Preventing and Managing Pelvic Inflammatory Disease: Key Questions, Practices, and Evidence

Eugene Washington, MD, MSc, and Alfred O. Berg, MD, MPH
San Francisco, California, and Seattle, Washington

Clinicians play a pivotal role in protecting women from pelvic inflammatory disease (PID), one of the most prevalent and serious diseases affecting women of reproductive age. This article examines PID prevention and management by critically addressing five questions: (1) What are the key risk factors for PID? (2) What are the principal microorganisms involved in PID? (3) What are the appropriate diagnostic criteria for PID? (4) What are the best treatment regimens for PID? and (5) What are the effective strategies for preventing PID? In addressing each of these questions, the quality of available evidence and recommended practice is discussed and gaps in the evidence are highlighted.

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Managing women who may have pelvic inflammatory disease (PID) is as challenging today as it was a decade ago, despite progress in our basic understanding of this multifaceted disease.[1,2] Wider recognition of PID's devastating toll on women's health, particularly their reproductive capability, by itself is a notable accomplishment. More than 1 million women in the United States experience an episode of PID each year,[3,4] ectopic pregnancy rates are six to ten times higher after PID,[5] and infertility due to tubal occlusion occurs in 12% to 50% of women with PID.[6] More providers and decision-makers are also aware of the substantial economic burden imposed by PID, the annual costs of which exceeded $4.2 billion in 1990 and are projected to approach $10 billion by the year 2000.[4]

Advances in our knowledge of the prevention,[7] pathogenesis,[8] diagnosis,[9] and treatment[10] of PID have occurred. Practice guidelines that draw on these advances have aided physicians in counseling and managing women with PID,[11] but we still face nagging questions about what constitutes the most effective practices. Moreover, the new emphasis on evidence-based care appropriately calls for more explicit disclosure of the quality of data supporting recommended approaches.

This article examines the state of the art in PID prevention and management by addressing the following five questions:

1. What are the key risk factors for PID?
2. What are the principal microorganisms involved in PID?
3. What are the appropriate diagnostic criteria for PID?
4. What are the best treatment regimens for PID?
5. What are the effective strategies for preventing PID?

The discussion that follows focuses on data and current practices related to these question.

WHAT ARE THE KEY RISK FACTORS FOR PID?

Knowing the risk factors for PID will help physicians to identify women who need more intensive counseling to modify risky behavior, and may increase suspicion of PID when the clinical syn-

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From the Department of Obstetrics, Gynecology, and Reproductive Sciences, School of Medicine, University of California, San Francisco (A.E.W.), and the Department of Family Medicine, School of Medicine, University of Washington, Seattle (A.O.B.). Requests for reprints should be addressed to A. Eugene Washington, MD, MSc, Department of Obstetrics, Gynecology, and Reproductive Sciences, Box 0132, University of California, San Francisco, CA 94143-0132.

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TABLE 1

Probable Risk Category and Quality of Evidence Supporting Association Between Risk Factor and Pelvic Inflammatory Disease

Risk Marker	Risk Factor
Age*	Age*†
Socioeconomic status	Sexual behavior†
Residence	Contraceptive practice†
Substance abuse	Health care behavior‡
Smoking	Douching§†
	Menses‡

*Age may be either a risk factor, a risk marker, or both.

†Quality of evidence grade II, indicating evidence obtained from well-designed cohort or case-control analytic studies. Grading scheme adapted from the US Preventive Services Task Force.*Guide to Clinical Preventive Services.* 2nd ed. Baltimore, Md: Williams & Wilkins, 1996.

‡Quality of evidence grade III, reflecting opinions of respected authorities based on clinical experience, descriptive studies, or reports of expert committees. Grading scheme adapted from the US Preventive Services Task Force. *Guide to Clinical Preventive Services.* 2nd ed. Baltimore, Md: Williams & Wilkins, 1996.

§Preliminary data are suggestive but inconclusive.

Table adapted from Washington AE, Aral SO, Wølner-Hanssen P, Grimes DA, Holmes KK. Assessing risk for pelvic inflammatory disease and its sequelae. JAMA 1991; 266:2581-6.

drome is suggestive. While numerous demographic variables and individual behaviors and practices have been reported to affect this risk of PID, many are risk markers rather than risk factors.[12] Risk factors are variables that directly affect the risk of transmission or progression of disease, while risk markers are surrogates for risk factors that have an indirect effect. Admittedly, it is often difficult to determine which of these two categories is applicable to a given risk variable. A discussion of PID risk factors follows, and risk markers are noted in Table 1.

•*Age* predicts risk. Young women appear to be biologically susceptible to the development of PID because they have a lower prevalence of protective chlamydial antibodies, larger zones of cervical ectopy (presence of columnar epithelium on the ectocervix), and more penetrable cervical mucus.[12] Age-specific incidence rates for PID are highest for women under the age of 25.[6] When approximate adjustments are made for sexual activity, teenagers appear to have the highest relative risk for PID.

•*Sexual behavior* exposes women to sexually transmitted organisms, but its precise role in the development of PID remains poorly defined. Even the studies that consider the role of sexual behavior as a risk factor for PID fail to differentiate between the role of sexual behavior as a risk factor in the acquisition of lower genital tract infection and its role in the subsequent development of PID.[12] Nevertheless, several dimensions of sexual behavior have been associated with increased risk of PID: multiple sex partners, high frequency of sexual intercourse, and a high rate of acquiring new partners within the previous 30 days.[12]

•*Contraceptive choice* affects risk of PID. When properly used, mechanical and chemical barrier methods, such as condoms, diaphragms, possibly cervical caps, and vaginal spermicides, decrease the risk of sexually transmitted disease (STD), PID, and tubal infertility.[12] On the other hand, use of intrauterine devices (IUDs) appears to increase the relative risk of PID, with the highest quality studies showing an increase in the range of 1.5 to 2.6. The risk appears to be transient and limited to certain at-risk women. PID risk associated with IUD use centers around the time of insertion, being highest in the first 4 months and not significantly elevated above baseline at 5 months and beyond.[12] Women at low risk of acquiring STD have little increased risk of IUD-associated PID, but women at high risk for STD are not good candidates for the IUD. Preliminary data suggest that the minimal risk of IUD-associated PID may be reduced with prophylactic administration of 200 mg of doxycycline 1 hour prior to IUD insertion, followed by 200 mg daily for 2 days.[13]

The relationship between oral contraceptives (OCs) and PID continues to engender controversy. Most studies have demonstrated a two- to threefold increase in the prevalence of cervical *Chlamydia trachomatis* infection in women using OCs.[14] Several studies, however, have shown that rates of PID requiring hospitalization among women using OCs are as much as 50% lower in women using OCs compared with that of sexually

active women who do not use any contraceptive method.[12] These data prompt the question of how can OC use decrease rates of PID when it increases rates of chlamydial infection, one of the leading causes of PID? Notably, in one study of infertile women, OCs appear neither to protect against tubal infertility nor to promote it.[15] While cogent arguments are made on both sides of this debate, there appear to be insufficient data available on which to draw a conclusion about the precise relationship between OCs and PID.[12]

•*Appropriate health care behavior* exhibited by women can decrease their risk of PID. Seeking medical care promptly, adhering to management instructions, and ensuring sex partner treatment of STDs will lower a woman's risk of PID.[12]

•*Douching and menses* are two other factors associated with increased risk of PID. Data suggest that women with PID are more likely to have a history of douching compared with women who do not have PID.[12,16] This reputed association should be viewed as preliminary because available studies do not provide sufficient data on which to determine whether the association reflects a causal relationship. A relationship between menses and PID is suggested by a study showing that women with chlamydial and/or gonococcal salpingitis experience onset of symptoms significantly more often within 7 days of the onset of menses than at 7 to 14 days or more from the onset of menses.[12] Finally, risk variables themselves should not be the sole basis for diagnosing PID. Many women who do not fit a typical risk profile will have PID, and many women perceived at increased risk will not have PID. The value of a risk indicator in the diagnostic process is that it helps a clinician differentiate among suspected diseases when the diagnosis is uncertain. When properly used, risk assessment not only facilitates correct diagnosis but also helps identify women who might benefit from risk-reduction counseling.

WHAT ARE THE PRINCIPAL MICROORGANISMS INVOLVED IN PID?

A variety of microorganisms have been isolated from the upper genital tracts of women with acute PID[8,17,18] (Table 2). In approximately two thirds of women with PID, either *C trachomatis* or *Neisseria gonorrhoeae* is confirmed.[17] Other anaerobic or aerobic microorganisms are concurrently isolated in about one half of these women.[18] Importantly, in roughly one third of women with PID, a sexually transmitted microorganism is not recovered. While a mixture of anaerobic and aerobic organisms is often recovered, the true microbial origin of PID in these women is unclear. This observation has implications for the way education messages are delivered to women with PID who do not have a confirmed STD.

WHAT ARE THE APPROPRIATE DIAGNOSTIC CRITERIA FOR PID?

Determining the appropriate criteria for diagnosing PID has proved to be a challenging exercise. First, PID is like a chameleon in that clinical presentations can vary considerably over a wide range of symptoms and signs. Some infected women present acutely ill with a severe clinical picture, while others—probably the majority—complain of relatively mild symptoms. This inconstant feature of PID means that clinicians cannot operate confidently with a single, focused view of this disease's clinical presentation. Second, there is no single diagnostic technique or laboratory test to reliably diagnose PID that is widely available and readily accessible. Even laparoscopy, which is the current gold standard for diagnosis, has recently been shown to miss about 20% of confirmed cases.[19] Moreover, laparoscopy has risks and monetary costs that limit its use in many settings. Last, only limited data are available to determine which symptoms, signs, laboratory tests, or diagnostic procedures—singly or in combination—best predict PID. In light of the diversity of clinical presentation, research studies would likely require large samples, multiple study sites, and invasive diagnostic confirmation to properly address this problem. These studies have not yet been undertaken.

Where does this leave the clinician? The general answer to this question is that most women suspected of having PID will receive a "presumptive" diagnosis, based on clinical symptoms and signs, supplemented by appropriate laboratory tests. In most of these women, a sexually transmitted organism will not be isolated from the cervix, endometrial biopsy results will not be available, and direct visualization of the adnexae will not occur. Defining the specific symptoms, signs, and

TABLE 2

Microbial Origin of Pelvic Inflammatory Disease

Exogenous	Endogenous	Other
Sexually transmitted diseases	Vaginal bacteriosis	*Escherichia coli*
Neisseria gonorrhoeae	*Gardnerella vaginalis*	*Haemophilus* spp
Chlamydia trachomatis	*Bacteroides* spp	Group B streptococci
Mycoplasmas*	*Prevotella spp*	Staphylococci
	Peptostreptococci	Pneumonococci
	Mobiluncus	
	Streptococci	
	Mycoplasmas	

Table adapted from Sweet RL. Changing etiology of PID. In: *Genitourinary Infections in Women: Update on Urinary Tract Infections and Pelvic Inflammatory Disease.* Consensus Conference Proceedings 1994. Sponsored by the University of Wisconsin Medical School. Little Falls, NJ: Health Learning Systems Inc, 1994.

*Precise role in origin is undetermined.

tests that should be used to make the diagnosis then emerges as the principal challenge. While the sensitivity and specificity for many diagnostic indicators known to be associated with PID are now available[9] (Table 3), debate continues about what constitutes the best combination of diagnostic indicators and how low or high the diagnostic threshold should be for PID.

Emphasizing the adverse downstream consequences of underdiagnosing PID, the Centers for Disease Control and Prevention (CDC) recommends a "low threshold for diagnosis."[11] The CDC's minimal criteria for a diagnosis of PID require the presence of three clinical findings: lower abdominal tenderness, adnexal tenderness, and cervical motion tenderness (Table 4). Additional routine criteria for a diagnosis of PID consist of physical findings and laboratory tests results. If all three minimum criteria are present and there is no established cause other than presumptive PID, empiric antimicrobial treatment is recommended.

The exact sensitivity, specificity, and predictive values of these diagnostic criteria across the heterogeneous population of women with PID are not known. Our rough extrapolation based on limited data suggests a sensitivity as high as 80% to 90% for symptomatic PID, but a specificity as low as 50% to 40%. Any estimation of the predictive values depends on the prevalence of PID in the population. In a higher-risk population (ie, women aged ≤ 25 years with multiple sex partners) with a PID prevalence of 25%, the predictive value of a positive test (PVPT) would be about 37% and the predictive value of a negative test (PVNT) would be about 94%. For a low-risk population with a lower prevalence of approximately 5% (ie, monogamous women aged > 25 years), the PVPT would be lower (only 9%), and the PVNT higher (99%). Note that to achieve a PVPT of 50%, the underlying prevalence of PID would need to be in the range of 35%. The preva-

TABLE 3

Diagnostic Indicators of Pelvic Inflammatory Disease

Criterion	Average for Studies Cited* Sensitivity, %	Specificity, %
History		
Pain >4 days' duration	78	54
Irregular menses	43	70
Clinical examination		
Temperature >38°C	33	82
Palpable mass	40	76
Vaginal discharge	60	61
Laboratory		
Elevated C-reactive protein	86	72
ESR >15 to >25 mm/h	72	56
Endometrial inflammation on biopsy	80	78

*Kahn JG, Walker CK, Washington AE, Landers DV, Sweet RL. Diagnosing pelvic inflammatory disease. A comprehensive analysis and considerations for developing a new model. JAMA 1991; 266:2594-604.

ESR denotes erythrocyte sedimentation rate.

lence of PID in the population seen by a clinician is best estimated by the clinician, as the medical literature provides only very rough estimates.

We believe that the current CDC diagnostic criteria offer a reasonable starting point, but underscore that they are guidelines rather than firm rules. Most cases of PID can be diagnosed clinically using only the minimum criteria. It seems reasonable to suggest that the CDC's additional routine or elaborate criteria (Table 4) be used to evaluate women with an uncertain diagnosis and more severe clinical presentation. Conditions often mistaken for PID include appendicitis, ovarian cyst (rupture, hemorrhage, torsion), urinary tract infection, gastroenteritis, and diverticulitis.[20,21] Importantly, evaluation of a woman suspected of having PID should be individualized to leverage all relevant information available. Assessment of risk variables, the likelihood of competing diagnoses, and the severity of clinical presentation all should be factored into the diagnostic equation.

TABLE 4

Centers for Disease Control and Prevention Criteria for the Diagnosis of Pelvic Inflammatory Disease

Minimum criteria*
Lower abdominal tenderness
Adnexal tenderness
Cervical motion tenderness
Additional routine criteria
Oral temperature exceeding 38.3°C (101°F)
Abnormal cervical or vaginal discharge
Elevated erythrocyte sedimentation rate
Elevated C-reactive protein
Laboratory evidence of gonococcal or chlamydial infection
Additional elaborate criteria†
Biopsy evidence of endometritis
Sonographic or other radiologic evidence of inflammatory mass
Laparoscopic abnormalities consistent with pelvic inflammatory disease

*All three must be present.
†Defined as procedures that are technically more difficult and more costly.
Information in this table from the Centers for Disease Control and Prevention. 1993 Sexually transmitted diseases treatment guidelines. MMWR 1993; 42(RR-14):77.

Severity of presentation usually dictates the aggressiveness of the evaluation, reflecting an often-unacknowledged philosophy that promotes diagnostic sensitivity for mild disease and thorough, accurate diagnosis for severe disease. Women with severe overall findings need more complete workups, including expensive or invasive procedures that can be omitted in those who are less ill. Such intensive evaluation derives from the perceived and often real urgency of instituting management specific for the true illness. When disease is mild, on the other hand, sensitivity is important; otherwise women with more subtle presenting symptoms may be missed and will not receive antimicrobial treatment. The need to treat women with milder PID, however, is great, since severity of clinical presentation corresponds with damage to the fallopian tubes and the likelihood of developing serious long-term sequelae.[22] Looking only for the "classic" presentation of PID involving a complaint of severe lower abdominal pain, high fever, and an elevated white blood cell count (Table 3) will lead to the underdiagnosis of PID.[23]

Finally, a special note of caution is warranted when using a presumptive diagnosis to manage women suspected of having PID. In the absence of a documented sexually transmitted organism, women should be clearly advised that the diagnosis is presumptive and should be informed that while PID is associated with a sexually transmitted organism in most cases, no organism is found in about one third of women with confirmed PID. Nevertheless, it is prudent to treat these women and their sex partners. Once a presumptive diagnosis is made based on CDC's minimum criteria, treatment should be completed regardless of additional laboratory results, unless a different diagnosis is confirmed.

WHAT ARE THE BEST TREATMENT REGIMENS FOR PID?

Selection of a treatment regimen may be one of the easier decisions clinicians face in managing women with PID. Many antimicrobial regimens are now available to treat PID, and most have proven efficacy in achieving short-term clinical and microbiologic cure.[10] A recent meta-analysis involving 34 PID treatment studies published between 1966 and 1992[10] found clinical and microbiologic cure rates above 90% for the commonly used treatment regi-

TABLE 5

Centers for Disease Control and Prevention Recommendations Regarding Criteria for Hospitalization

Clinical common sense
- Diagnosis is uncertain, and surgical emergencies such as appendicitis and ectopic pregnancy cannot be excluded

Parental consensus
- Pelvic abscess is suspected
- Patient has human immunodeficiency virus infection
- Severe illness or nausea and vomiting preclude outpatient management
- Patient is unable to follow or tolerate an outpatient regimen
- Patient has failed to respond clinically to outpatient therapy

Clinical judgment
- Patient is pregnant
- Patient is an adolescent (among adolescents, compliance with therapy is unpredictable)
- Clinical follow-up within 72 hours of starting antibiotic treatment cannot be arranged

NOTE: There are no data evaluating the effectiveness or cost effectiveness of these criteria. Criteria categories added by authors.

Recommended criteria for hospitalization taken from the Centers for Disease Control and Prevention. 1993 Sexually transmitted diseases treatment guidelines. MMWR 1993; 42(RR-14):78.

mens. Drawing on these data, the CDC published new PID treatment guidelines in 1993.[11]

A tougher decision for clinicians is whether to hospitalize a woman with PID. While some experts recommend hospitalization of all women with PID so that they can receive supervised parenteral antibiotic therapy, there are currently no experimental data comparing the outcomes of inpatient and outpatient management of PID. Debates about hospitalization for PID too often fail to distinguish between the need for hospitalization and the need for parenteral therapy. Now that intravenous outpatient therapy is more widely available, many women previously hospitalized for PID can be treated as outpatients. Even with this distinction, the question about which women with PID should be hospitalized remains controversial. The CDC recommends hospitalization when any one of the nine criteria listed in Table 5 is met. Our approach to using the CDC criteria is to group them into three categories. Women in the *clinical common sense* category should be hospitalized. Women in the *parenteral consensus* category probably need intravenous therapy (based on expert consensus), but not necessarily in the hospital. Hospitalization is recommended when intravenous outpatient therapy is not available. Last is the *clinical judgment* category, which includes criteria that are more controversial. Women in this group do not necessarily need hospitalization or parenteral therapy just because they meet one of these criteria. Hospitalization and parenteral therapy decisions for these women should be based on individual circumstances.

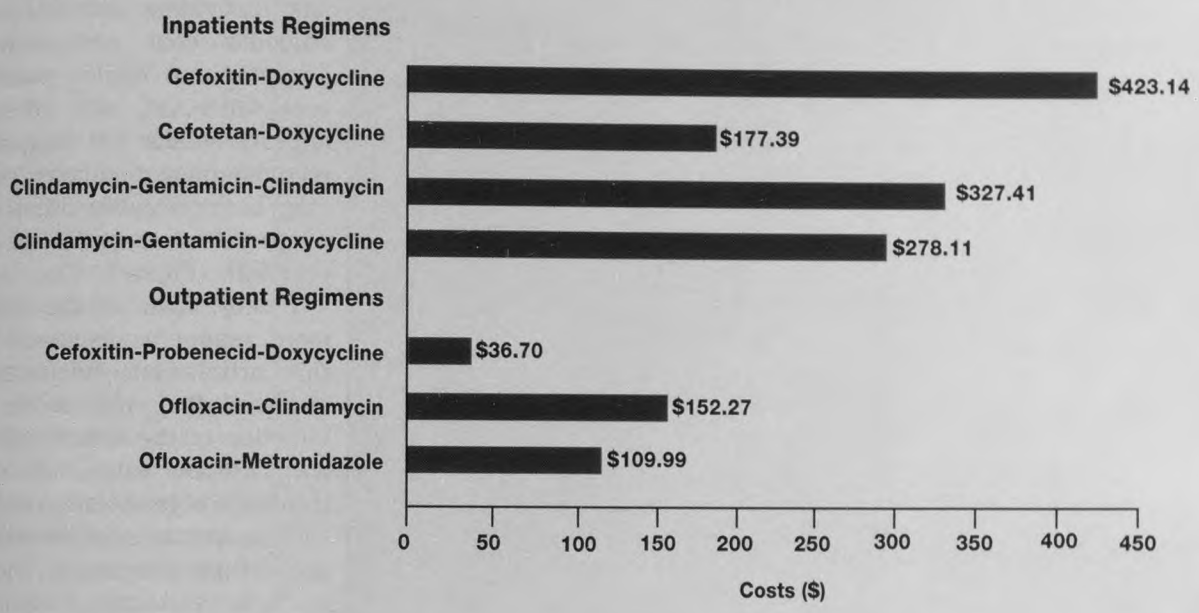
Returning to our principal question about treatment, there are several excellent regimens for PID. No single therapeutic regimen has been established as the superior treatment for women with PID. Perhaps the most important consideration in selecting an antimicrobial regimen for PID is the need to provide empiric, broad-spectrum coverage of likely pathogens, including *N gonorrhoeae*, *C trachomatis*, gram-negative facultative bacteria, anaerobes, and streptococci. Antimicrobial regimens covering these organisms can be expected to provide efficacious treatment of PID.

The CDC recommends five inpatient and two outpatient regimens in their current treatment guidelines published in 1993[11] (Table 6). The CDC notes that their recommendations provide guidelines and that other regimens can be used if they have demonstrated efficacy in randomized clinical trials. In general, specific treatment regimens are recommended by the CDC when experts have experience with them and there are multiple randomized trials demonstrating their efficacy.

•*Inpatient regimens* (Table 6). Regimens A and B are the oldest among the current CDC treatment recommendations. Both have been evaluated in multiple studies, with pooled clinical cure rates ranging from 92% to 94% and pooled microbiologic cure rates ranging from 97% to 100%.[10] According to the CDC, in the presence of tuboovarian abscess, many providers use clindamycin rather than doxycycline for continued therapy because the former is more effective against anaerobes. The only change in these regimens from earlier guidelines is the recommendation to increase

FIGURE

Average total cost of regimens approved by the Centers for Disease Control and Prevention. Cost includes acquisition, preparation, and administration, based on a 14-day course. Reprinted from Walker CK. PID decision analysis, assessment parameters, and outcomes. In: *Genitourinary Infections in Women: Update on Urinary Tract Infections and Pelvic Inflammatory Disease.* Consensus Conference Proceedings 1994. Sponsored by the University of Wisconsin Medical School. Little Falls, NJ: Health Learning Systems Inc, 1994. Source for data from *Drug Topics Red Book.* Montvale, NJ: Medical Economics Data, 1992. Used with permission of Health Learning Systems Inc.



therapy from 10 days to 14 days. Data supporting this change are weak, but the general feeling of many experts and providers is that a 14-day recommendation will lead to 10 days or less of actual use and a 10-day recommendation will lead to 7 days or less of actual therapy. This regimen can be used if the clinician is confident the patient will complete 10 days of treatment.

The two alternative regimens listed, both of which are new recommendations, have undergone at least one clinical trial and exhibit broad-spectrum antibacterial coverage. A combination of ampicillin and sulbactam plus doxycycline has good anaerobic coverage and appears to be effective for patients with tubo-ovarian abscess. The frequent occurrence of gastrointestinal side effects associated with this regimen, however, often precludes its use as first-line therapy. Although intravenous ofloxacin alone achieved clinical and bacteriologic cures in all 36 patients treated for gonococcal or chlamydial PID in a recent study,[24] the CDC emphasizes that there is at present insufficient evidence to support the use of any single-agent regimen for the inpatient treatment of PID. Therefore, intravenous ofloxacin should still be used in combination with either clindamycin or metronidazole.

•*Outpatient regimens* (Table 6). Regimens A and B provide clinicians with two different approaches to treating women with PID as outpatients. Each has been associated with a clinical cure rate of about 95% and a microbiologic cure rate approaching 100%, but as with the recommended inpatient regimens, neither has been studied for its effect on intermediate and long-term outcomes. Regimen A requires an intramuscular injection followed by oral therapy. A concern with this regimen is that one intramuscular dose of either cefoxitin or ceftriaxone does not provide effective long-term coverage for anaerobic organisms. If anaerobes are considered important in the microbial etiology of PID, every treatment regimen for PID should provide adequate coverage of these organisms. Regimen B, which is the new addition

TABLE 6

Centers for Disease Control and Prevention Treatment Recommendations for Acute Pelvic Inflammatory Disease

Treatment Regimens	Strength of Recommendation*
Inpatient Regimens	A
A. Cefoxitin 2 g IV q6h or cefotetan 2 g IV q12h PLUS Doxycycline 100 mg IV or PO q12h†	
B. Clindamycin 900 mg IV q8h PLUS Gentamicin 2 mg/kg IV or IM (loading dose) followed by 1.5 mg/kg (maintenance dose) q8h‡	
Alternative Inpatient Regimens Ampicillin/sulbactam plus doxycycline OR Ofloxacin IV plus clindamycin or metronidazole	B
Outpatient Regimens	B
A. Cefoxitin 2 g IM plus probenecid 1 g PO concurrently, or ceftriaxone 250 mg IM, or other third-generation cephalosporin IM once PLUS Doxycycline 100 mg PO bid for 14 days	
B. Ofloxacin 400 mg PO bid for 14 days PLUS Clindamycin 450 mg PO qid, metronidazole 500 mg PO bid OR for 14 days	

Treatment recommendations for acute pelvic inflammatory disease taken from the Centers for Disease Control and Prevention. 1993 Sexually transmitted diseases treatment guidelines. MMWR 1993; 42(RR-14):78-80.

*Grading scheme adapted from the US Preventive Services Task Force. *Guide to Clinical Preventive Services*. 2nd ed. Baltimore, Md: Williams & Wilkins, 1996. "A" indicates there is *good* evidence to support the recommendation; "B" indicates there is *fair* evidence to support recommendation; and "C" indicates there is *poor* evidence, but recommendation may be made on other grounds.

†Continue regimen for at least 48 hours after patient demonstrates substantial clinical improvement and then follow with doxycycline 100 mg PO bid for a total of 14 days.

‡Continue regimen for at least 48 hours after patient demonstrates substantial clinical improvement and then follow with doxycycline 100 mg PO bid or clindamycin 450 mg PO qid for a total of 14 days.

IV denotes intravenous; q, every; h, hour; PO, by mouth; IM, intramuscularly; bid, twice daily; qid, four times daily.

to the CDC guidelines, is an entirely oral treatment approach. Ofloxacin has excellent microbiologic activity against *both N gonorrhoeae* and *C trachomatis*, and the addition of clindamycin or metronidazole provides anaerobic coverage. According to the CDC, clindamycin, but not metronidazole, further enhances the gram-positive coverage of this regimen. We question the need, however, for such a high dose of clindamycin, especially given the lack of data on this particular dose, and believe that a 300-mg dose two to four times a day for 14 days is sufficient. At least one clinical trial is underway to evaluate the lower daily dose of clindamycin.

Beyond efficacious coverage, providers should also consider cost and patient acceptance. While patient acceptance, ie, side effects, appears similar for currently recommended regimens, cost may be noticeably different, ranging from around $40 to over $400 (Figure).

Finally, none of the treatment regimens discussed in this article has adequately assessed the eradication of infection of the endometrium and fallopian tubes, nor the incidence of long-term complications such as tubal infertility and ectopic pregnancy. There is, however, some evidence that early treatment reduces PID sequelae.[25] Consequently, providers should emphasize to women the need for early consultation when symptoms first appear, and should consistently provide prompt, effective therapy in suspected cases.

WHAT ARE THE EFFECTIVE STRATEGIES FOR PREVENTING PID?

Currently, the best method for preventing PID is to prevent lower genital tract infection with *C trachomatis* and *N gonorrhoeae*. While several preventive measures have been recommended for both individuals and health providers,[7,26] nearly all are aimed at preventing STDs. Prophylactic antibiotics for IUD insertion is the one practice recommended specifically to prevent PID.[13] Consequently, the following examination of strategies to prevent PID will, by necessity, focus on preven-

tion of STDs.

What can primary care clinicians do to enhance prevention of STD and therefore PID? The following five measures can be considered in providing effective preventive care to women at risk for PID (Table 7). The disturbingly few data currently available on some of these widely recommended approaches[26] are reflected by the grade assigned for the "strength of the recommendation" (Table 7).

TABLE 7

Recommendations for Health Providers to Prevent Sexually Transmitted Disease/Pelvic Inflammatory Disease (STD/PID)

General Preventive Measure	Specific Recommendations*	Strength of Recommendation†
Maintain up-to-date knowledge on STD/PID prevention	1. Develop an accurate information base of information on the diagnosis, treatment, and prevention of STD/PID. 2. Update knowledge through continuing medical education courses and use of current practice guidelines.	C
Counsel patients effectively	1. Emphasize risk-reduction to women exhibiting high-risk behavior, including lifestyle changes and use of barrier methods. 2. Encourage women with STD/PID to adhere to management instructions.	C
Screen target groups	— Screen women for chlamydial and gonococcal infection routinely when indicated.	B
Treat infections appropriately	1. Diagnose STD/PID promptly. 2. Treat with effective antibiotics. 3. Provide epidemiologic treatment for STD/PID when appropriate.	A
Ensure treatment of sex partners	1. Encourage infected women to refer sex partners for empiric treatment. 2. Examine and treat sex partners appropriately.	B

*More detail is provided in text.

†The grading scheme refers to the general preventive measure column. Adapted from the US Preventive Services Task Force. *Guide to Clinical Preventive Services.* 2nd ed. Baltimore, Md: Williams & Wilkins, 1996. "A" indicates there is *good* evidence to support the recommendation; "B" indicates there is *fair* evidence to support recommendation; and "C" indicates there is *poor* evidence, but recommendation may be made on other grounds.

Information in this table is adapted from Washington AE, Cates W Jr, Wasserheit JN. Preventing pelvic inflammatory disease, JAMA 1991; 266:2574-80; and from Centers for Disease Control and Prevention. Pelvic inflammatory disease: guidelines for prevention and management. MMWR 1991; 40(RR-5):1-25.

•*Maintain up-to-date knowledge on STD/PID prevention.* Because most medical schools have not provided specific STD clinical training,[7] many clinicians will have to first develop an accurate base of information on the diagnosis, treatment, and prevention of STD/PID. Information and practices are then best updated through continuing medical education courses and use of current practice guidelines.[11,26,27]

•*Counsel patients effectively.* A comprehensive discussion of patient counseling is beyond the scope of this review. For STD/PID prevention, however, the two key health education roles for clinicians are to (1) emphasize risk-reduction methods for preventing acquisition and transmission of STD, and (2) encourage patients to adhere to management instructions. Assuming the risk-reduction role will require providers to take an adequate sexual history, revealing their patient's sexual practices and partners. Admittedly, such intimate inquiry does not come naturally to most people. One approach is to elicit information about the patient's sexual behavior while asking about other health-related behaviors such as exercise, sleep patterns, smoking, and the use of alcohol or other drugs. Women exhibiting high-risk behavior should be counseled about potential lifestyle changes in a nonjudgmental fashion using understandable messages that set forth attainable goals.

Women being treated for an STD or PID should be urged to adhere to management recommendations. Specifically, women should be (1) advised about the nature of their disease and possible associated sequelae; (2) told exactly how and when to

TABLE 8

Principal Unanswered Questions About the Prevention and Management of Pelvic Inflammatory Disease (PID)

- What are the most effective methods for counseling women about PID risk reduction?
- What factors other than the intrauterine device directly affect the risk of developing PID?
- What is the microbial origin of PID in women without chlamydial or gonococcal infection?
- Which combination of diagnostic indicators leads to the most cost-effective management?
- Is there a difference between parenteral and oral therapy in risk for PID sequelae?

take their medications; (3) encouraged to take all medications, even after symptoms disappear; (4) informed about potential side effects, drug-drug interactions, and drug-food interactions; (5) engaged in a brief discussion of possible adherence problems and solutions, such as what to do if a dose is omitted; and (6) counseled to abstain from sex until symptoms have disappeared and appropriate treatment has been completed. It is also a good idea to reinforce verbal counseling with written or visual instructions whenever possible.

•*Screen target groups routinely.* Because many infected women have no symptoms and often have asymptomatic partners, routine screening for chlamydial and gonococcal infection is indicated for selected groups. Exactly which groups should be screened and how often, however, remains controversial. Although relevant guidelines on this issue are not entirely consistent in their recommendations,[27-29] several high-risk groups stand out as cost-effective screening targets. These include (1) commercial sex workers and illicit drug users; (2) residents of facilities where high levels of STD might be expected, such as jails and some emergency departments; (3) pregnant women in whom STD could cause adverse pregnancy outcome; and (4) sexually active teenagers, particularly those who smoke and those with multiple sex partners. In addition, providers can determine whether other women are at high risk by directly asking them about their sexual exposures. Women who report a recent new sex partner should be offered screening for *C trachomatis* and *N gonorrhoeae*. What is most important is that clinicians adopt a screening strategy compatible with their practice population and setting.

•*Treat infections appropriately.* Early and adequate treatment of women and their sex partners is an effective means of minimizing risk for adverse consequences in patients and preventing the community spread of STD. Comprehensive guidelines for the treatment of PID and other STD should be consistently applied.

•*Ensure treatment of sex partners.* Prompt treatment of sex partners is a complex task in most primary care settings. Rarely is the partner in the waiting room ready to be examined, and there are often ethical, legal, and financial considerations that compound this challenge. Nevertheless, because most clinicians agree that no woman should be considered adequately treated for PID until her partners are similarly treated, an attempt should always be made to have partners properly evaluated and treated. The form of such efforts will vary depending on the circumstances of the individual woman, the particular clinical practice, and prevailing laws regarding partner notification.[7] At a minimum, providers can emphasize to women the importance of having their sex partners treated empirically for presumptive *C trachomatis* and *N gonorrhoeae*, recognizing that infection rates of 53% and 41%, respectively, have been reported among partners of women with PID,[7] and that diagnostic tests are often insensitive in asymptomatic men.[11]

CONCLUSIONS

PID is one of the most common, serious medical conditions affecting women of reproductive age. Despite the dearth of data to answer key questions regarding its prevention and management and to guide clinical practice (Table 8), primary care clinicians occupy a commanding position in the battle to ameliorate the morbidity and suffering associated with PID. To fulfill this promise, we must assume a greater responsibility for prevention activities such as counseling and patient education, in addition to our traditional clinical role of diagnosing and treating illness.

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