

Endocarditis Prophylaxis in a Primary Care Clinic

Diane J. Madlon-Kay, MD

St Paul, Minnesota

Background. Primary care physicians often make decisions about the use of endocarditis prophylaxis (EP). Compliance with American Heart Association (AHA) recommendations has been found to be poor in hospitalized patients and in a dental school clinic. The purpose of this study was to examine the use of endocarditis prophylaxis in a primary care clinic.

Methods. The problem list of all adult patients seen in a primary care clinic in 1989 was reviewed for diagnoses that might require EP. Eighty-four charts were identified and reviewed.

Results. Sixty-five percent of the study patients had documentation in their charts about the need for EP. Mitral valve prolapse was the most frequent diagnosis. The physicians recommended EP for most patients with mitral valve prolapse regardless of whether there was documented mitral insufficiency. Endocarditis prophylaxis was most commonly prescribed for dental

procedures. Six patients received prophylaxis for procedures for which the AHA does not recommend prophylaxis. Only 19% of the antibiotic regimens prescribed were entirely consistent with the AHA 1984 guidelines. The most common deviation from the AHA guidelines was continuing oral antibiotics too long.

Conclusions. Compliance with the AHA 1984 recommendations, although better than reported in other settings, was less than optimal in this primary care clinic. Family physicians should consider whether EP is indicated in any patient with cardiac disease. If prophylaxis is indicated, then such a recommendation should be clearly documented in the chart. Family physicians need to be familiar with the 1990 AHA recommendations.

Key words. Endocarditis, rheumatic fever, mitral valve prolapse. *J Fam Pract* 1991; 32:504-507.

Primary care physicians are frequently confronted with questions about the use of endocarditis prophylaxis (EP). A widely accepted source of information on the prevention of endocarditis is the recommendations made by the American Heart Association (AHA),¹ most recently updated in December 1990. Unfortunately, compliance with AHA guidelines has been found to be poor both in hospital settings^{2,3} and in a dental school clinic.⁴ Physician experience with EP in a primary care setting, however, has not been previously reported. The purpose of this study was to examine EP in a primary care clinic. Indications, physician documentation of the need for EP, types of high-risk procedures received by the patients, and physician adherence to guidelines issued by the AHA in 1984 were studied.

Methods

The study took place in Maplewood, Minnesota, at a branch clinic of the St Paul-Ramsey Medical Center. Three internists and two family physicians, all board certified, provided medical care for adults at the clinic at the time of the study. Approximately 13,600 patient visits were made to these physicians in 1989. The problem list of all adult patients who made clinic appointments in 1989 was reviewed by the author for diagnoses that might require EP according to AHA guidelines. Appropriate charts were then reviewed individually to determine the patient's age, sex, and diagnosis. Each chart was searched for documentation of a statement about the need for EP. All procedures for which EP was prescribed, either in person or by telephone, and the antibiotic regimen used were noted and compared with 1984 AHA recommendations.¹

Results

Eighty-four patients had diagnoses on their problem list indicating a possible need for EP. Mitral valve prolapse

Submitted, revised, January 11, 1991.

From the Department of Family Medicine, St Paul-Ramsey Medical Center, St Paul, Minnesota. Reprint requests should be addressed to Diane J. Madlon-Kay, MD, Department of Family Medicine, St Paul-Ramsey Medical Center, St Paul, MN 55101-2595.

Table 1. Types of Cardiac Diagnoses in Study Patients (n = 84) and the Percent of Those Patients with Documented Physician Recommendation for Endocarditis Prophylaxis

Diagnosis	Patients with Diagnosis No.	Patients with Physician Recommendation of EP* No. (%)
Mitral valve prolapse	35	25 (71)
Rheumatic or other acquired valvular dysfunction	32	18 (56)
Prosthetic cardiac valves	8	6 (75)
Congenital cardiac malformations	7	4 (57)
Previous history of bacterial endocarditis	2	2 (100)

*Includes 1 patient with documented recommendation against having endocarditis prophylaxis.

EP—endocarditis prophylaxis.

(MVP) was the most frequent diagnosis (Table 1). The patients' mean age was 49 years, with a range of 17 to 97 years. Sixty-seven (80%) of the patients were women.

Fifty-four (64%) patients had a statement somewhere in their charts recommending EP. One chart stated specifically that the patient did not require EP. Twenty-nine (35%) of the charts contained neither a statement regarding the need for EP nor documentation of ever having received antibiotics for EP. Two of the eight patients with prosthetic cardiac valves did not have EP recommendations documented in their charts (Table 1).

Twenty-five (71%) of the 35 patients with MVP had EP recommendations in their charts. The charts of patients with MVP were examined to determine whether a patient's age, sex, or the presence of mitral insufficiency by clinical examination or echocardiogram was associated with the recommendation for EP. Endocarditis prophylaxis was recommended for 25 (76%) of the 33 women with MVP, but not for either of the two men with MVP ($\chi^2 = 5.3, P < .05$). Recommendations for EP were not associated with the patients' ages. Although more patients who were diagnosed as having mitral insufficiency during clinical examination or by echocardiogram had EP recommended than patients without insufficiency (78% of 23 vs 58% of 12), the difference was not statistically significant.

Patients with a history of rheumatic fever had the most varied EP recommendations. Of the five patients who had had rheumatic fever but in whom no murmur was detected during examination, two were recommended to have EP, one was recommended not to have

Table 2. Physician Adherence to the 1984 American Heart Association Guidelines for Endocarditis Prophylaxis

Specific EP regimen described	
Adherence consistent with AHA	11
Not consistent with AHA	
Different drug	4
Drug regimen extended too long	26
Parenteral dose following procedure omitted	8
Specific EP regimen not described	9
Total	58

EP—endocarditis prophylaxis; AHA—American Heart Association.

EP, and two received no recommendation either for or against having EP.

Of the 54 patients with an EP recommendation, 36 (67%) had a procedure documented in the chart for which they received EP. Endocarditis prophylaxis was most commonly prescribed for dental procedures; 45 antibiotic courses were documented. Four patients received EP for colonoscopy. Nine patients received EP for other procedures that are likely to cause bacteremia.

Six patients received EP for procedures for which the AHA does not recommend EP: endometrial biopsy, tubal ligation, vaginal delivery, colposcopy, laser surgery of the nose, and orthopedic surgery.

Compliance with AHA guidelines is shown in Table 2. Only 11 regimens were entirely consistent with 1984 AHA recommendations. The most common deviation was the use of multiple doses of penicillin following dental procedures.

Discussion

Prior reports of physician experience with EP recommendations have come from various settings other than primary care. Sixty-five percent of patients in this study had statements about the need for EP documented in their charts. This rate compares favorably with a 49% documentation rate reported from British cardiology clinics for patients with valvular or congenital heart disease.⁵ Recommendations for EP were made for 37% of patients with MVP admitted to a university medical center³ and for 59% of MVP patients whose inpatient and outpatient records were reviewed in another study.⁶ Nevertheless, the 71% documentation rate for MVP patients noted in this primary care setting, though encouraging, is less than optimal.

An important limitation of these results is that the relatively high documentation rate may reflect the methodology used. Only cardiac abnormalities noted on the problem list were reviewed. Physicians may include a cardiac diagnosis on the problem list more often when

they recognize that EP is required for the abnormality. Therefore, the documentation rate might have been lower if it had been investigated in other ways.

Mitral valve prolapse was the most frequent diagnosis requiring an EP recommendation in this primary care clinic. This finding is not surprising since the prevalence of MVP in the general population is estimated to be as high as 5%.⁶ Unfortunately, the need for EP in MVP patients is controversial. The AHA recommends EP in MVP patients with valvular insufficiency, or regurgitation, but has noted that definitive data are particularly limited.¹ Men and patients older than 45 years with MVP also appear at greater risk for infective endocarditis.⁶

The physicians who took part in the Maplewood clinic study recommended EP in most MVP patients regardless of whether mitral insufficiency was present. The patients' ages had no effect on EP recommendations, but women were significantly more likely to have EP recommended than men. Therefore, there was no association between recommendations for EP and clinical factors expected to influence that decision. This finding may reflect a conservative approach to the current controversy in the medical literature.

Other studies have found similar inconsistencies in EP recommendations for patients with MVP. In a study of university medical center inpatients with MVP it was found that the only factor associated with an EP recommendation was whether a patient had been seen in consultation by a cardiologist.³ A population-based study showed that young age and Doppler-detected mitral regurgitation were strong predictors of EP recommendations.⁶

The study reported herein revealed uncertainty about the need for EP in patients who had a history of rheumatic fever but in whom no murmur was detected on physical examination. For some of these patients EP was recommended, for another, EP was expressly not recommended, and for still others no recommendation regarding EP was made. The AHA clearly recommends EP for patients with rheumatic heart disease.¹ Conversely, the AHA does not recommend EP if rheumatic heart disease is not present. There is no clear consensus among physicians whether an echocardiogram should be obtained to document the presence or absence of rheumatic heart disease.⁷

Thirty-three percent of patients for whom EP had been recommended had no evidence of ever receiving prophylaxis. The procedures for which EP is recommended are listed in Table 3. The most common procedure requiring EP is dental work, and dentists often prescribe the antibiotics for their patients. Unfortunately, compliance with EP recommendations by dentists has

Table 3. Procedures for Which Endocarditis Prophylaxis Is Recommended in the American Heart Association 1990 Guidelines¹⁴

Dental procedures known to induce gingival or mucosal bleeding, including professional cleaning
Tonsillectomy or adenoidectomy
Surgical operations that involve intestinal or respiratory mucosa
Bronchoscopy with a rigid bronchoscope
Sclerotherapy for esophageal varices
Esophageal dilatation
Gallbladder surgery
Cystoscopy
Urethral dilatation
Urethral catheterization if urinary tract infection is present
Urinary tract surgery if urinary tract infection is present
Prostatic surgery
Incision and drainage of infected tissue
Vaginal hysterectomy
Vaginal delivery in the presence of infection

also been less than ideal.^{4,8-11} A study of a dental school with a special protocol for managing patients requiring EP showed that only 11% of patient charts had documentation of correct EP for every procedure for which bacteremia was possible.⁴

Unnecessary EP has been reported in other settings. A study of patients with prosthetic heart valves revealed that antibiotics had been given to 74% of patients who underwent surgical procedures considered at low risk of bacteremia.² Twenty-three percent of patients received EP for heart catheterization. The AHA 1984 recommendations clearly stated that EP is not required for this procedure,¹ and that position remains unchanged.

Physician adherence to the specific antibiotic regimens recommended by the 1984 AHA guidelines was poor in this study. Only 19% of the antibiotic regimen prescribed were entirely consistent with 1984 AHA guidelines. Similarly, other studies have found that only 30% of patients with prosthetic valves undergoing high-risk procedures² and 11% of patients having dental work⁴ received EP that followed AHA recommendations.

The most common error noted in this study was continuing oral antibiotics too long. The 1984 AHA guidelines recommended a single 1 g dose of penicillin 6 hours after dental procedures.¹ Continuing EP wastes antibiotics, may lead to the emergence of resistant organisms, and increases the risk of adverse reactions.¹² Unnecessarily prolonged regimens may also worsen the already poor patient compliance.^{5,12,13} Prescribing errors noted frequently in other studies include starting antibi-

Table 4. Regimens Recommended in the American Heart Association 1990 Guidelines for Prevention of Bacterial Endocarditis¹⁴

Regimens for dental, oral, or upper respiratory tract procedures

Standard regimen	
Amoxicillin	3.0 g orally 1 h before procedure; then 1.5 g 6 h after initial dose
Alternate regimen (for amoxicillin/penicillin-allergic patients)	
Erythromycin	Erythromycin ethylsuccinate, 800 mg, or erythromycin stearate, 1.0 g, orally 2 h before procedure; then half the dose 6 h after initial dose
or	
clindamycin	300 mg orally 1 h before procedure and 150 mg 6 h after initial dose

Regimens for genitourinary/gastrointestinal procedures

Standard regimen	
Ampicillin, gentamicin, and amoxicillin	Intravenous or intramuscular administration of ampicillin, 2.0 g, plus gentamicin, 1.5 mg/kg (not to exceed 80 mg), 30 min before procedure; followed by amoxicillin, 1.5 g, orally 6 h after initial dose; alternatively, the parenteral regimen may be repeated once 8 h after initial dose
Alternate regimen (for ampicillin/amoxicillin/penicillin-allergic patients)	
Vancomycin and gentamicin	Intravenous administration of vancomycin, 1.0 g, over 1 h, plus intravenous or intramuscular administration of gentamicin, 1.5 mg/kg (not to exceed 80 mg), 1 h before procedure; may be repeated once 8 h after initial dose.

otics too early, using low-dose antibiotics, and using oral antibiotics in patients with prosthetic valves.^{4,8-12}

In December 1990, new AHA recommendations were published.¹⁴ The new regimens are shown in Table 4. A major change is the use of oral rather than parenteral regimens for dental procedures in high-risk patients. The committee recognized the logistic and financial barriers to the use of parenteral regimens. Moreover, they noted that in other countries oral regimens have been used in individuals who have prosthetic heart valves, and failures in prophylaxis have not been a problem. The committee does continue to recommend parenteral antibiotics for genitourinary and gastrointestinal procedures.

The findings of this study suggest several steps that primary care physicians can take to be more effective in their efforts to prevent infective endocarditis. Physicians should consider whether EP is indicated in any patient

with cardiac disease. Although patients with MVP and insufficiency clearly need EP, the controversy continues about EP for MVP without insufficiency. In patients with a history of rheumatic fever but in whom no murmur is detected on examination, the physician might consider obtaining an echocardiogram or cardiology consultation before making a recommendation. If EP is indicated, the recommendation should be clearly documented in the chart, preferably on a problem list. Physicians need to know the current AHA antibiotic regimens for dental procedures and have the other AHA regimens easily accessible. Finally, the primary care physician should ensure that the patient's dentist is also aware of the need for EP.

References

- Shulman ST, Amren DP, Bisno AL, et al. Prevention of bacterial endocarditis. A statement for health professionals by the Committee on Rheumatic Fever and Infective Endocarditis of the Council on Cardiovascular Diseases in the Young. *Circulation*. 1984; 70:1123A-7A.
- Brooks RG, Notario G, McCabe RE. Hospital survey of antimicrobial prophylaxis to prevent endocarditis in patients with prosthetic heart valves. *Am J Med* 1988; 84:617-21.
- Retchin SM, Fletcher RH, Buescher PC, et al. The application of official policy. Prophylaxis recommendations for patients with mitral valve prolapse. *Med Care* 1985; 23:1156-62.
- Murrah VA, Merry JW, Little JW, Jaspers MT. Compliance with guidelines for management of dental school patients susceptible to infective endocarditis. *J Dent Educ* 1987; 51:229-32.
- Pitcher DW, Papouchado M, Channer KS, James MA. Endocarditis prophylaxis: do patients remember advice and know what to do? *Br Med J* 1986; 293:1539-40.
- Lavie CJ, Khandheria BK, Seward JB, et al. Factors associated with the recommendation for endocarditis prophylaxis in mitral valve prolapse. *JAMA* 1989; 262:3308-12.
- Kilmartin C, Munroe C. Prophylactic antibiotic coverage and the cardiac patient. How to identify the "at risk" patient. *Can Dent Assoc J* 1986; 52:71-3.
- Hashway T, Stone LJ. Antibiotic prophylaxis of subacute bacterial endocarditis for adult patients by dentists in Dade County, Florida. *Circulation*. 1982; 66:1110-3.
- Sadowsky D, Kunzel C. Recommendations for prevention of bacterial endocarditis: compliance by dental general practitioners. *Circulation* 1988; 77:1316-8.
- Sadowsky D, Kunzel C. Clinician compliance and the prevention of bacterial endocarditis. *J Am Dent Assoc* 1984; 109:425-8.
- Scully CM, Levers BGH, Griffiths MJ, Shirlaw PJ. Antimicrobial prophylaxis of infective endocarditis: effect of BSAC recommendations on compliance in general practice. *J Antimicrob Chemother* 1987; 19:521-6.
- Durack DT. Prophylaxis of infective endocarditis. In: Mandell GL, Douglas RG, Bennett JE, eds. *Principles and practice of infectious diseases*. 3rd Ed. New York: Churchill Livingstone, 1990:716-21.
- Bertel O, Braun H-P, Gradel E. Non-compliance with the AHA recommendations for antibiotic prophylaxis of bacterial endocarditis in patients with valvular heart disease [Abstract]. *Circulation* 1983; 68 (suppl III):III-205.
- Dajani AS, Bisno AL, Chung KJ, et al. Prevention of bacterial endocarditis. Recommendations by the American Heart Association. *JAMA* 1990; 264:2919-22.