NICE guideline on antibiotic prophylaxis against infective endocarditis: attitudes to the guideline and implications for dental practice in Ireland

IN BRIEF

- Presents the attitudes of Irish dentists, cardiologists and patients to the 2008 NICE guideline on antibiotic prophylaxis against infective endocarditis.
- Highlights the uncertainty of patients regarding prophylactic antibiotics and the importance of patient re-education.
- Outlines the difficulties facing Irish dentists due to the lack of direction from a national body regarding antibiotic prophylaxis against infective endocarditis.

RESEARCH

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Aims and objectives To investigate attitudes of Irish dental practitioners, cardiologists and patients with cardiac lesions to the new NICE guideline for antibiotic prophylaxis against infective endocarditis and to determine the implications of this guideline for dental practice in Ireland. **Methods** Individually tailored anonymous postal questionnaires were sent to 500 dental practitioners, 54 cardiologists and 50 patients with a history of antibiotic prophylaxis usage before dental treatment. **Results** Two hundred and ninety questionnaires were returned from dental practitioners (a response rate of 58%), 20 questionnaires were returned from cardiologists (a response rate of 37%) and 34 questionnaires were returned from patients (a response rate of 68%). Two thirds of patients surveyed would be concerned about the possible cessation of antibiotic prophylaxis before dental treatment and would require either verbal or written confirmation from a cardiologist. Among the dental practitioners surveyed a significant majority were not willing to implement the NICE guideline without further information from the patient general medical practitioner, cardiologist or an official Irish body. **Conclusion** To enable patient re-education regarding antibiotic prophylaxis, dental practitioners must keep abreast of changes to current guidelines and understand the rationale driving these changes. Difficulties arise for dental practitioners when there is no national statutory body endorsing such guidelines, particularly now that the guidelines in relation to antibiotic prophylaxis in dentistry are so different.

INTRODUCTION

Infective endocarditis (IE) is an inflammation of the endocardium, principally affecting the heart valves, of mainly bacterial origin. It has an annual incidence of approximately 1.7-6.2 per 100,000 cases[1] in the normal population. Significant mortality and morbidity is associated with the condition and annual mortality has been reported to approach 40%.[2]

Accepted clinical practice has been to use antibiotic prophylaxis in those at risk of IE who are having dental procedures, in order to prevent the development of infective endocarditis. The rationale for prophylaxis against IE can be summarised as follows: endocarditis generally follows bacteraemia; certain interventional procedures can cause bacteraemia with organisms that cause endocarditis; these bacteria are usually sensitive to antibiotics and therefore, antibiotics should be given to patients with predisposing heart disease before procedures that may cause bacteraemia.[3] In fact antibiotic prophylaxis for the prevention of infective endocarditis in dental patients was first used in 1943[4] and in 1955 the American Heart Association (AHA) published its first set of guidelines.[5]

The effectiveness of such antibiotic prophylaxis in humans, however, has not been proven[6] and the majority of cases of IE of oral origin are most likely due to random bacteraemias caused by daily activities such as chewing food, brushing teeth and flossing.[7-9] Within the last two years alone a number of amendments to current antibiotic prophylaxis guidelines were made, leading to confusion among practitioners. In 2006 the British Society for Antimicrobial Chemotherapy (BSAC) produced guidelines on the prevention of endocarditis[10] and in June 2007 the AHA published updated guidelines on antibiotic prophylaxis.[8] The National Institute for Health and Clinical Excellence (NICE) reviewed matters with regard to antibiotic prophylaxis to prevent bacterial endocarditis and as a result, NICE published its own guidelines in March 2008.[11]

Although these guidelines govern clinical practice in England and Wales, they are also pertinent for clinicians practising in the Republic of Ireland given their close geographic proximity and the fact that dental professionals move between these countries regularly. Other NICE guidelines are commonly applied in Ireland in clinical situations, such as the guideline regarding removal of wisdom teeth, so although there is no legal requirement for practitioners

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in the Republic of Ireland to adopt the NICE guideline regarding antibiotic prophylaxis, it would certainly not be unreasonable for this guideline to be used in dental practice. The aims of this study were firstly to investigate current practice relating to antibiotic prophylaxis against infective endocarditis, secondly to ascertain the opinions of dental practitioners, cardiologists and patients previously prescribed antibiotic prophylaxis to the new NICE guideline and finally to determine attitudes towards possible implementation of this guideline in clinical practice within the Republic of Ireland.

MATERIALS AND METHODS

Individually tailored anonymous questionnaires (Appendices 1a-c), cover letters and a summary of the NICE guideline on antibiotic prophylaxis were sent to dental practitioners, cardiologists and patients with a history of antibiotic prophylaxis usage. A list of 500 dental practitioners was randomly derived from the 2,500 dentists on the dental register as provided by the Dental Council in Ireland. A total of 54 cardiologists registered with the Irish Cardiac Society and a list of 50 patients previously requiring antibiotic prophylaxis before dental treatment, were obtained from the drug register of Cork University Dental School and Hospital. Local ethics committee approval was obtained.

Dental practitioners

Dental practitioners were asked in what area of practice they were involved, the antibiotic prophylaxis guidelines they currently followed, what their opinion was on the new NICE guideline, whether on not they intended to implement the new guideline and in a case of uncertainty with a patient regarding whether or not prophylaxis was required, how they would proceed.

Cardiologists

Cardiologists were likewise asked which guidelines they currently followed and their opinion on the NICE guideline. They were requested to estimate the number of patients they had treated with IE and the number they felt were linked to a dental cause. Finally they were asked if they would be happy for a dental practitioner to implement the new NICE guideline without consulting them on this matter.

Patients

The patients were asked why they required antibiotic prophylaxis before dental treatment, which practitioner had informed them of the need for this prophylaxis and the number of years they have received prophylaxis. They were asked their opinion of the new guideline as outlined in the summary presented to them and if they would be happy for their dental practitioner to implement these changes in the practice they attend.

Table 1 Responses of dental practitioners (n = 290) to the questionnaire

Current guidelines being used	n	%
BSAC	226	77.9
AHA	48	16.6
Hospital guideline*	11	3.8
NICE	3	1
Unsure	2	0.7
What to do if unsure about whether or not antibiotic prophylaxis is needed	**n**	**%**
Contact cardiologist	89	30.6
Give antibiotics just in case	42	14.5
Contact general medical practitioner	148	51
Continue without antibiotics	6	2.1
Chlorhexidine mouthwash	1	0.34
Contact a dental hospital	3	1.03
Consult BNF	1	0.34
Opinion on new NICE guideline	**n**	**%**
A positive change	125	43
Too radical	30	10.3
Clarification required	130	45
Patient education will be difficult	3	1
Unsure	2	0.7
Intention to implement new NICE guideline	**n**	**%**
Immediate implementation	49	17
Letter of confirmation from cardiologist	105	36
Clearance from medical practitioner	67	23
Guidance requested from an official body in Ireland	55	19
No, I will not be implementing the new guideline	10	3
AHA guideline is better	4	2

*Guidelines regarding antibiotic prophylaxis developed by either Cork Dental Hospital or Dublin Dental Hospital.

RESULTS

Dental practitioners

Of the 500 questionnaires sent to dental practitioners, 290 replied, giving a response rate of 58%. One hundred and eighty-two (62.7%) responses were from general dental practitioners, 44 (15.3%) from dentists working in the Health Service Executive (public dental service), 39 (13.4%) from specialist practice and 25 (8.6%) from hospital-based practice.

The results of the questionnaire sent to dental practitioners are represented in Table 1.

Cardiologists

A total of 20 questionnaires were returned from cardiologists, giving a response rate of 37%.

A wide range of figures was given in response to the question of how many patients had been diagnosed with infective endocarditis (2-500). A similar range was seen in relation to the number

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Table 2 Responses of cardiologists (n = 20) to the questionnaire		
Current guidelines being used	**n**	**%**
BSAC	4	20
AHA	14	70
NICE	1	5
ESC*	1	5
Opinion on new NICE guideline	**n**	**%**
A positive change	4	20
Too radical	6	30
Clarification required	8	40
AHA guidelines are better	2	10
Happy for a GDP to implement this guideline without consulting you?	**n**	**%**
Yes	15	75
No	5	25

*European Society of Cardiology

Table 3 Responses of patients (n = 34) to the questionnaire		
Cardiac condition	**n**	**%**
Murmur	12	35.3
Valve prolapse	4	11.8
Valve stenosis	4	11.8
Atrial fibrillation	3	8.9
Valve replacement	2	5.9
Unspecified cardiac surgery	2	5.9
Cardiomyopathy	1	2.9
Corrected septal heart defect	1	2.9
Corrected transposition of great artery	1	2.9
Stent fitted	1	2.9
Leaking valve	1	2.9
Nephritis	2	5.9
Practitioner who advised patient of the need for antibiotic prophylaxis	**n**	**%**
Cardiologist	17	50
General dental practitioner	13	38.2
General medical practitioner	4	11.8
No. of years of antibiotic prophylaxis before dental treatment	**n**	**%**
0-4 years	14	41.2
5-9 years	6	17.6
10-14 years	6	17.6
>15 years	8	23.5
Opinion on new NICE guideline	**n**	**%**
An improvement	11	32.3
Concerned	23	67.7
Happy for dentist to implement new NICE guideline?	**n**	**%**
Yes	3	8.9
Letter of confirmation from a cardiologist	15	44
Verbal confirmation from a cardiologist	12	35.3
No	4	11.8

of patients with IE suspected to be related to a dental cause (0-50%). This reflected the varying duration in clinical practice and relevant experience of each cardiologist.

The remainder of the results from the cardiologist questionnaires are contained in Table 2.

Patients

Of the 50 questionnaires sent to patients, 34 were returned, giving a response rate of 68%.

The results of the patient questionnaires are contained in Table 3.

DISCUSSION

The use of antibiotic prophylaxis against infective endocarditis in a dental setting is a topic that has generated much discussion in the past. The debate has been fuelled of late with the publication of the new NICE guideline regarding the prevention of infective endocarditis. We decided to use a postal questionnaire to collect information from three groups of people to whom this topic would be of particular importance – dental practitioners, cardiologists and patients with cardiac conditions. The use of a postal questionnaire is considered a cost- and time-effective method of collating information from people over a wide geographic area. Its effectiveness is called into question, however, when taking the 'non-responders' into account, as this group can not only reduce the effective sample size but can also introduce bias.[12] Means of increasing the response rate to postal questionnaires have previously been investigated and a Cochrane review has been published which proposed various strategies to boost rates of response.[13] We incorporated two such strategies into the design of our postal questionnaires: firstly the use of shorter questionnaires and secondly the inclusion of stamped addressed return envelopes. The response rate from both dental practitioners (58%) and patients (68%) was relatively high, with a lower rate of response from cardiologists (37%). Perhaps the incorporation of follow-up contact with further distribution of questionnaires at this point, which showed substantially higher response rates in the Cochrane review, could have

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yielded an improved rate of response.[13]

A number of interesting issues are evident from the results of this survey regarding current practises and patient care. 77.9% of dental practitioners surveyed follow the BSAC guidelines (1997) on antibiotic prophylaxis as published in the BNF. In an article by Wray *et al.* the authors highlight the importance of identifying modifications to prescribing protocols which may impact on dental practice. These modifications are published as a supplement to each edition of the BNF.[14] Of note in the most recent edition, BNF 55, is the inclusion of the NICE guideline on prevention of endocarditis: 'BNF 55 ... advises that antimicrobial prophylaxis is no longer recommended for the prevention of endocarditis in patients undergoing dental and non-dental procedures'.[15]

Confusion among patients may arise from the fact that 70% of cardiologists surveyed, many of whom in Ireland are American trained, use the AHA guidelines in practice. This could lead to conflicting advice being given to patients on what is considered best practice.

If faced with uncertainty about whether or not to give antibiotic prophylaxis before dental treatment, 51% of dental practitioners surveyed would contact the patient's general medical practitioner for advice, which could introduce another, possibly different, opinion on the best course of action. In a survey conducted by Lauber *et al.*[16] the results demonstrate considerable differences between dentists and family physicians in terms of drug prescription and regimes advised, as well as medical conditions and dental procedures requiring antibiotic prophylaxis. All of the guidelines available are definitive in their recommendations regarding antibiotic prophylaxis, therefore the difficulty lies with the fact that the NICE guidelines are not legally binding in the Republic of Ireland and so practitioners have the freedom to adopt the guidelines of their choosing. This problem has become particularly apparent now that such variation exists between the AHA 2007 guideline and this NICE guideline.

Almost 20% of dental practitioners surveyed would require an opinion from an official Irish body before considering implementation of the NICE guideline. An institution such as NICE does not exist in Ireland and two such official Irish bodies mentioned in responses were the Irish Dental Association (IDA) and the Dental Council of Ireland. The question is, under the remit of which organisation or body in Ireland does guidance on this issue fall? Guidance on clinical matters is not included in the role of the IDA as outlined on the association website[17] and membership, although representative of 80% of dental practitioners, is voluntary. Registration with the Dental Council of Ireland is compulsory to practice in Ireland and similar to the IDA, guidance on clinical matters is not included in the functions of the Dental Council as outlined on its website.[18] So the question remains as to who to turn to for guidance on these matters in Ireland and without a consensus from a representative body, the likelihood of widespread adoption by practitioners of one guideline on antibiotic prophylaxis is reduced.

Nearly 80% of patients felt they would require either written or verbal confirmation from a cardiologist before considering any change to their prophylactic regime, whereas 75% of cardiologists surveyed would be content for dental practitioners to implement this guideline without consulting them. The defence union Dental Protection state on their website that each clinician has his or her own separate duty of care to the patient. An opinion expressed by a patient's cardiologist (or general medical practitioner) can be regarded as a valid consideration in the overall assessment of a case, but it is not in itself definitive. In fact they state that following such an opinion is inadvisable and may be difficult to defend.[19] The NICE guideline is designed to act as guidance only and the final decision on whether or not to use antibiotic prophylaxis should be made after the practitioner and the patient reach a consensus. From these results one can see the importance of interdisciplinary communication and effective communication with patients to ensure clarity of care.

The British Cardiac Society (BCS) issued a position statement in April 2008 endorsing the new NICE guidance while acknowledging that it may create difficulties for cardiologists and patients alike.[20] One such difficulty for both cardiologists and dental practitioners may arise from the need to re-educate patients, many of whom had prophylactic antibiotic administered for years, that the need no longer exists and that the emphasis now lies with the maintenance of good oral health. However, as part of this BCS position statement it is confirmed that practitioners and patients who wish to continue with antibiotic prophylaxis will be allowed to do so.

Forty-three percent of dental practitioners considered the cessation of antibiotic prophylaxis against endocarditis to be a positive change due to concern about the risk of anaphylaxis or antibiotic resistance. The risk of death from anaphylactic reaction was deemed to be five times greater than that from treating infective endocarditis.[7] Sweeney *et al.*,[21] in an article regarding antibiotic resistance in dental practice, concluded that there is reason for concern in this regard and that action must be taken to lessen the impact of this antibiotic resistance in the future. Perhaps the guideline by NICE could be considered part of this.

CONCLUSION

In conclusion, a lack of uniformity of approach exists among Irish dental practitioners and cardiologists regarding the treatment of patients with cardiac conditions in a dental setting. The introduction of the NICE guideline has met with mixed reaction from all three groups surveyed. Re-education of patients about the changes to antibiotic prophylactic practices has been highlighted as an area of importance. However, before re-education of patients can take place, practitioners themselves must become familiar with both the guidelines and the rationale behind them. Historically in Ireland we have followed best practice guidelines as laid down by bodies such as NICE on various topics. The release of the 2008 NICE guideline on antibiotic prophylaxis against infective endocarditis was clear and unambiguous. However, it was published in quick succession to another set of clear and unambiguous guidelines from the AHA. Not unexpectedly, each set of guidelines

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argues very coherently for the particular protocols recommended. This situation has thrown into sharp relief the fact that in Ireland there is no national statutory body endorsing guidelines such as this and practitioners are therefore unsure regarding best practice.

1. Mylonakis E, Calderwood S B. Infective endocarditis in adults. *N Engl J Med* 2001; **345:** 1318-1330.
2. Cabell C H, Jollis J G, Peterson G E *et al.* Changing patient characteristics and the effect on mortality in endocarditis. *Arch Intern Med* 2002; **162:** 90-94.
3. Durack D T. Prevention of infective endocarditis. *New Engl J Med* 1995; **332:** 38-44.
4. Northrop P M, Crawley M C. The prophylactic use of sulfathiazole in transient bacteraemia following the extraction of teeth. *J Oral Surg* 1943; **1:** 19-29.
5. Jones T D, Baumgartner L, Bellows M T *et al.* American Heart Association: prevention of rheumatic fever and bacterial endocarditis through control of streptococcal infections. *Circulation* 1955; **11:** 317-320.
6. Prendergast B D. The changing face of infective endocarditis. *Heart* 2006; **92:** 879-885.
7. Little J W, Falace D A, Miller C S, Rhodus N L. Infective endocarditis. *In Dental management of the medically compromised patient.* 6th ed. pp 21-51. Toronto: Mosby Inc., 2002.
8. Wilson W, Taubert K, Gewitz M *et al.* Prevention of infective endocarditis. Guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. *Circulation* 2007; **116:** 1736-1754.
9. Roberts G J. Dentists are innocent! 'Everyday' bacteraemia is the real culprit: a review and assessment of the evidence that dental surgical procedures are the principal cause of infective endocarditis in children. *Pediatr Cardiol* 1999; **20:** 317-325.
10. Gould F K, Elliott T S J, Foweraker J *et al.* Guidelines for the prevention of endocarditis: report of the Working Party of the British Society for Antimicrobial Chemotherapy. *J Antimicrob Chemother* 2006; **57:** 1035-1042.
11. National Institute for Health and Clinical Excellence. *Prophylaxis against infective endocarditis.* London: NICE, 2008. Clinical Guideline No. 64.
12. Armstrong B K, White E, Saracci R. *Principles of exposure measurement in epidemiology.* pp 294-321. New York: Oxford University Press, 1994. Monographs in Epidemiology and Biostatistics volume 21.
13. Edwards P, Roberts I, Clarke M *et al.* Methods to increase response rates to postal questionnaires. *Cochrane Database Syst Rev* 2007; **2:** MR000008.
14. Wray D, Wagle S M S. A dentist's guide to using the BNF: part 1. *Br Dent J* 2008; **204:** 437-439.
15. Joint Formulary Committee. *British national formulary.* 55th ed. London: British Medical Association and Royal Pharmaceutical Society of Great Britain, 2008.
16. Lauber C, Lalh S S, Grace M *et al.* Antibiotic prophylaxis practices in dentistry: a survey of dentists and physicians. *J Can Dent Assoc* 2007; **73:** 245.
17. Irish Dental Association. Role and history of the Irish Dental Association (webpage). www.dentist.ie/about/idarole.jsp (accessed 24 February 2009).
18. Dental Council of Ireland. Dental Council functions (webpage). www.dentalcouncil.ie/aboutus.php (accessed 24 February 2009).
19. Dental Protection. *Antibiotic cover for dental procedures – frequently asked questions.* London: Dental Protection, 2008. www.dentalprotection.org/assets/documents/2008_DPL_FAQ_Antibiotic_Prophylaxis_0308.pdf
20. Boon N. *British Cardiovascular Society antibiotic prophylaxis against infective endocarditis position statement.* London: British Cardiovascular Society, 2008.
21. Sweeney L C, Dave J, Chambers P A, Heritage J. Antibiotic resistance in general dental practice – a cause for concern? *J Antimicrob Chemother* 2004; **53:** 567-576.

Appendix 1a Dental practitioner questionnaire

Please circle the appropriate response

Q1. Indicate the area of dental practice in which you are principally involved?

a. General dental practice – private practice
b. Specialist dental practice (please specify)
c. Hospital-based dentistry (please specify)
d. HSE dental surgeon

Q2 Which guidelines for antibiotic prophylaxis do you currently follow?

American Heart Association
British Society for Antimicrobial Chemotherapy (as published in the British National Formulary)
Other (please specify)

Q3 If you were unsure of whether a patient required antibiotic prophylaxis before treatment how would you proceed?

a. Continue with the treatment without giving antibiotics
b. Give the antibiotic prophylaxis before treatment just in case
c. Contact the patient's general medical practitioner for advice
d. Contact the patient's cardiologist for advice
e. Other (please specify)

Q4 What is your opinion on the new NICE guidelines on antibiotic prophylaxis?

a. A positive change as I was always concerned about the risk of anaphylaxis
b. Too radical a change
c. A number of areas require clarification before I would be willing to implement changes
d. Other (please specify)

Q5 Do you intend to implement these new guidelines in your practice?

Yes, I will be implementing these changes immediately
Yes, once I get clearance from the treating physician
No, I would require a letter from the patient's cardiologist to determine whether or not prophylaxis is required
No, I do not agree with these changes and will not be implementing them in my place of work
Other (please specify – eg Dental Protection or Medical Defence Union)

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Appendix 1b Cardiologist questionnaire

Please circle the appropriate response

Q1. Which guidelines do you currently follow/recommend regarding antibiotic prophylaxis before dental treatment?

a. American Heart Association (AHA)   b. British Society for Antimicrobial Chemotherapy (BSAC)

c. Other (please specify)

Q2. What is your opinion on the new NICE guidelines on antibiotic prophylaxis against infective endocarditis?

a. I think this is a positive change   b. I think there are areas that require clarification

c. I think this is too radical a change   d. Other (please specify)

Q3. How many patients have you treated with infective endocarditis?

Please specify

Q4. How many of these cases do you think were related to a dental cause?

Please specify

Q5. Would you be happy for a General Dental Practitioner to implement this guideline without consulting you?

Yes

No

Appendix 1c Patient questionnaire

Please circle the appropriate response

Q1. Why do you require antibiotic prophylaxis before dental treatment?

a. History of rheumatic fever   b. Heart murmur   c. Heart surgery (please specify)

d. Heart defect from birth (please specify)   e. Current heart condition (please specify)

Q2. Which practitioner recommended that you would take antibiotics before dental treatment?

a. General dental practitioner   b. General medical practitioner   c. Cardiologist

d. Other (please specify)

Q3. For how many years have you received antibiotic prophylaxis before dental treatment?

a. 0-4 years   b. 5-9 years   c. 10-14 years   d. >15 years

Q4. What is your opinion on these new guidelines as outlined on page 1?

a. An improvement, as I was never happy taking antibiotics before dental treatment

b. An improvement, as it was a real inconvenience having to attend an hour before my dental appointment to take the antibiotics

c. Concerned, as I was pleased with the protection provided by the antibiotics before dental treatment

Q5. Would you be happy for your dentist to implement these changes in his/her practice?

a. Yes

b. Yes, but I would need verbal confirmation from my cardiologist/general medical practitioner before stopping the antibiotics

c. Yes, but I would need written confirmation from my cardiologist/general medical practitioner before stopping the antibiotics

d. No

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