Neisseria gonorrhea and *Chlamydia trachomatis* Screening at Intrauterine Device Insertion and Pelvic Inflammatory Disease

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OBJECTIVE: To evaluate the relationship between *Neisseria gonorrhea* and *Chlamydia trachomatis* screening strategies and risk of pelvic inflammatory disease (PID) after intrauterine device (IUD) insertion.

METHODS: We conducted a retrospective cohort study of all IUD insertions at Kaiser Permanente Northern California from January 2005 to August 2009. The PID incidence within 90 days after insertion was compared among women who were and were not screened for *N gonorrhea* and *C trachomatis*. The study was powered for equivalence with a PID risk difference of −0.006 to 0.006 between two groups considered to be clinically insignificant. Risk difference was calculated by subtracting the proportion of females with PID in one screening group from the proportion of females with PID in the comparison screening group.

RESULTS: Of 57,728 IUD insertions, 47% were unscreened within 1 year of insertion; of screened women, 19% were screened on the same day. The overall risk of PID was 0.54% (95% confidence interval [CI] 0.48–0.60%). Nonscreening had an equivalent risk of PID as any screening (risk difference −0.0034, 95% CI −0.0045 to −0.0022), and same-day screening was equivalent to prescreening (risk difference −0.0031, 95% CI −0.0049 to −0.0008). The equivalence persisted when adjusted for age and race and when stratified by age younger than 26 years and older than 26 years.

CONCLUSION: The risk of PID in women receiving IUDs was low. These results support IUD insertion protocols in which clinicians test women for *N gonorrhea* and *C trachomatis* based on risk factors and perform the test on the day of insertion. These findings have potential to reduce barriers to IUD use for women seeking highly effective, long-term, reversible contraception.

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Intrauterine devices (IUDs) are among the most effective, well-tolerated methods of contraception. However, their use in the United States remains limited,[1] largely as a result of misperceptions that IUDs cause pelvic inflammatory disease (PID).[2–6] This fear of PID leads many health care providers to require a recent negative *Neisseria gonorrhea* and *Chlamydia trachomatis* test before insertion,[7] creating the need for multiple visits. Studies in regions with low[8–11] and high[12–15] prevalence of *N gonorrhea* and *C trachomatis* have demonstrated that women with unknown, asymptomatic infection on the day of IUD insertion who were treated within 2–3 weeks had a low risk of PID (0–5%). The American College of Obstetricians and Gynecologists states that routine *N gonorrhea* and *C trachomatis* screening is unnecessary, and, when

indicated, it is "reasonable" to screen on the insertion day.[16] Nonetheless, minimal evidence exists for optimal timing or necessity of testing asymptomatic women.

The Centers for Disease Control and Prevention recommends annual screening for sexually active women younger than 26 years and for all women with risk factors[17] but provides no specific guidelines for IUD insertions. Kaiser Permanente Northern California, a large, integrated health care delivery system, has actively promoted Centers for Disease Control and Prevention evidenced-based *N gonorrhea* and *C trachomatis* screening recommendations for all women, including those receiving IUDs.[18]

We conducted a retrospective cohort study of *N gonorrhea* and *C trachomatis* screening strategy and PID among women who had IUD insertions. We hypothesized that, at Kaiser Permanente Northern California where Centers for Disease Control and Prevention guidelines and prompt treatment for infections are common, women not screened before IUD insertion would not have a clinically significant difference in PID diagnosis within 90 days compared with women who were screened.

MATERIALS AND METHODS

Females between the ages of 14 and 49 years who had either type of IUD (levonorgestrel intrauterine system or copper-T) inserted for contraceptive or noncontraceptive use at Kaiser Permanente Northern California between January 1, 2005, and August 31, 2009, were considered for inclusion. Participants were excluded if they did not have continuous Kaiser Permanente Northern California membership for 12 months before and 90 days after IUD insertion. This criterion was chosen so that we would have complete information on the predictor and outcome variables for all participants; because Kaiser Permanente Northern California is a closed system, it is unlikely that participants would have received *N gonorrhea* and *C trachomatis* testing or been diagnosed with PID elsewhere, minimizing the risk of losses to follow-up. Kaiser Permanente Northern California's integrated pharmacy, laboratory, and medical visit databases and electronic medical records system were accessed for all study data. This study was approved by the Committee on Human Research at the University of California, San Francisco and with a waiver of consent by the Kaiser Foundation Research Institute's institutional review board.

The predictor was timing of *N gonorrhea* and *C trachomatis* testing in relation to IUD insertion. The date of the IUD insertion visit was compared with the most recent *N gonorrhea* and *C trachomatis* screening date to categorize participants into four screening groups: 1. screening on the same day as insertion; 2. screening 1 day up to 8 weeks before insertion; 3. screening 8 weeks up to 1 year before insertion; and 4. no screening within 1 year before insertion.

For the analysis, participants with *N gonorrhea* and *C trachomatis* screening within the previous year (groups 1, 2, and 3) were categorized as "any screen," and participants with screening before the insertion date (groups 2 and 3) were categorized as "any prescreen." Comparisons were made between: no screening and any screening; same-day and any prescreen; same-day and 1 day to 8 weeks before insertion; and same-day and no screening.

The outcome was the diagnosis of PID within 90 days of IUD insertion (Fig. 1 for outcome ascertainment steps). Because PID is a clinical diagnosis, the outcome was based on the health care provider's clinical assessment of PID and whether it led to a clinically meaningful consequence such as an antibiotic prescription; we did not apply a set of clinical criteria for identifying PID cases because our study was not designed to evaluate clinicians' accuracy of diagnosis, but rather whether the clinician made the decision to diagnose PID. Pelvic inflammatory disease was defined as an *International Classification of Diseases, 9th Revision (ICD-9)* code for PID or other upper genital tract infections ("primary" ICD-9 code in Fig. 1) plus a pharmacy record for a dispensed antibiotic typically used to treat PID[17] ascertained from visit and pharmacy databases (Step 1, Fig. 1). Because pelvic pain is the major diagnostic criterion for PID,[17] ICD-9 codes for pelvic pain were also included in our search strategy for PID diagnoses. Because pelvic pain is common after IUD insertion, medical records were reviewed to assess whether these postinsertion pelvic pain visits were deemed to be the result of infection. Although the risk of PID in IUD users is highest in the first 20 days after insertion,[19] 90 days after insertion was chosen to be conservative in estimating the risk of PID. Of note, it is not standard practice at Kaiser Permanente Northern California to administer prophylactic antibiotics at IUD insertion.[20]

We anticipated that the initial criteria requiring both an ICD-9 code for PID and antibiotics would miss some cases. This strategy of the initial step of outcome ascertainment yielded four groups with discrepancies between the ICD-9 code and antibiotic, which were reviewed for possible additional cases of PID (Step 2, Fig. 1). These groups include: group A–PID or upper genital tract infection code but no antibiotics; group B–pelvic pain code plus antibiotics; group C–antibiotics but no PID or upper genital tract infection code; and group D–pelvic pain code only.

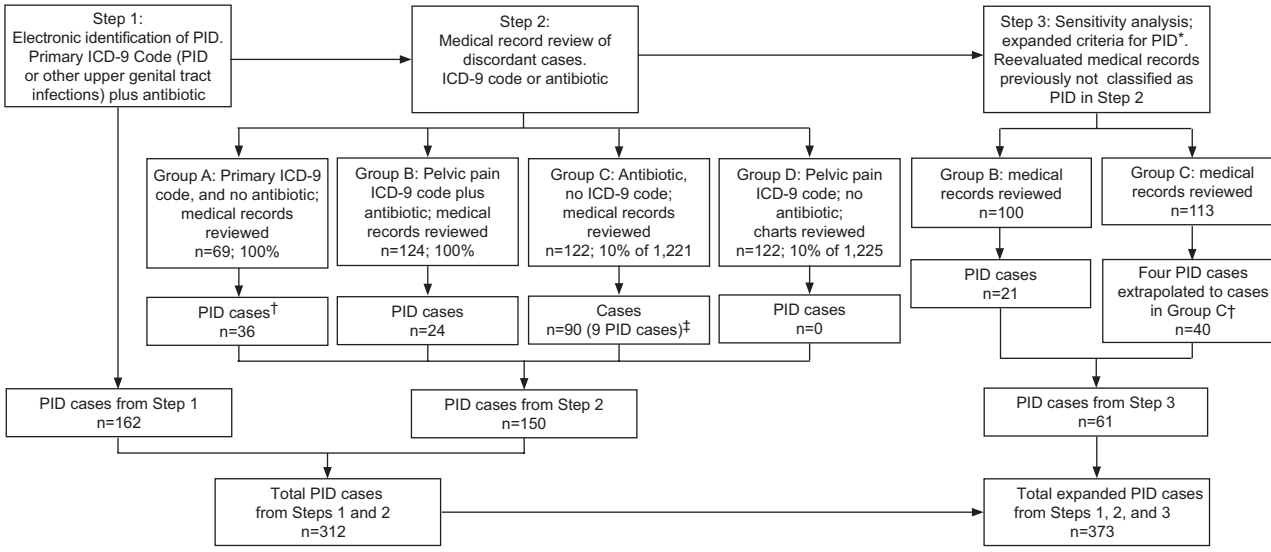

Fig. 1. Pelvic inflammatory disease (PID) outcome ascertainment. *For the sensitivity analysis, charts from antibiotic groups B and C, which had not been classified as PID in Step 2, were re-reviewed. Expanded criteria reclassified women as having PID if women received an antibiotic and chart notes indicated cervicitis or possible upper genital tract infection. †Chart notes for 36 participants all indicated the diagnosis "PID" in the assessment, and 30 of them also explicitly stated an antibiotic that the clinician planned to prescribe. ‡Total number of additional cases in group C was calculated by multiplying PID cases identified in the 10% subset by 10.

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Although females in these groups did not have both an ICD-9 code and antibiotic, some of these could represent cases of PID; medical record review was therefore planned as part of the outcome ascertainment strategy. We searched for antibiotics administered only within 90 days after IUD insertion and not before or on the day of.

Medical records of all females in groups A and B were reviewed. Groups C and D were too large for complete review; thus, a 10% random sample of each group was reviewed (Fig. 1); we chose a 10% random sample because it was a feasible number to review with adequate precision, and we felt it to be representative of the large groups. Based on findings of the medical record review, the outcome was classified as PID according to a predetermined algorithm, described subsequently. The proportion of PID cases confirmed in the 10% samples of groups C and D was then extrapolated to estimate the risk of PID in the entirety of these groups distributed proportionally by screening strategy. An obstetrician–gynecologist reviewed the medical records of participants in these four groups, and her findings were confirmed by two additional obstetrician–gynecologists. First, the reviewer looked to see whether progress notes from follow-up visits within 90 days contained specific wording for PID. When PID was not specifically stated in the charted note, the algorithm included the following to assess whether the clinician intended to diagnose PID: 1. indication in the chart note of prescribing an antibiotic commonly used for PID, even without Kaiser Permanente Northern California pharmacy record of the antibiotic being filled; 2. fever, cervical motion tenderness, mucopurulent discharge, or leukocytosis; 3. the clinical department where the patient was evaluated; and 4. diagnosis of an infection outside of the pelvis, such as in the upper respiratory tract, for which an antibiotic was prescribed. Sensitivity analysis was performed (Step 3) for participants who were given antibiotics but did not meet criteria for PID in the initial medical record review algorithm of Step 2. These participants were reevaluated using expanded criteria, which reclassified females as having PID if charted notes contained language indicating cervicitis or a possible upper genital infection.

A two-sided equivalence test using the confidence interval approach was used to determine equivalence of PID rates among screening group comparisons. The measure of association used was risk difference, which calculates the absolute difference in the proportion with an outcome between the exposed and unexposed group. In this case, the risk difference was obtained by subtracting the proportion of females with PID in one screening group from the proportion with PID in the comparison screening group. The "margin of equivalence" was prechosen as a risk difference range from

−0.006 to 0.006 (ie, equivalence was declared if the 95% confidence interval [CI] on the difference between two PID proportions fell between −0.006 and 0.006.). A PID risk of 6 per 1,000 was chosen based on prior studies, which report PID in IUD users to be 1 per 1,000 to 10 per 1,000[9,13]; moreover, a risk difference falling in this range was felt to be clinically and epidemiologically insignificant. Using the estimated number of females in the cohort and a two-sided α of 0.05, we had 99% power to detect equivalence in the primary comparison of no screening to any screening as well as 99% power in all other three comparisons of screening groups.

Descriptive analysis included frequencies and means of demographic characteristics (age, race) as well as PID rate; these characteristics were compared across screening groups using χ^2 tests for categorical variables and *t* tests for continuous variables. Adjusted risk differences were calculated using an average marginal prediction model from the logistic regression, which yielded adjusted risks and then CIs around the risk differences.[21] PID risks for the *N gonorrhea* and *C trachomatis* screening groups were compared by calculating both unadjusted and adjusted risk differences and odds ratios with 95% CIs. Logistic regressions were adjusted for age and race, factors known to be associated with PID. These variables were not known for the 1,221 women in group C for whom PID status was extrapolated from the 10% of medical records that were reviewed; thus, these females could not be included in the logistic regression. Analyses stratified by age (younger than or 26 years or older) were conducted to reflect Centers for Disease Control and Prevention *N gonorrhea* and *C trachomatis* screening guidelines. A pilot chart review conducted in preparation to conduct this study revealed that other covariates known to be associated with PID such as number of sexual partners, condom use, history of sexually transmitted infections, marital status, and parity[8] were not consistently available in patient records. To adjust for nonrandomized screening groups, a propensity score analysis was used to control for age and race and ethnicity that exhibited significant differences among study groups.[22,23] A logistic regression was used to produce the predicted probability (propensity score). This propensity score was then included as a covariate to adjust the estimated differences among study groups for the effect of age and race and ethnicity reflected in the score.

RESULTS

Of the 71,743 IUD insertions at Kaiser Permanente Northern California during the study period, 14,015 participants did not have continuous Kaiser Permanente Northern California membership during the study period and were therefore excluded, resulting in a final cohort of 57,728. The excluded women were demographically similar to those included in the final cohort.

No *N gonorrhea* and *C trachomatis* screening within 1 year of IUD insertion (47%) was the most common strategy and this proportion increased over time (Fig. 2; Table 1). Of females with any *N gonorrhea* and *C trachomatis* screening, 19% were screened on the same day as IUD insertion. The mean age of females in the cohort was 32 years; females in the nonscreened group were, on average, 7 years older than those in other groups (Table 1). Among the 15,274 females younger than 26 years, screening between 8 weeks and 1 year of insertion was most common. In contrast, no screening within 1 year was the most frequent strategy among females aged 26 years and older. The cohort was racially and ethnically diverse (37.5% white, 8.1% black, 12.8% Asian, 29.6% Hispanic, and 11.9% other), and screening strategies were differentially applied according to age and race (Table 1).

The risk of PID diagnosis within 90 days of IUD insertion in the entire cohort was 0.0054 (95% CI 0.0048–0.0060) and was highest in the group screened 1 day to 8 weeks before insertion (0.0099, 95% CI 0.0082–0.0120) (Table 1). The risk of PID diagnosis

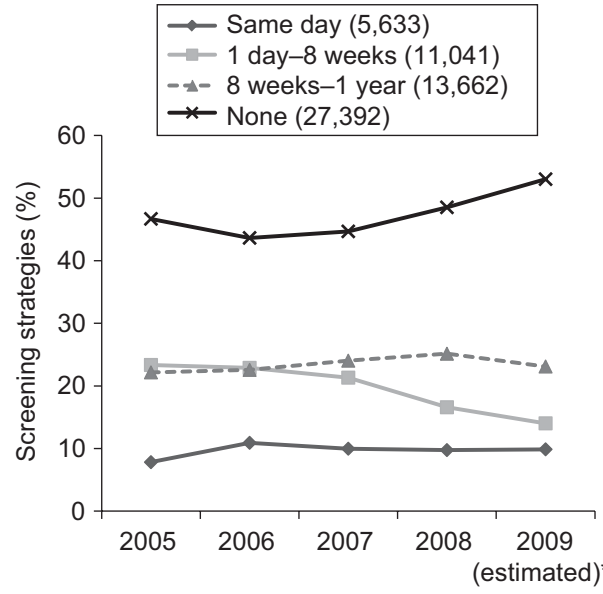

Fig. 2. Distribution of *Neisseria gonorrhea* and *Chlamydia trachomatis* screening strategies by year for intrauterine device insertions (n=57,728). *Rate for 2009 estimated based on rate from January 1 to August 31, 2009.

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Table 1. Patient Age, Race and Ethnicity, and Pelvic Inflammatory Disease Risk by *Neisseria gonorrhea* and *Chlamydia trachomatis* Screening Strategy

	Same Day (n=5,633 [9.8%])	1 d–8 wk (n=11,041 [19.1%])	8 wk–1 y (n=13,662 [23.7%])	No Screen (n=27,392 [47.4%])
Age (y)	28.4±7.3*	28.6±7.2*	28.6±6.4*†	35.8±6.4
Younger than 26 (n=14,905)‡	17.8 (17.2–18.4)	33.9 (33.1–34.6)	38.8 (38.1–39.6)	9.6 (9.1–10.0)
26 or older (n=41,602)‡	6.9 (6.6–7.1)	13.8 (13.5–14.2)	18.2 (17.8–18.6)	61.1 (60.6–61.6)
Race and ethnicity				
White‡	8.1 (7.8–8.5)	16.6 (16.1–17.1)	20.8 (20.3–21.4)	54.5 (53.8–55.1)
Black‡	14.4 (13.4–15.4)	22.4 (21.2–23.6)	27.9 (26.6–29.2)	35.3 (33.9–36.7)
Asian‡	7.7 (7.1–8.3)	15.5 (14.7–16.4)	23.5 (22.5–24.5)	53.3 (52.2–54.5)
Hispanic‡	10.8 (10.4–11.3)	21.3 (20.7–21.9)	27.8 (27.2–28.5)	40.1 (39.3–40.8)
Unknown or other‡	11.4 (10.6–12.2)	23.4 (22.4–24.4)	19.6 (18.7–20.6)	45.6 (44.4–46.8)
Proportion with pelvic inflammatory disease	0.0044§ (0.0029–0.0066)	0.0099 (0.0082–0.0120)	0.0056§ ‖ (0.0044–0.0070)	0.0036¶ (0.0029–0.0044)

Data are mean±standard deviation, % (95% confidence interval) or proportion (95% confidence interval).
* $P<.001$ compared with no-screen group.
† $P=.04$ compared with same-day screen group.
‡ $P<.001$ for all pairwise comparisons.
§ $P<.001$ compared with 1 day–8 weeks group.
‖ $P<.01$ compared with no screen group.
¶ $P<.0001$ compared with 1 day–8 weeks group.

was compared between different screening groups in four sets of comparisons (Table 2).

In unadjusted and adjusted analyses, the point estimates for the risk of PID in the unscreened group were lower than among those who had any screening. The 95% CI for the adjusted risk difference (−0.00022 to −0.00019) fell within the predetermined margin of equivalence of −0.006 to +0.006, indicating that females who were not screened had an equivalent risk of PID as females who were screened. All other adjusted risk difference CIs similarly fell within the margin of equivalence. Among the 30,336 females screened for *N gonorrhea* and *C trachomatis*, same-day screening was equivalent to preinsertion screening and to nonscreening (Table 2).

Sensitivity analyses were conducted using expanded criteria for PID, which reclassified 61

Table 2. Comparison of Pelvic Inflammatory Disease Risk Difference Between *Neisseria gonorrhea* and *Chlamydia trachomatis* Screening Strategies

	Proportion With Pelvic Inflammatory Disease (95% CI)*	Risk Difference* (95% CI)	Adjusted Risk Difference† (95% CI)	Odds Ratio* (95% CI)	Adjusted Odds Ratio† (95% CI)
No screen	0.0036 (0.0030–0.0044)	−0.0034 (−0.0045 to −0.0022)	−0.00021 (−0.00022 to −0.00019)	0.52 (0.41–0.66)	1.05 (0.78–1.43)
Any screen	0.0070 (0.0061–0.0080)	—	—	Reference	Reference
Same day	0.0044 (0.0030–0.0065)	−0.0031 (−0.0049 to −0.0008)	0.00002 (−0.000007 to 0.00005)	0.59 (0.39–0.89)	1.00 (0.64–1.54)
Any prescreen	0.0075 (0.0065–0.0087)	—	—	Reference	Reference
Same day	0.0044 (0.0030–0.0065)	−0.0055 (−0.0079 to −0.0027)	0.0011 (0.0010 to 0.0012)	0.45 (0.29–0.69)	0.80 (0.51–1.29)
1 d–8 wk	0.0099 (0.0082–0.0119)	—	—	Reference	Reference
No screen	0.0036 (0.0030–0.0044)	−0.0008 (−0.0030 to 0.0008)	−0.0006 (−0.0006 to −0.0005)	0.81 (0.52–1.27)	1.16 (0.69–1.96)
Same day	0.0044 (0.0030–0.0065)	—	—	Reference	Reference

CI, confidence interval.
* The overall proportion with pelvic inflammatory disease, unadjusted risk differences, and unadjusted odds ratios are calculated for all 57,728 women.
† Adjusted for age and race and ethnicity. The adjusted odds ratios and risk differences exclude 1,221 women for whom these variables were not available. Propensity score adjustment did not change results.

females as having PID. The equivalence in PID between different screening strategies persisted, with all CIs for adjusted analyses falling within the −0.006 to +0.006 range (data not shown).

Stratifying by age yielded similar results (Table 3). Among females younger than 26 years, same-day screening had an equivalent adjusted risk of PID as screening within 8 weeks of insertion; same-day screening was also equivalent to any preinsertion screening within 1 year of insertion. For females 26 years or older, in both unadjusted and adjusted analyses, no screening was equivalent to any screening, and same-day screening was no different than screening ahead of time. These findings all persisted with the expanded PID criteria. Model results were similar using propensity score adjustment.

DISCUSSION

The absolute risk of being diagnosed with PID within 90 days of IUD insertion in our cohort was low. There was no significant difference between females who were screened for *N gonorrhea* and *C trachomatis* within 1 year of IUD insertion and females who were not screened in this setting where Centers for Disease Control and Prevention evidence-based screening is applied. Furthermore, among females who were screened, same-day screening was associated with an equivalent risk of PID as preinsertion screening. Equivalence of same-day screening persisted even among females younger than 26 years, who are presumably at higher risk of infection.

Several smaller studies have indirectly looked at PID risk when IUDs are inserted without knowing *N gonorrhea* and *C trachomatis* cervical status. A Planned Parenthood affiliate reported no cases of PID in 732 low-risk women who had *N gonorrhea* and *C trachomatis* screening on the same day as IUD insertion.[7] A systematic review concluded that although women with asymptomatic *N gonorrhea* and *C trachomatis* at insertion had an increased risk of PID than those without infection, the absolute risk for both groups remained low, 0–5% for those with sexually transmitted infections and 0–2% for those without.[8] Randomized trials of prophylactic antibiotics at IUD insertion similarly reported a low risk of PID after insertion[11,14] and no benefit to antibiotics,[14,20] even in women screened on the same day.[14] Further evidence can be extrapolated from the known safety of immediate postabortion IUD insertion,[24,25] which is usually done without knowing *N gonorrhea* and *C trachomatis* results.

These studies, like ours, show that there is a low risk of PID after IUD insertion. Targeted *N gonorrhea* and *C trachomatis* screening of those at higher predicted risk therefore makes sense. Local *N gonorrhea* and *C trachomatis* prevalence should also be a factor in screening protocols.[26] The prevalence of

Table 3. Comparison of Pelvic Inflammatory Disease Risk Difference Between *Neisseria gonorrhea* and *Chlamydia trachomatis* Screening Strategies Stratified by Age*

	Proportion With Pelvic Inflammatory Disease (95% CI)*	Risk Difference* (95% CI)	Adjusted Risk Difference† (95% CI)	Odds Ratio* (95% CI)	Adjusted Odds Ratio† (95% CI)
Age younger than 26 y					
Same day	0.0059 (0.0036–0.0096)	−0.0065 (−0.0106 to −0.0019)	0.0011 (0.0010 to 0.0013)	0.47 (0.27–0.82)	0.84 (0.46–1.52)
1 d–8 wk	0.0124 (0.0097–0.0158)	—	—	Reference	Reference
Same day	0.0059 (0.0036–0.0096)	−0.0038 (−0.0069 to 0.0002)	−0.0004 (−0.0005 to −0.0003)	0.60 (0.36–1.02)	1.08 (0.62–1.88)
Any prescreen	0.0097 (0.0081–0.0117)	—	—	Reference	Reference
Age 26 y or older					
No screen	0.0035 (0.0028–0.0043)	−0.0018 (−0.0032 to −0.0005)	−0.00008 (−0.0001 to −0.00007)	0.66 (0.49–0.88)	1.02 (0.73–1.43)
Any screen	0.0053 (0.0043–0.0065)	—	—	Reference	Reference
Same day	0.0031 (0.0016–0.0058)	−0.0026 (−0.0047 to 0.0003)	0.0005 (0.0005 to 0.0005)	0.54 (0.27–1.07)	0.86 (0.42–1.76)
Any prescreen	0.0057 (0.0046–0.0072)	—	—	Reference	Reference

CI, confidence interval.

* These numbers include the 56,507 women for whom age was available.

† Adjusted for race and ethnicity. The adjusted odds ratios and risk differences exclude 1,221 women for whom these variables were not available. Propensity score adjustment did not change results.

C trachomatis among females in managed care populations in California in 2007 was 3.3% and 0.5% for *N gonorrhea*.[27]

Among screened females, same-day screening had equivalent PID risk as other preinsertion strategies. A separate visit for *N gonorrhea* and *C trachomatis* screening before IUD insertion is therefore unnecessary and costly. Furthermore, even if *N gonorrhea* and *C trachomatis* results from weeks before insertion were negative, a woman could acquire an infection after screening and before the insertion visit. Thus, the most accurate time to clinically assess and screen for cervical infection is on IUD insertion day. If there is obvious clinical evidence of cervicitis or upper genital tract infection, insertion should be delayed.[28] A woman's risk status does not depend on her method of contraception, or when she is screened, but rather on sexual behaviors. Females with high-risk sexual behaviors continue to be at increased risk of *N gonorrhea* and *C trachomatis* acquisition after IUD placement. This may partially explain why females screened before insertion had the highest risk of PID. Presumably, clinicians were more likely to prescreen females with high-risk sexual behaviors; these are the same females who continue to be at increased risk of *N gonorrhea* and *C trachomatis* acquisition after IUD placement.

Because the average age of the overall cohort of 32 years indicates a population generally at lower risk for PID, results should be interpreted with caution. However, in the subgroup analysis of the females aged younger than 26 years, same-day screening was equivalent to preinsertion screening strategies. The lowest risk of PID was among females not screened within 1 year, who were, on average, 7 years older than the other groups; this lower risk was most likely the result of bias in selecting low-risk females for nonscreening.

A major strength of this study is the large number of participants in an integrated health care delivery system. Widespread use of IUD in this setting allowed us to perform a highly powered equivalence study. The demographically diverse, community-based population is highly representative of the local and statewide population, except for extremes of age and income.[29] Despite the economic and racial diversity of Kaiser Permanente Northern California members, this cohort does represent a population with insurance (public and private) and results may not be applicable to all populations; in addition, our findings may not be fully generalizable to settings with a high background prevalence of *N gonorrhea* and *C trachomatis*.

A retrospective study introduces several limitations. First, clinician discretion played a role in screening strategy. Based on Kaiser Permanente Northern California's promotion of evidence-based screening guidelines, we presume that the screening strategy applied to a woman is a proxy for appropriately choosing whether to test. However, we were unable to assess systematically for deviations from Centers for Disease Control and Prevention recommendations. Second, it was not feasible to obtain clinician and additional patient characteristics, which may be confounders. Nonetheless, Centers for Disease Control and Prevention guidelines represent a surrogate for PID risk factors. Moreover, propensity score adjustment did not change the results. We could not ascertain the type of IUD, and although the levonorgestrel IUD may protect against PID,[30] it is unlikely that screening strategy varied by IUD type. Although a randomized trial would eliminate these confounders, conducting one of this size would be exceptionally challenging.

To minimize the risk of misclassification bias of PID, we did a sensitivity analysis to include more cautiously diagnosed cases, and results did not change. There is also the risk of misclassification bias of the outcome in the antibiotics only (record review group C) and pelvic pain only (record review group D) groups for which we reviewed 10% of the records and extrapolated PID risk to the remainder of the groups. It is possible that, if misclassification occurred, it could be either nondifferential or differential by screening group, making it difficult to estimate the magnitude of potential bias. However, when these two groups with PID extrapolated from record review were dropped from the logistic regression analysis, there was still equivalence in screening strategies; thus, if reviewing records of 10% of these groups involved misclassification, it did not alter the results. Another potential limitation to our study is the imprecise, variable nature of diagnosing PID. However, our study was designed to investigate real-life diagnosis patterns, not whether the PID assessment fulfilled specific diagnostic criteria.

In conclusion, the low absolute risk of PID in this study provides evidence to support clinicians who apply Centers for Disease Control and Prevention risk factor–guided screening to females receiving IUDs. All females were screened in some way, whether through a laboratory test or a clinician's decision not to test. If testing is indicated, our results suggest that it is safe to do so on the day of IUD insertion with prompt treatment of positive results. These findings have the potential to reduce barriers to IUD access and to promote more widespread use among females who desire highly effective, long-term, reversible contraception.

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