Nigerian dentists’ knowledge of the current guidelines for preventing infective endocarditis

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Objective: This study assessed Nigerian dentists’ knowledge of current guidelines for the prevention of infective endocarditis. Material and methods: A self-administered questionnaire surveyed a cross-section of Nigerian dentists gathering information on respondent demographics, awareness of the American Heart Association current guidelines on preventing infective endocarditis and sources of knowledge regarding that guidance. Respondents indicated: a) whether or not they would prescribe antibiotics before dental treatment in 10 cardiac conditions, b) if antibiotic prophylaxis was reasonable before 10 dental procedures in an endocarditis high-risk patient, and c) a prescription for oral antibiotics for an endocarditis high-risk non-allergic adult about to undergo a dental procedure. Results: Respondents numbered 173 and 41% were aware of the guidelines. Most commonly the sources of this knowledge were undergraduate/postgraduate education. Overall, the correct responses for the 10 cardiac conditions was very low (33%), ranging from 94% for prosthetic heart valves (94.2%) down to 4% for previous coronary artery bypass (3.5%). For clearly invasive procedures, 80% to 96% of respondents indicated that a prophylactic antibiotic was reasonable. For clearly non-invasive procedures, 89% to 92% indicated that antibiotics were not reasonable. Correct antimicrobial agent, dose and timing of administration were prescribed by 89%, 9%, and 57% respectively. Conclusions: A low level of knowledge of the current guidelines was found among Nigerian dentists. Although, most prescribed the correct antimicrobial agent, the numbers prescribing correct dose and time of administration were quite low. Therefore, attempts should be made to teach the current guidelines in Nigerian undergraduate/postgraduate dental education.

Key words: Nigeria, infective endocarditis

Introduction

Infective endocarditis (IE) is an uncommon but life-threatening infection (Wilson et al., 2007). Despite advances in diagnosis, antimicrobial therapy, surgical techniques, and management of complications, patients with IE still have high morbidity and mortality rates related to this condition (Wilson et al., 2007). Since 1955, the American Heart Association (AHA) has recommended peridental operative antibiotic administration to prevent infective endocarditis (IE). The guidelines have been updated many times since then. Since the 1997 AHA guidelines on prevention of IE were published (Dajani et al., 1997) many authorities, societies and conclusions of published studies have questioned the efficacy of antimicrobial prophylaxis to prevent IE in patients who undergo a dental, gastrointestinal (GI), or genitourinary (GU) tract procedure and have suggested that the AHA guidelines be revised (Durack, 1998; Strom et al., 1998). The guidelines were revised in 2007 due to obvious glaring deficiencies of the previous guidelines (Wilson et al., 2007). The revision was based on the fact that the previous recommendations were based on Class IIb recommendations (usefulness/efficacy of the recommendations is less well established by evidence/opinion) and level of evidence C (evidence based only on consensus opinion of experts, case studies, or standard of care) (Wilson et al., 2007). Knowledge of the recommendation for prevention of infective endocarditis and its compliance is mandatory for clinicians especially when handling patients that undergo a dental, gastrointestinal and genitourinary procedure because of its possible legal implication (Dajani et al., 1990). Inadequate knowledge and poor to fair compliance with the previous versions of the AHA recommendations among patients and health care providers have been reported (Brooks, 1980; Sadowsky and Kunzel, 1988). This has been attributed to the fact that the previous guidelines are cumbersome and confusing (Wilson et al., 2007).

To date, there is no information regarding knowledge of the guidelines for the prevention of infective endocarditis among Nigerian dentists. The aim of the survey was to assess the knowledge and the implementation of a cross section of Nigerian dentists on the current guidelines (American Heart Association, 2007) for the prevention of infective endocarditis.

Material and methods

A self-administered questionnaire (a modification of Zadik et al., 2008) was distributed among a cross-section of Nigerian dentists between March and April 2010. The sample was selected among dentists practicing in private, public and teaching hospitals in the country using convenience sampling method. The information sought

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included demographics of the respondents, awareness of the current AHA guidelines on preventing infective endocarditis and sources of knowledge regarding that guidance. Respondents were also asked to indicate whether or not they would prescribe antibiotics before dental treatment in 10 cardiac conditions. They were also asked if antibiotic prophylaxis was reasonable before 10 dental procedures in an endocarditis high-risk patient.

Data analysis was done using SPSS for Windows (12.0 version, Chicago IL). Descriptive statistics and tests of significance (p≤0.05) were used as appropriate.

### Results

Out of 200 questionnaires distributed 173 (87%) were returned and analysed. The mean age of respondents was 34.3 years (SD 7.7) and 57% of them were men (Table 1). Time from dental school graduation ranged between 1 and 28 years (mean 6.9, SD 6.3). Most respondents graduated before 2007 and most commonly they were resident doctors in training (Table 1). Only 71 respondents (41%) knew of the current AHA guidelines on the prevention of infective endocarditis and the most common source of this knowledge was their undergraduate education, followed by postgraduate continuing medical education (Table 2). Most respondents indicated more than one source of knowledge; most commonly the above two sources (n=11) followed by undergraduate education and verbal personal communication (n=6). No respondent indicated local literature alone as their source of knowledge. Overall, only 33% of respondents indicated all the correct answers for the cardiac conditions with most correct responses for prosthetic heart valves and previous IE illness but fewest for previous coronary artery bypass and mitral valve prolapsed with valvular regurgitation (Table 3). The correct response rates for pre-and post-2007 graduates were similar (p=0.17). Table 4 shows the participants’ decisions regarding the need for antibiotic prophylaxis for the 10 dental procedures in a high-risk endocarditis patient. For clearly invasive procedures, endodontics, and clearly non-invasive procedures four-fifths or more responded correctly regarding indications for antibiotic prophylaxis. However, with other procedures listed lower in Table 4 there was greater uncertainty or error.

One hundred and forty-three (83%) prescribed antibiotics for an adult endocarditis high-risk non-allergic patient about to undergo a dental procedure. Thirteen respondents (8%) prescribed correct antibiotics agent, dosage and timing based on the new AHA guidelines. The recommended Amoxicillin was prescribed by 127 (89%), correct dosage (2g) by 9% and timing of administration (30-60 minutes preoperative) were correctly indicated by 57%.

### Discussion

Unlike 1997 AHA guidelines which were based on consensus opinion of experts, case studies or standard of care, the 2007 AHA guidelines were based on collected evidence published in numerous studies over the past two decades. The primary reasons for 2007 AHA...
recommendations for IE prophylaxis are: (i) IE is much more likely to result from frequent exposure to random bacteremia associated with daily activities than from bacteremia caused by a dental, GI tract, or GU tract procedure; (ii) prophylaxis may prevent an exceedingly small number of cases of IE, if any, in individuals who undergo a dental, GI tract, or GU tract procedure; (iii) The risk of antibiotic-associated adverse events exceeds the benefit, if any, from prophylactic antibiotic therapy and (iv) maintenance of optimal oral health and hygiene may reduce the incidence of bacteremia from daily activities and is more important than prophylactic antibiotics for a dental procedure to reduce the risk of IE (Wilson et al., 2007).

Although about 41% of dentists claimed to have knowledge of the current AHA guidelines for the prevention of IE, only a third of the dentists correctly answer correctly for all 10 cardiac conditions. Many Nigerian dentists appear unfamiliar with the details of current guidelines. Zadik et al. (2008) reported that all dentists in their study knew of the 2007 guidelines with 81% correctly answering for the ten cardiac conditions. In the present study, the most prominent inadequate knowledge regarding cardiac conditions was shown in “previous coronary artery bypass graft surgery” (4% correct) and mitral valve prolapsed (MVP) with valvular regurgitation (9%). Zadik et al. (2008) however reported a lowest correct response of 58% for MVP with valvular regurgitation.

In the present study, the highest correct responses for which prophylaxis with dental procedures is reasonable were indicated for prosthetic cardiac valves and previous IE illness; and correct response to them was “yes”. This result is similar to the findings of Zadik et al. (2008) among practicing Israeli dentists, where 95% and 90% indicated correct response for prosthetic cardiac valves and previous IE illness. Based on the available evidence, the two conditions are reported to be associated with the highest risk of adverse outcome from endocarditis (Wilson et al., 2007). This includes procedures such as biopsies, suture removal and placement of orthodontic bands (Wilson et al., 2007). Although IE prophylaxis is reasonable for these patients, its effectiveness, based on the quality of evidence in the literature is unknown (Wilson et al., 2007). The guidelines also stated clearly that the following procedures and events do not need prophylaxis: routine anesthetic injections through non-infected tissue, taking dental radiographs, placement of removable prosthetic or orthodontic appliances, adjustment of orthodontic appliances, placement of orthodontic brackets, shedding of deciduous teeth, and bleeding from trauma to the lips or oral mucosa (Wilson et al., 2007).

For high-risk patients and clearly invasive procedures a high percentage of respondents indicated that antibiotic prophylaxis was reasonable. However, between 4% and 21% either indicated that antibiotic prophylaxis was unreasonable or they were unsure. Conversely, about 4-5% of respondents indicated antibiotics prophylaxis for clearly non-invasive procedures such as intra-oral radiography and placement of orthodontic appliance (not bands). The latest AHA guidelines on dental procedures requiring antibiotics prophylaxis in IE high-risk patients were based on the fact that few published studies exist on the magnitude of bacteremia after a dental procedure or

<table>
<thead>
<tr>
<th>Dental procedures</th>
<th>Number (%) who responded</th>
<th>Correct response</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Reasonable</td>
<td>Not reasonable</td>
</tr>
<tr>
<td>Periodontal surgery</td>
<td>166 (96)</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Tooth extraction</td>
<td>159 (92)</td>
<td>9 (5)</td>
</tr>
<tr>
<td>Intraoral radiographs</td>
<td>8 (5)</td>
<td>158 (91)</td>
</tr>
<tr>
<td>Placement of orthodontic appliance (not bands)</td>
<td>7 (4)</td>
<td>154 (89)</td>
</tr>
<tr>
<td>Endodontic treatment</td>
<td>153 (88)</td>
<td>14 (8)</td>
</tr>
<tr>
<td>Shedding of a primary tooth</td>
<td>6 (4)</td>
<td>153 (88)</td>
</tr>
<tr>
<td>Scaling</td>
<td>138 (80)</td>
<td>31 (18)</td>
</tr>
<tr>
<td>Tooth preparation with taking of oral impressions</td>
<td>19 (11)</td>
<td>134 (77)</td>
</tr>
<tr>
<td>Local anesthetic infiltration</td>
<td>44 (25)</td>
<td>108 (63)</td>
</tr>
<tr>
<td>Restoration of gingival (class II) caries lesion</td>
<td>88 (51)</td>
<td>72 (42)</td>
</tr>
</tbody>
</table>

Note: R=Reasonable; NR=Not reasonable
from routine daily activities, and most of the published data used older, often unreliable microbiological methodology (Wilson et al., 2007). There are no published data demonstrating that a greater magnitude of bacteremia, compared with a lower magnitude, is more likely to cause IE in humans. The magnitude of bacteremia resulting from a dental procedure is relatively low (104 colony-forming units of bacteria per ml), similar to that resulting from routine daily activities, and is less than that used to cause experimental IE in animals (106 to 108 colony-forming units of bacteria per ml) (Durack and Beeson, 1972, Roberts et al., 2006). It is also believed that the frequency, nature and duration of bacteremia associated with routine daily activities unrelated to dental procedures (brushing, flossing, chewing food) are far greater than during a few minutes/hours of dental procedures (Wilson et al., 2007).

Although about 90% of respondents prescribed the recommended antibiotic agent, only 9% indicated the correct dosage and 57% the correct timing of administration. The high number of those who prescribed correct antibiotic agent may be due to the fact that Amoxicillin has been the preferred antibiotic for antibiotic prophylaxis in IE prone patients since 1990 (Dajani et al., 1990; 1997). The current AHA guidelines (2007) recommend that antibiotics for prophylaxis should be administered in a single dose before the procedure. If the dosage of antibiotic is inadvertently not administered before the procedure, the dosage may be administered up to 2 hours after the procedure (Wilson et al., 2007). However, administration of the dosage after the procedure should be considered only when the patient did not receive the pre-procedure dose.

Some patients scheduled for an invasive procedure may have a coincidental endocarditis. The presence of fever or other manifestations of systemic infection should alert the provider to the possibility of IE. In these circumstances, it is important to obtain blood cultures and other relevant tests before administering antibiotics intended to prevent IE and failure to do so may result in delay in diagnosis or treatment of a concomitant case of IE (Wilson et al., 2007).

Conclusions

A low level of knowledge of the current AHA guidelines on antibiotics prophylaxis in IE high risk patients undergoing dental procedures was found among Nigerian dentists. The lack of awareness and familiarity with the latest guidelines’ detail may reflect the fact that most respondents graduated before their release; and many have not acquainted themselves with the current version. Therefore, attempts should be made to teach the current guidelines in both the undergraduate curriculum and in continuing postgraduate dental education.

References


