MAYO CLINIC

ORIGINAL ARTICLE

Effect of the American Heart Association 2007 Guidelines on the Practice of Dental Prophylaxis for the Prevention of Infective Endocarditis in Olmsted County, Minnesota

Daniel C. DeSimone, MD; Abdelghani El Rafei, MD; Douglas W. Challener, MD; Alan B. Carr, DMD; James A. Kelly, DDS; Walter A. Rocca, MD, MPH; Jennifer L. St Sauver, PhD; Cynthia M. Bock-Goodner, BA; Brian D. Lahr, MS; James M. Steckelberg, MD; Walter R. Wilson, MD; and Larry M. Baddour, MD

Abstract

Objective: To determine the adherence of dental providers to the 2007 American Heart Association (AHA) infective endocarditis prevention guidelines regarding antibiotic drug administration before invasive dental procedures.

Patients and Methods: The study included all adults (≥18 years old) with a moderate-risk (MR) or high-risk (HR) cardiac condition who received dental care at participating dental offices from January 1, 2005, through June 1, 2015, in Olmsted County, Minnesota. Data collected included the date and type of dental procedure performed and receipt of antibiotic prophylaxis (AP).

Results: A total of 1351 patients underwent 8854 dental visits at participating dental offices during the study period; 1236 patients had an MR cardiac condition and 115 had an HR condition. The percentage of visits in which antibiotic drugs were used for indicated dental procedures in the MR group declined from 64.6% before to 8.6% after publication of the 2007 AHA guidelines ($P<.001$); for the HR group, AP declined from 96.9% before to 81.3% after publication of the guidelines ($P=.02$).

Conclusion: In this historical cohort in Olmsted County there was a statistically significant reduction in AP in the MR group before invasive dental procedures. In addition, there was an unanticipated significant reduction in AP in the HR group after publication of the 2007 AHA guidelines. These findings can be used to provide feedback and education to medical and dental professionals who are involved in decision making regarding the use of dental prophylaxis for their patients.

 ■ Mayo Clin Proc. 2017;■■(■):1-9

In 2007, the American Heart Association (AHA) guidelines for the prevention of infective endocarditis (IE) recommended cessation of antibiotic prophylaxis (AP) before invasive dental procedures for patients with certain cardiac conditions at moderate risk (MR) for developing IE, but continuation of prophylaxis for patients at high risk (HR) compared with the lifetime risk of the general population.[1] This recommendation, if followed, would result in a drastic reduction in the overall number of patients receiving AP. In response, there has been substantial concern among some medical and dental health care providers that there would be a significant increase in the incidence of viridans group streptococci (VGS) IE after adoption of these guidelines. Fortunately, in 2 population-based studies from our group in Olmsted County, Minnesota,[2,3] and in studies from large, national (US) databases,[3-5] there has not been a detectable increase in the VGS IE incidence in the United States since publication of the 2007 AHA guidelines.[2-5]

Lockhart et al[6] surveyed a random sample of 5500 US dentists to determine the acceptance of the 2007 AHA recommendations. Interestingly, most respondents indicated that they had patients who continued to receive AP despite the lack of support from

From the Division of Infectious Diseases (D.C.D., A.E.R., J.M.S., W.R.W., L.M.B.), Division of Internal Medicine (D.W.C.), Division of Dental Specialties (A.B.C., J.A.K.), Division of Epidemiology, Department of Health Sciences Research (W.A.R., J.L.S.S.), Department of Neurology (W.A.R.), Department of Information Technology (C.M.B.-G.), Division of

Affiliations continued at the end of this article.

the 2007 guidelines. The most common reasons were physician recommendation (57%), patient preference (33%), dentist recommendation (5%), or other (5%).[6]

Although study results regarding VGS IE incidence since 2007 are reassuring, the magnitude of the practice change in response to the 2007 AHA IE prevention guidelines in the United States remains unknown. The lack of a single, centralized database for the identification of at-risk patients and the lack of access to private medical and dental records have posed a significant barrier to performing studies on guideline adherence. Using the Rochester Epidemiology Project (REP), we performed a linkage of medical and dental records to identify adults with MR and HR cardiac conditions living in Olmsted County who received dental care at any of 8 local offices (of 40 offices) that were participating in the REP from January 1, 2005, through June 1, 2015. These 8 dental offices serve approximately 25% of all residents of Olmsted County. The percentage of patients receiving AP before (based on the 1997 AHA guidelines) and after the 2007 AHA guidelines were compared to define guideline adherence.

PATIENTS AND METHODS

Details regarding the characteristics of the Olmsted County population and the REP medical records linkage system have been described previously.[7-12] Briefly, the REP links together the medical records of health care providers in Olmsted County. This linkage system allows investigators to follow residents of this community across all of their sources of health care, regardless of type of health condition or insurance status. This system has historically included only medical care providers, but more recently has expanded to include 8 dental practices; these were listed as practices 1 through 8 to protect confidentiality. These practices provided dental care for approximately 25% of the county population. Each provider had a practice that included approximately 1500 to 2000 patients. Practice 1 had 3 dentists and 3 hygienists; practice 2 had 2 dentists and an undisclosed number of hygienists; practice 3 had 1 dentist and 1 hygienist; practice 4 had 3 dentists and 2 hygienists; practice 5 had 7 periodontists and 11 hygienists; practice 6 had 3 dentists, 7 hygienists, and 2 oral maxillofacial surgeons; practice 7 had 1 dentist and an undisclosed number of hygienists; and practice 8 had 2 orthodontists, 2 periodontists, 5 oral surgeons, 1 orofacial pain dentist, 3 maxillofacial prosthodontists, and 5 hygienists.

Study Population

Adults (age $\geq$18 years) were included if they lived in Olmsted County for a minimum of 12 months from January 1, 2005, through June 1, 2015, with an MR or HR cardiac condition for developing IE and had received dental care at any of the 8 local dental offices. Medical records were reviewed extensively (D.C.D.). All the patients had at least 1 echocardiogram (either transthoracic or transesophageal), which provided confirmation of each patient's MR or HR cardiac condition. Patients with other indications for AP were excluded. Dental records, including general/hygiene, periodontics, orthodontics, prosthetics/aesthetics, and oral maxillofacial surgery, were also reviewed at each dental office (D.C.D.). Patient allergy histories to amoxicillin, penicillin, cephalexin, azithromycin, clarithromycin, and clindamycin were also recorded.

The institutional review boards of Mayo Clinic and Olmsted Medical Center approved the study. All the patients included in this study provided authorization for their medical and dental records to be used for research.[10]

Cardiac Conditions Associated With IE

In the 1997 and 2007 AHA IE prevention guidelines,[1,13] certain cardiac conditions were associated with HR, MR, and negligible risk of IE. Before April 19, 2007, (online publication date of the 2007 AHA guidelines), AP was recommended for patients in both the MR and HR groups but not in the negligible-risk group. After 2007, AP was recommended only for the HR group but no longer for the MR group. The *International Classification of Diseases, Clinical Modification* diagnostic coding system was used to identify patients with the specific cardiac conditions listed in Supplemental Tables 1-3 (available online at http://www.mayoclinicproceedings.org).

Mayo Clin Proc. ■ XXX 2017;■■(■):1-9 ■ http://dx.doi.org/10.1016/j.mayocp.2017.03.013
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