,000 United States adolescent females (ages 14–21) per year. *Bars along each data point reflect 95% CIs.

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