Recommendations for prevention of bacterial endocarditis: compliance by dental general practitioners

DONALD SADOWSKY, D.D.S., M.P.H., PH.D., AND CAROL KUNZEL, PH.D.

ABSTRACT Telephone interviews were conducted with a national sample of general practice dentists (n = 460). Clinical vignettes were used to test clinicians’ knowledge of, and compliance with, the 1984 American Heart Association (AHA) recommendations for prevention of bacterial endocarditis. Analyses of the data document a relatively low level of knowledge of correct indications and regimens for antibiotic prophylaxis to prevent endocarditis. Respondents were unsure, and often incorrect, about the relationship between a variety of cardiac conditions and potential risk for endocarditis. Compliance with the guidelines for proper dosage and timing of antibiotics was also problematic. Those clinicians who had a better understanding of patient risk factors and the principles underlying the AHA recommendations were more likely to follow them, as were practitioners who kept a copy of the recommendations in the office. The findings are significant in view of previous suggestions that use of inappropriate antibiotic regimens may predispose to adverse outcomes.


THE American Heart Association (AHA) in concert with the American Dental Association (ADA) has periodically advised physicians and dentists to prescribe antibiotics prophylactically for patients receiving therapeutic interventions that can produce bacteremia. The most recent recommendations (1984) supersede those of 1977, 1972, 1965, and 1955.

There has been some research during the past decade on dentists’ compliance with accepted antibiotic regimens for patients at risk for bacterial endocarditis. This study differs from any of those preceding in that, in addition to the issue of clinician adherence to expert advice, it also (1) presents analysis of a national database, (2) focuses on the most recent AHA recommendations (1984), (3) examines general practice (GP) dentists’ difficulties in assessing degree of risk associated with a variety of cardiac conditions, (4) discusses the impact of selected factors on adherence to the recommendations and their implications for increased compliance by American dentists.

Methods

Subjects. A stratified sample of 836 American GP dentists was drawn from the November 1985 ADA master file.* Certified letters introducing the study, followed shortly thereafter by a telephone call, were used to ascertain potential respondents’ eligibility and willingness to participate. Eligibility was determined by the two basic criteria of nonspecialist status and a specified minimum level of patient contact. Telephone interviews were completed with 578 of the 714 eligible potential respondents, for a response rate of 81%. There were no statistically significant differences (p ≥ .05) between respondents and nonrespondents with respect to mean age, percentage of both groups under and over 45 years of age, number of years since graduating dental school, urban-rural locale of practice or census region (nine U.S. census regions), or ADA membership status. Because of decreased precision resulting from disproportionate weighting, the 578 stratified cases were equivalent to a simple random sample of 460,10 the sample size reported here.

Data collection. A structured instrument was used to collect data via telephone interviews. Open-ended clinical vignettes were used to test knowledge of and compliance with the AHA recommendations. Respondents were asked to give the actual prescription(s) they would write or the regimens they would administer to patients at risk for endocarditis who needed an extraction. The standard against which clinician levels of knowledge were assessed was the most recent AHA recommendations for the prevention of the disease.

Results

Identification of patients at risk. Respondents were unsure, and often incorrect, about the connection be-

*The specifics of sample methodology and all results presented in tabular form may be obtained on request.
THERAPY AND PREVENTION—BACTERIAL ENDOCARDITIS

TABLE 1
Variation (%) in GP dentists’ determination of patient risk status (n=456)

<table>
<thead>
<tr>
<th>Patient type</th>
<th>Yes, would provide prophylaxis for an extraction</th>
<th>No, would not provide prophylaxis for an extraction</th>
<th>Don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart attack</td>
<td>19.5</td>
<td>68.0&lt;sup&gt;B&lt;/sup&gt;</td>
<td>12.5</td>
</tr>
<tr>
<td>Bypass heart surgery</td>
<td>39.7</td>
<td>45.9&lt;sup&gt;B&lt;/sup&gt;</td>
<td>14.3</td>
</tr>
<tr>
<td>History of endocarditis</td>
<td>80.7&lt;sup&gt;B&lt;/sup&gt;</td>
<td>8.3</td>
<td>10.9</td>
</tr>
<tr>
<td>History of rheumatic fever — no murmur</td>
<td>69.9</td>
<td>21.9&lt;sup&gt;B&lt;/sup&gt;</td>
<td>8.2</td>
</tr>
<tr>
<td>Congenital malformation</td>
<td>68.4&lt;sup&gt;B&lt;/sup&gt;</td>
<td>15.6</td>
<td>15.9</td>
</tr>
<tr>
<td>Continuing regimen (n=460)</td>
<td>29.2&lt;sup&gt;B&lt;/sup&gt;</td>
<td>47.9</td>
<td>22.9</td>
</tr>
</tbody>
</table>

(1) = A patient who had a heart attack 6 months ago and has made an uneventful recovery.
(2) = A patient who had bypass heart surgery 6 months ago and has made an uneventful recovery.
(3) = A patient who was hospitalized with bacterial endocarditis 5 years ago and who was successfully treated and now leads a normal life.
(4) = A patient with a history of rheumatic fever but with no detectable heart murmur.
(5) = A patient with a history of a congenital cardiac malformation, for example, a ventricular septal defect.
(6) = A patient on a continuing regimen for secondary prevention of rheumatic fever.
<sup>A</sup> Respondents were given the following additional information for patients 1 to 5: Assume in each case that there is no other significant medical history and that the patient’s medical history has been verified.
<sup>B</sup>The correct answer.

Between a variety of cardiac conditions and potential risk for bacterial endocarditis (table 1). For two hypothetical patients who had histories of heart attack and bypass surgery 6 months before presenting for an extraction, 20% and 40% of respondents, respectively, said they would provide antibiotic prophylaxis. Likewise, 70% said they would prescribe prophylaxis for patients with a history of rheumatic fever but without clinical evidence of heart disease.

About one-third of respondents did not recognize that patients with a history of congenital heart disease are at risk for endocarditis and require antibiotic prophylaxis. These clinicians stated either that they did not know whether or not to use antibiotics or that these patients do not require prophylaxis. Issues of the same nature confused 71% of subjects with regard to patients receiving a continuing regimen of penicillin for secondary prevention of rheumatic fever (table 1).

**Antibiotic management of patients.** The rate of strict adherence to the recommendations was low, and varied from about one in three respondents for the patient with rheumatic heart disease to a single respondent who was correct about treating the patient with a prosthetic heart valve.

Of subjects who did not follow the AHA recommendations, 55% to 93% (depending on risk category) prescribed an initial dose half or less that of the recommended dosage. A range of 37% to 90% also prescribed a postoperative dose half or less that of the recommended dosage (table 2).

For patients with histories of rheumatic heart disease and those with prosthetic heart valves, 44% and 27%, respectively, incorrectly began prophylaxis 1 day or more in advance, and 62% and 39%, respectively, incorrectly continued the regimen 2 days or more postoperatively (table 2).

**Disease process, risk assessment, and awareness of the AHA recommendations.** Subjects who were more knowledgeable about the pathophysiology of the disease were more likely to follow the AHA recommendations than were those with little or no knowledge of the disease principles (table 3). There was also a direct linear relationship between increasing ability to assess
TABLE 3
Relation of three variables to knowledge of the AHA recommendations for the patient with rheumatic heart disease

(1) Relation of theoretical knowledge index to knowledge of the AHA recs

<table>
<thead>
<tr>
<th>Theoretical knowledge index</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>(n=305)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't follow recs</td>
<td>80.7%</td>
<td>64.4%</td>
<td>48.9%</td>
<td>(n=155)</td>
</tr>
<tr>
<td>Follow recs</td>
<td>19.3%</td>
<td>35.6%</td>
<td>51.1%</td>
<td>(n=460)</td>
</tr>
</tbody>
</table>

(2) Relation of patient risk assessment index to knowledge of the AHA recs

<table>
<thead>
<tr>
<th>Patient risk assessment index</th>
<th>(0-1)</th>
<th>2</th>
<th>3</th>
<th>4-5</th>
<th>(n=155)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't follow recs</td>
<td>85.7%</td>
<td>72.3%</td>
<td>64.3%</td>
<td>55.1%</td>
<td>(n=456)</td>
</tr>
<tr>
<td>Follow recs</td>
<td>14.3%</td>
<td>27.7%</td>
<td>35.7%</td>
<td>44.9%</td>
<td>(n=456)</td>
</tr>
</tbody>
</table>

(3) Relation of office-based possession of the AHA recs to knowledge of the AHA recs

<table>
<thead>
<tr>
<th>Keep copy of AHA recs in office?</th>
<th>No</th>
<th>Yes</th>
<th>(n=301)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't follow recs</td>
<td>92.6%</td>
<td>58.0%</td>
<td>(n=155)</td>
</tr>
<tr>
<td>Follow recs</td>
<td>7.4%</td>
<td>42.0%</td>
<td>(n=456)</td>
</tr>
</tbody>
</table>

\(A\) The theoretical knowledge index was created by summing the number of correct responses to the following items: (1) the organism most frequently identified as coming from the mouth and adhering to damaged heart valves; (2) the duration of the bacteremia produced by a dental surgical procedure.

\(B\) The patient risk assessment index was created by summing the number of correct responses for patient types 1 to 5 presented in table 1.

risk correctly and respondents' adherence to the recommendations.

Approximately 90% of American GP dentists professed to be aware of the AHA recommendations for the prevention of infective endocarditis. All respondents were asked if they had referred to the recommendations during the interview. Of the 12.5% who answered in the affirmative, 40% were unable to answer correctly all questions about the recommendations. Nevertheless, respondents who kept a copy of the recommendations in the office (77%) were more likely to follow them (table 3).

Discussion

Although a dentist member serves on the AHA Committee on Rheumatic Fever and Infective Endocarditis, and there is also review and approval of the committee recommendations by the ADA Council on Dental Therapeutics, the identification of patients at risk for endocarditis and the proper dosage and timing of antibiotics remain incompletely understood by American GP dentists.

However, clinicians who understand some of the principles of pathophysiology that underlie the AHA recommendations, e.g., the concept of transient bacteremia, are more likely to follow the recommendations, as are those who understand the factors that place patients at risk for endocarditis, and those who retain a copy of the recommendations in the office. These data suggest the possible efficacy of increased efforts to make dentists more aware of the pathophysiology of bacterial endocarditis, and to direct this information, and the AHA recommendations themselves, to dental offices.

The study findings are of particular significance when considered in the light of the earlier findings of Durack et al.\(^{11}\) regarding "failed prophylaxis," i.e., patients who developed endocarditis after receiving prophylactic antibiotic regimens that were not in accord with the then-current recommendations of the AHA.

We thank Dr. Edward Kaplan, University of Minnesota, for his helpful comments subsequent to a thoughtful review of an earlier draft of this report.

References
Recommendations for prevention of bacterial endocarditis: compliance by dental general practitioners.
D Sadowsky and C Kunzel

Circulation. 1988;77:1316-1318
doi: 10.1161/01.CIR.77.6.1316
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
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