

**Final-year dental students' perceptions of education
and guidance at an Irish dental school, regarding
antibiotic prophylaxis to prevent infective
endocarditis in dentistry**

A thesis submitted to the University of Dublin in partial
fulfilment of the degree of Doctorate in Dental Surgery,
D.Ch.Dent. (Oral Surgery)

Dr Vy Phan

BDS, MHIth&Med Law, MRACDS (GDP)

Division of Oral Surgery,
School of Dental Science,
Trinity College Dublin



Declaration of Academic Integrity

I declare that this thesis has not been submitted as an exercise for a degree at this or any other university and it is entirely my own work. I confirm that the work has been completed in full compliance with relevant university policies, including the Academic Integrity policy, the Trinity Policy on Good Research Practice, and the guidance on AI and GenAI in Teaching, Learning, Assessment and Research.

I agree to deposit this thesis in the University's open access institutional repository or allow the Library to do so on my behalf, subject to Irish Copyright Legislation and Trinity College Library conditions of use and acknowledge.

I consent to the examiner retaining a copy of the thesis beyond the examining period, should they so wish (EU GDPR May 2018).

Signed:

Vy Phan

Acknowledgements

I wish to express my sincere gratitude to all those who supported me throughout my academic research over the past three years.

Mr Dermot Pierse, Consultant in Oral & Maxillofacial Surgery and my supervisor. I am grateful for the confidence you entrusted in me from the outset and for your encouragement of my research concept. Your consistent reassurance, guidance, and advice were integral to the completion of this thesis.

Dr Caoimhin Mac Giolla Phadraig, Special Care Lecturer and my supervisor. Thank you for the numerous meetings, extended hours dedicated to coding, discussions, debriefings, and the comprehensive feedback and advice provided throughout the research process. Your passion, expertise, and meticulous approach greatly contributed to the development and completion of this thesis.

To the final-year dental students (Class of 2024/2025) who participated in the focus groups, as well as the fourth-year dental students involved in the pilot study, I extend my gratitude for your generous participation and active engagement. Without your involvement, this research would not be what it is.

Professor Sasha Scambler, Senior Lecturer at King's College London. Thank you for your willingness to exchange ideas from the very beginning, for attentively listening to my thesis presentations, and for offering great insight. Your lectures on qualitative research and your expertise were invaluable.

I also thank Amy Fisher for her great help during the postgraduate program and for serving as the gatekeeper in disseminating recruitment information to students.

Sincere appreciation is extended to all staff within the Oral Surgery Department, especially Dr Mary Collins, Dr Veronica Fisher, the administrative team, and theatre nurses, whose

encouragement and positivity were constantly motivating. My co-trainee, Dr Shay Taylor, for your companionship and support over these three years.

Finally, I am profoundly grateful to my family for their love and patience throughout this period. To my parents, Thac and Hang, for their unwavering support from Australia, and to my dear husband, Eamonn, whom I was fortunate to meet at the start of this program. Your enduring patience, reassurance, humour, and love over the past three years have made the journey much more enjoyable.

Summary

Conflicting guidance regarding the use of antibiotic prophylaxis for infective endocarditis may lead to confusion among dental students, thereby impacting both their educational development and their capacity to implement guidelines in clinical settings. To enhance the quality of teaching and learning in this vital area, this study seeks to investigate dental students' perceptions of their education concerning antibiotic prophylaxis for the prevention of infective endocarditis.

This qualitative descriptive study consisted of face-to-face focus group interviews. All registered final-year dental students attending Trinity College Dublin in the academic year 2024-2025 were invited to participate voluntarily. Semi-structured interview schedules were utilised. Audio recordings were transcribed using an artificial intelligence (AI) recorder and subsequently checked and edited for accuracy. Open coding was developed inductively using thematic content analysis by two authors (VP and CP) independently. Codes were further analysed using closed coding techniques, yielding final codes and the development of subthemes and themes. Trustworthiness and methodological rigour were considered throughout.

Data from four focus groups were analysed (n = 18). Three themes were identified. Firstly, *Education* encompassed teaching and assessment, clinical application during training, and student suggestions. Variability in the delivery of teaching, lack of assessment methods in senior years, and inadequate clinical exposure were highlighted. Secondly, *Use of Guidelines* explored students' application, awareness of infective endocarditis guidelines, as well as the impact of the range of guidelines on their learning. Inconsistent knowledge, understanding, and application of infective endocarditis prophylaxis guidelines were revealed amongst the undergraduate cohort. The presence of multiple international guidelines contributed to confusion, leaving students uncertain about which guidelines to follow. Lastly, *Future Practice* addressed patient-related concerns, students' apprehensions regarding antibiotic prescribing, and their reliance on senior support. Participants expressed fears about risks to patients, including adverse side effects

associated with antibiotics, how their limited knowledge of guidelines could influence patient rapport, and their anticipation of relying on medical and/or senior colleagues for support during early clinical practice.

Findings indicate that students would benefit from greater curricular alignment regarding infective endocarditis prophylaxis. This should include expert-led didactic teaching that clearly emphasises the specific guidelines students are expected to follow, increased clinical exposure to patients at risk of infective endocarditis, assessment through clinical logbooks and examinations, alongside an opportunity for structured feedback on students' learning experiences.

List of Figures

Figure 1: PRISMA flowchart demonstrating selection of included studies.....	6
Figure 2: GED Curriculum Domains and Competencies.....	19
Figure 3: Antibiotic prophylaxis student learning outcomes in pharmacology	20
Figure 4: Broader undergraduate curriculum and GED learning outcomes	20
Figure 5: Themes and subthemes	28
Figure 6: Recommendations for undergraduate dental education	75
Figure 7: Recommendations in policy and guideline implementation	78
Figure 8: Recommendations for future research	79

Table of Contents

<i>Declaration of Academic Integrity</i>	<i>i</i>
<i>Acknowledgements</i>	<i>ii</i>
<i>Summary</i>	<i>iv</i>
<i>List of Figures</i>	<i>vi</i>
<i>Table of Contents</i>	<i>vii</i>
1. Introduction	1
1.1 Background	1
1.2 Impact on Dental Education	2
1.3 Purpose of this Study	3
2. Narrative Literature Review	4
2.1 Introduction.....	4
2.2 Objectives	5
2.3 Methods	5
2.3.1 Search Strategy	5
2.3.2 Study Selection	6
2.3.3 Results	6
2.3.4 Discussion.....	14
2.3.5 Limitations of the literature reviewed	15
2.3.6 Limitations of this narrative literature review	16
Methods	18
2.4 Qualitative approach and research paradigm	18
2.5 Context	18
2.5.1 Infective Endocarditis and Antibiotic Prophylaxis in the Undergraduate Curriculum	19
2.6 Sampling	21
2.7 Ethical Issues.....	22
2.8 Pilot study, topic guide and data collection	22
2.9 Qualitative coding and Thematic Analysis	24
2.10 Researcher reflexivity and trustworthiness.....	25
3. Results	28
3.1 Education	29
3.1.1 Teaching and assessment.....	29
3.1.2 Clinical application during training	33
3.1.3 Student perceptions and suggestions.....	34
3.2 Use of Guidelines.....	37
3.2.1 Application of guidelines	37
3.2.2 Awareness of guidelines	38
3.2.3 Range of guidelines	42

3.3	Future Practice.....	44
3.3.1	Patient-Related Concerns	44
3.3.2	Reliance on Senior Support.....	47
3.3.3	Apprehension around prescribing	52
4.	Discussion	54
4.1	Main findings for Education	54
4.2	Main findings for Use of Guidelines	58
4.3	Main Findings for Future Practice	61
4.4	Comparative Studies.....	65
5.	Strengths and limitations	69
5.1	Strengths	69
5.2	Limitations	70
6.	Implications.....	73
6.1	Implications for Undergraduate Dental Education	73
6.2	Implications for Clinical Practice	75
6.3	Implications for Policy and Guideline Implementation	76
6.4	Implications for Future Research	78
7.	Conclusion	80
8.	References.....	83
9.	Appendices.....	90
9.1	Appendix A – Table of Comparison of International Antibiotic Prophylaxis Dental Guidelines.....	90
9.2	Appendix B - Infographic of Comparison of International Antibiotic Prophylaxis Dental Guidelines.....	93
9.3	Appendix C - Ethical Approval Letter	94
9.4	Appendix D – Participant Information Leaflet	95
9.5	Appendix E Participant Consent Form	105
9.6	Appendix F - Pilot Study Transcript	108
9.7	Appendix G - Focus Group Transcripts	126

1. Introduction

1.1 Background

Infective endocarditis is a serious and potentially life-threatening infection of the endocardial surface of the heart, typically occurring on heart valves, but also within cardiac chambers or on vascular endothelium (Sheppard, 2025). The condition is most commonly caused by *Streptococcus* and *Staphylococcus* species, which account for approximately 75% of cases. Bacteraemia originating from the oral cavity has long been recognised as a potential contributing factor, especially following invasive dental procedures that can induce transient bacteraemia (Sheppard, 2025).

Consequently, this has led to a range of evolving protocols to prevent infective endocarditis through antibiotic prophylaxis prior to bacteraemia-evoking procedures (Baddour *et al.*, 2015). While some international guidelines, such as those in Ireland, Europe, Australia and the United States continue to recommend prophylactic antibiotics for patients with specific high-risk cardiac conditions undergoing invasive dental procedures (Task Force of the European Society of Cardiology, 2023; *Infective Endocarditis*, 2024; Expert Group, 2025; HSE, 2026) there remains variation in the scope and application of these recommendations. Presently, in the Republic of Ireland, clinicians are expected to adhere to the HSE antibiotic prophylaxis guidance (HSE, 2026); consequently, undergraduate students are generally taught to follow these protocols.

As illustrated in Appendix A and B, the HSE (HSE, 2026), ESC (Task Force of the European Society of Cardiology, 2023), AHA (Baddour *et al.*, 2023), TGA (Expert Group, 2025) and SDCEP (Programme Development Team, 2026) broadly align on a targeted approach towards high-risk groups with similar first-line regimens and nuances in antibiotic alternatives. The rationale for prophylaxis resides in its capacity to diminish the risk of transient bacteraemia leading to infective endocarditis in susceptible patients, a condition associated with considerable morbidity and mortality (Lean *et al.*, 2023). Nonetheless, this advantage must be balanced against the risks associated with antibiotic use, including

adverse side effects, anaphylaxis, and wider public health issues such as antimicrobial resistance (Flasche and Atkins, 2018). In contrast, guidance in the United Kingdom differs significantly, with NICE advising that antibiotic prophylaxis is not routinely recommended for dental procedures (NICE, 2024), representing a shift from earlier recommendations that advised against prophylaxis altogether (NICE, 2008). However, NICE (2024 *exceptional surveillance of prophylaxis against infective endocarditis (NICE guideline CG64)*, 2024) additionally recommends consulting the latest SDCEP guidance (Programme Development Team, 2026) when managing patients at high risk of infective endocarditis. This is especially pertinent given the evidence indicating an increase in infective endocarditis cases following a reduction in antibiotic prophylaxis prescriptions (Dayer *et al.*, 2015). The vast array of guidance can lead to confusion for both experienced and novice practitioners.

An important consideration is evidence showing that even in countries where antibiotic prophylaxis is recommended, adherence to guidelines can be poor, leading to serious health risks for high-risk patients with infective endocarditis. Studies indicate that only 32.6% of high-risk patients undergoing invasive dental procedures in the United States received antibiotic prophylaxis (Thornhill *et al.*, 2022) whilst in France, just 58% of high-risk patients were administered antibiotics preventively (Tubiana *et al.*, 2017). Conversely, inappropriate prescribing has been reported, with 9.5% of moderate-risk patients receiving prophylaxis for invasive dental procedures (Thornhill *et al.*, 2022). These statistics depict ongoing challenges in implementing guideline recommendations in clinical practice and emphasise the importance of understanding how future dental practitioners are educated about guideline adherence, infective endocarditis prevention, and clinical decision-making.

1.2 Impact on Dental Education

This is all further complicated by the growing international presence of dental education and training. Dental schools in Ireland teach a diverse student body originating from numerous countries worldwide, including Canada, Singapore, Malaysia, the United Kingdom, and other regions. Many of these students will subsequently practice within healthcare systems governed by varying guidelines. Consequently, students encounter

multiple, occasionally conflicting sources of guidance during their training, which may lead to uncertainty in clinical practice. This internationalisation underlines the necessity of clear curricular alignment and explicit guidance regarding the protocols to be applied, particularly in areas where the balance between benefit and harm remains contentious.

While little is known about factors that influence dentists' decision-making concerning antibiotic prophylaxis (Lockhart *et al.*, 2022), current evidence suggests that dental students and dentists are inconsistent in antibiotic prophylaxis prescribing, lack compliance and possess inadequate overall knowledge of guidelines (Cummins *et al.*, 2020). When studied, dental students demonstrate poor performance when examined about their knowledge of prophylaxis, while far greater (two-thirds) felt that they knew about antibiotic prophylaxis for dental procedures adequately (Thanissorn *et al.*, 2022). Discrepancies between students' perceived knowledge and their actual performance raise concerns regarding preparedness for safe and appropriate antibiotic prescribing in clinical practice.

1.3 Purpose of this Study

Given that undergraduate dental education may represent the first and final stage at which students receive structured training in antibiotic prophylaxis, understanding how students experience and interpret this learning is critically important. Existing research remains limited and is solely quantitative in nature, focusing on the assessment of knowledge rather than exploring educational experiences that may influence students' clinical judgement (Cummins *et al.*, 2020). This novel study aims to explore final-year dental students' perspectives on antibiotic prophylaxis, engagement with guidelines, and educational experiences at Trinity College Dublin.

2. Narrative Literature Review

2.1 Introduction

A review of the existing academic literature was performed to determine the current evidence regarding dental students' knowledge, perceptions and experiences of antibiotic prophylaxis to prevent infective endocarditis. Although antibiotic prophylaxis plays a crucial role within dental practice, multiple varying international guidelines have evolved in recent decades, which have proven confusing. Dental students may encounter varying guidance during their training, which may impact their understanding of when antibiotic prophylaxis is indicated and how it should be prescribed.

Research into dental students' understanding of antibiotic prophylaxis for infective endocarditis remains limited, with the few existing studies largely focusing on assessing the knowledge of dental students and dentists through quantitative, survey-based methods (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012; Struzycka *et al.*, 2019; Cikes *et al.*, 2020; Cummins *et al.*, 2020). Although useful in providing some insight into levels of knowledge and guideline compliance, these studies offer a limited understanding of how dental students engage with antibiotic prophylaxis guidelines during their undergraduate education or of their perceptions of their clinical training. Much of the available literature explores antibiotic prescribing more broadly, lacking detail on antibiotic prophylaxis for the prevention of infective endocarditis (Jain *et al.*, 2015; Wong, Mohan and Pau, 2016; Doshi *et al.*, 2017; Baddal, Lajunen and Sullman, 2022).

This narrative literature review aims to explore existing research relating to dental students' understanding of antibiotic prophylaxis for infective endocarditis, whilst identifying limitations within the current evidence. Gaps in the current literature will also be highlighted and the strong indication for further research into dental students' educational experiences, perceptions, exposure and preparedness to prescribe antibiotic prophylaxis in practice.

2.2 Objectives

The purpose of this review was to assess the existing academic literature to achieve the following objectives:

1. Determine what research, if any, has been published on dental students' understanding, perceptions and experiences of antibiotic prophylaxis to prevent infective endocarditis
2. To identify gaps in the current literature that may indicate the need for further research

2.3 Methods

2.3.1 Search Strategy

An electronic search of the academic literature was conducted in May 2024 using PubMed and The Cochrane Library to locate articles addressing the above objectives. There were no restrictions applied with respect to the study type, sample size or publication date.

The search terms and strategy utilised to identify relevant literature were:

1. Students
2. Antibiotic OR antibiotics OR Amoxycillin OR amoxicillin OR amoxicilline OR Actimoxi OR Clamoxyl OR Penamox OR Polymox OR Trimox OR Wymox OR Amoxil OR penicillin OR Clindamycin OR Chlolinocin OR Chlorlincocin OR Dalacin OR Cleocin OR Lyncomycin
3. Prophylaxis OR prevention OR preventative OR prescription OR prescribing
4. Dental OR dentistry OR "oral surgery" OR "periodontal therapy" OR "periodontal surgery" OR "periodontal treatment"
5. 1-4/AND

Results were listed by 'best match', and all of these were analysed accordingly.

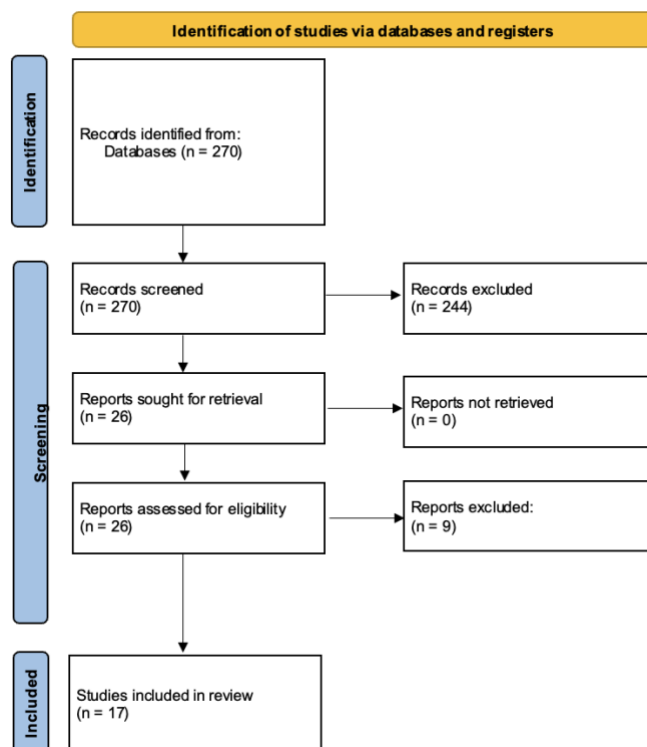


Figure 1: PRISMA flowchart demonstrating selection of included studies

2.3.2 Study Selection

The initial search produced 270 results. The papers were first assessed via title and abstract and then considered for relevance to the objectives defined in the review. Articles were excluded if they were not written in English, did not include medical or dental students, or were related to prescribing medications other than antibiotics, or to prescribing antibiotics for other purposes, such as endodontic infections and periodontal therapy. As a result, 17 articles were found to be relevant and eligible for inclusion in this review.

2.3.3 Results

A systematic review conducted in 2020 involving dental students and dentists concluded that compliance with guidelines for prescribing antibiotic prophylaxis to prevent infective endocarditis ranged from 40% to 81%. The knowledge of these guidelines varied from

1.9% to 100%, with respondents' age and dental training being the most associated variables influencing their understanding of infective endocarditis guidelines (Cummins *et al.*, 2020). The findings from this systematic review indicated that dental students exhibited less knowledge regarding antibiotic prophylaxis for the prevention of infective endocarditis compared to qualified practitioners, particularly concerning antibiotic dosage and timing (Cummins *et al.*, 2020). Although the review screened 3427 articles, only 41 studies specifically assessed the understanding of dentists and dental students, highlighting a substantial gap in evidence related to compliance with antibiotic prescribing guidelines and the factors affecting their knowledge (Cummins *et al.*, 2020). The identified gaps in understanding of antibiotic prophylaxis included greater knowledge of the first-line drug choice compared to the second-line, specific cardiac conditions, as well as the correct dosage and timing of antibiotic prophylaxis (Cummins *et al.*, 2020).

Compared with dentists, dental students' knowledge of antibiotic prophylaxis was weaker, particularly regarding dosage and timing, possibly because practitioners have more experience prescribing independently (Cummins *et al.*, 2020). This may suggest that greater clinical exposure to prescribing antibiotic prophylaxis during dental training could be beneficial. Although this study provided a detailed summary of the most current available research on compliance and understanding of antibiotic prophylaxis guidelines to prevent infective endocarditis, some limitations were noted (Cummins *et al.*, 2020). All included studies in this review used convenience sampling, which carries a risk of selection bias. Studies also predominantly used self-administered questionnaires or telephone interviews, in which participants may refer to guidelines before or after data collection, potentially overestimating levels of knowledge (Cummins *et al.*, 2020). This systematic review also concluded that there is insufficient high-quality evidence on guideline compliance and recommended further research that 'explores better understanding of the factors that affect the knowledge and compliance of dentists and dental students' (Cummins *et al.*, 2020).

It appears that even less is known about dental students' perceptions, confidence in prescribing, or decision-making around antibiotic prophylaxis in the current literature. One of the first Australian studies to explore undergraduate and postgraduate dental

students' knowledge of antibiotic prophylaxis in dentistry was conducted in 2022. Only 3 out of 117 students answered all questions about antibiotic prophylaxis correctly; 89 answered more than half the questions correctly, and only two-thirds of students felt they understood antibiotic prophylaxis for dental procedures adequately (Thanissorn *et al.*, 2022). The study indicated that dental students may not receive any further training on antibiotic prophylaxis and/or antimicrobial stewardship at any stage in their future careers, and that students felt their knowledge needed to be consolidated further within their dental program (Thanissorn *et al.*, 2022). In the same study, three out of four dental students highlighted the need for further education in antibiotic prescribing and prophylaxis within the dental curriculum, underlining deficits in current Australian dental training programs (Thanissorn *et al.*, 2022).

Limitations within this study included questionnaires being available to students over the course of four months, with the possibility of improved response rates based on information made available to students during this time (Thanissorn *et al.*, 2022). In addition, this study was heavily represented by two of the nine dental schools (The University of Western Australia and the University of Melbourne) (Thanissorn *et al.*, 2022). The evidence concluded that Australian dental students were able to recognise scenarios where antibiotic prophylaxis was indicated more than those where it was contraindicated, further highlighting where knowledge in the prevention of infective endocarditis is lacking (Thanissorn *et al.*, 2022). Similar to the systematic review conducted in 2020 (Cummins *et al.*, 2020), this article proposes that further research is required to determine whether curriculum redesign in antibiotic prophylaxis and pharmacotherapeutics is warranted (Thanissorn *et al.*, 2022).

In a recent study evaluating knowledge of infective endocarditis prophylaxis among medical and dental students in Turkey, a questionnaire was completed by 332 participants (Karaçam and Erdem, 2024). The questionnaire comprised 42 questions, including 17 items measuring knowledge of antibiotic prophylaxis for medical conditions and dental procedures, and four multiple-choice questions assessing the type and dosage of prescribed antibiotics (Karaçam and Erdem, 2024). Results were similar to those reported by Thanissorn *et al.*, with students answering less than two-thirds of the questions

correctly (Karaçam and Erdem, 2024). 74.7% of students reported that their information on infective endocarditis prophylaxis originated solely from university lectures or clinical practice, highlighting the importance of high-quality didactic teaching and clinical exposure in undergraduate education (Karaçam and Erdem, 2024).

Overall, fifth-year dentistry students had higher levels of knowledge than fourth-year students. However, only 55% of dentistry students and 43.5% of medical faculty students possessed a good level of knowledge (Karaçam and Erdem, 2024). Students lacked awareness of updated guidance, including that clindamycin is no longer recommended as prophylaxis for patients with penicillin allergy and that prophylaxis is not required (Karaçam and Erdem, 2024). The study concluded that the education syllabus should be updated to align with current AHA guidelines (*Infective Endocarditis*, 2024) and that education in antibiotic prophylaxis should be improved across medical and dentistry faculties (Karaçam and Erdem, 2024). Limitations included the sample originating from a single region and the cross-sectional design, which did not permit assessment of changes in knowledge over time (Karaçam and Erdem, 2024). However, this was the first study of its kind at the time to compare the level of knowledge of both medical and dentistry students on infective endocarditis, highlighting the limited available evidence in this domain (Karaçam and Erdem, 2024).

Another study in Turkey found that although the majority of dentists and dental students appeared highly knowledgeable about antibiotic prophylaxis in paediatric patients, there remained confusion about circumstances in which antibiotics should not be prescribed (Sirinoglu Capan, Duman and Kalaoglu, 2023). Areas of confusion included prescribing antibiotic prophylaxis to prevent infective endocarditis when placing an orthodontic band and in cases of heart murmurs (Sirinoglu Capan, Duman and Kalaoglu, 2023). In this study, only 50.9% of dentists followed current guidelines on antibiotic use, and 75% followed the correct guidelines on antibiotic prophylaxis (Sirinoglu Capan, Duman and Kalaoglu, 2023). No clear reasons were provided for non-compliance; however, dentists admitted to prescribing antibiotics upon patient request and to not being up to date with guidance, which may contribute to lack of compliance (Sirinoglu Capan, Duman and Kalaoglu, 2023). Limitations of this study included not assessing students' awareness of guidelines in more

detail compared to dentists and not examining dentists' actual prescribing practices, relying instead on their responses to general clinical situations (Sirinoglu Capan, Duman and Kalaoglu, 2023). There appears to be scope for further research on dentists' compliance and awareness of infective endocarditis guidelines, as well as on those of dental students.

A 2018 study evaluating dental students' knowledge and attitudes towards antibiotic prescribing guidelines in Saudi Arabia found that dental students may inappropriately prescribe antibiotics when they are not indicated to manage oral and systemic conditions (AboAlSamh *et al.*, 2018). Examples include prescribing antibiotics for viral infections, pericoronitis, draining sinus tracts, and the routine management of periodontal diseases (AboAlSamh *et al.*, 2018). Regarding antibiotic prophylaxis against infective endocarditis, the study showed that only 79.1% of students opted to prescribe antibiotics for patients with proven subacute infective endocarditis as prophylaxis (AboAlSamh *et al.*, 2018). This highlights that one in five dental students has insufficient understanding of antibiotic prophylaxis to prevent infective endocarditis and a clear deficit in education and awareness of antibiotic prophylaxis guidelines (AboAlSamh *et al.*, 2018).

This is further complicated by the absence of national antibiotic guidelines in Saudi Arabia, meaning dental schools may not be teaching consistent guidance, if any at all (AboAlSamh *et al.*, 2018). Approximately half of respondents said they would prescribe antibiotics based on guidelines, whereas 44.5% of students would choose to prescribe antibiotics based on patient symptoms instead (AboAlSamh *et al.*, 2018). As this study encompassed antibiotic prescribing across several disciplines rather than specifically antibiotic prophylaxis to prevent infective endocarditis, there is limited insight into students' knowledge and perceptions of available prophylaxis guidance. The use of a cross-sectional questionnaire within this study may also have introduced bias, as students' responses may reflect the prescribing practices of their mentors, which may not be evidence-based (AboAlSamh *et al.*, 2018). Further research comparing the attitudes of clinical tutors and mentors towards antibiotic prescribing may help clarify this possible influence (AboAlSamh *et al.*, 2018).

Another study in Saudi Arabia assessing awareness of antimicrobial prophylaxis for infective endocarditis among dental students and new graduates found that, on average, 50% of participants lacked knowledge of conditions that require antibiotic prophylaxis (Bahammam and Abdelaziz, 2015). The study found that knowledge among dental students and new graduates was below the gold standard of 100% accuracy regarding antibiotic prophylaxis for infective endocarditis; hence, guidelines need to be reinforced more during the undergraduate and new graduate years (Bahammam and Abdelaziz, 2015). Students should also be assessed at different year levels during their training, and all staff members must be updated on any changes to guidelines (Bahammam and Abdelaziz, 2015). It should be noted that this study highlighted the simplicity of the questionnaire issued to respondents, which focused only on knowledge of cardiac conditions, dental procedures and antibiotic doses (Bahammam and Abdelaziz, 2015).

The most recent study assessing knowledge and attitudes towards antibiotic prescribing in Saudi Arabia included 248 participants, comprising fourth- to sixth-year dental students and new graduates (Mubarak *et al.*, 2024). This cross-sectional study assessed knowledge across multiple areas of antibiotic prescribing, including for pulpitis, draining sinus tracts, swelling, trauma, pericoronitis, extractions, dry sockets and systemic conditions (Mubarak *et al.*, 2024). Only two yes/no questions were included on antibiotic prophylaxis to prevent infective endocarditis, asking respondents whether they would prescribe antibiotic prophylaxis in patients with congenital cardiac abnormalities and for those with subacute bacterial endocarditis (Mubarak *et al.*, 2024). Although 88.7% of participants answered they would prescribe antibiotic prophylaxis for patients with subacute bacterial endocarditis (Mubarak *et al.*, 2024), which was higher than in a similar 2018 study (AboAlSamh *et al.*, 2018), these questions were far too simplistic. The yes/no design and the limited number of questions would not be sufficient to assess knowledge of infective endocarditis, awareness of guidelines, or the appropriate antibiotic regimen. This further highlights that research in Saudi Arabia regarding antibiotic prophylaxis to prevent infective endocarditis is lacking and of the limited research that does exist, there appear to be deficits in education on antibiotic prophylaxis to prevent infective endocarditis.

In 2010, knowledge of infective endocarditis prophylaxis among 58 final-year dental students and 98 general dental practitioners in Iran was assessed (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012). The overall knowledge of antibiotic prophylaxis for infective endocarditis among students and dentists was 64% and 56%, respectively (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012). These differing results could be attributed to the timing of the study, the study population, and dentists' lack of awareness of the significance of infective endocarditis at that time (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012). This study, albeit quite dated, concluded that revisions are required within the dental curriculum on antibiotic prophylaxis to prevent infective endocarditis for dental students (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012). The evidence also suggests that continuing education programs should be developed to increase dentists' knowledge of antibiotic prophylaxis against infective endocarditis (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012).

A study evaluating the knowledge of antibiotics and antimicrobial resistance among 752 final-year dental students in Poland included questions on infective endocarditis prophylaxis (Struzycka *et al.*, 2019). Among the questions posed, 10% of students asserted that prophylaxis is exclusively indicated for tooth extractions and not for any other dental procedures, and one in nine respondents indicated that none of the heart defects would warrant prophylactic antibiotic therapy (Struzycka *et al.*, 2019). A substantial 90% of respondents expressed a desire to enhance their understanding of antibiotics, with nearly 60% feeling that this subject was insufficiently covered within their university curriculum (Struzycka *et al.*, 2019). At that time, this represented one of the first studies of its kind in Poland, despite the fact that Poland exhibits one of the highest rates of human antibiotic consumption in Europe (Struzycka *et al.*, 2019). This reinforces overall deficiencies in the European literature concerning antibiotic awareness and education within the field of dentistry. A limitation of this study is the data collection occurring in 2015, with publication taking place in 2018; however, the authors affirm that there were no modifications to the dental school curriculum related to antibiotic therapy during this period (Struzycka *et al.*, 2019).

Eight of the included articles (Guzmán-Álvarez *et al.*, 2012; Jain *et al.*, 2015; Wong, Mohan and Pau, 2016; Doshi *et al.*, 2017; Cikes *et al.*, 2020; Nisabwe *et al.*, 2020; Baddal, Lajunen and Sullman, 2022; Raees *et al.*, 2023) did not mention antibiotic prophylaxis for infective endocarditis, and therefore did not provide information on understanding of infective endocarditis. These studies focused on students' understanding of antibiotic prescribing more broadly (Raees *et al.*, 2023), attitudes towards guidelines (Doshi *et al.*, 2017) and antimicrobial stewardship (Baddal, Lajunen and Sullman, 2022). A study of dental students' compliance with antibiotic guidelines for dental infections in children found that final-year dental students' compliance with prescribing guidelines in Malaysian and Asian dental schools ranged from 15.7% to 47.3% (Wong, Mohan and Pau, 2016). This study concluded that final-year dental students had poor awareness and compliance with antibiotic prescribing guidelines, particularly those of the American Academy of Paediatric Dentistry (Wong, Mohan and Pau, 2016). It was also found that among students who had received antibiotic prescribing education, namely 21.3%, felt more prepared to prescribe antibiotics, indicating a clear lack of antibiotic education, preparedness for practice and variation in teaching within some Asian dental schools (Wong, Mohan and Pau, 2016).

Doshi *et al.* 2017 observed that providing additional education on prescribing antibiotics and analgesics to undergraduate students would be beneficial, as postgraduate dental students demonstrated a significantly greater understanding compared to their undergraduate counterparts. This disparity is likely attributable to postgraduate students having received more extensive clinical practice, experience, or education. The study also notes that students do not adhere to guidelines; however, it does not specify which guidelines (Doshi *et al.*, 2017). An Indian study found that 50% of dental students from third to final year had prescribed incorrectly, failing to inquire about allergies or prescribing the wrong duration or dosage (Jain *et al.*, 2015). A study conducted in Rwanda, involving medicine, dentistry, and pharmacy students, reported that 83% of students were unfamiliar with antimicrobial stewardship (Nisabwe *et al.*, 2020). In Mexico, only 30% of students adhered to the WHO Guide to Good Prescribing guidelines; however, no reasons were provided for the non-adherence, except for lack of awareness (Guzmán-Álvarez *et al.*, 2012). Additionally, 5% of students admitted to following the advice of peers or medical representatives regarding prescriptions, rather than seeking appropriate

guidance (Guzmán-Álvarez *et al.*, 2012). These findings highlight a concerning trend of limited awareness and use of prescribing guidelines among dental students, who often rely on peers rather than current evidence when prescribing antibiotics.

In Croatia, only 31% of final-year dental students and 23% of medical students were able to name a correct guideline for antibiotic use (Cikes *et al.*, 2020). The study found that students had poor knowledge of antimicrobial guidelines and inadequate understanding of pharmacology; 19% believed fungal infections were cured by antibiotics (Cikes *et al.*, 2020). 75% of students felt they needed further continuing education on antimicrobial drugs after graduating, a finding that aligns with other studies (Struzycka *et al.*, 2019) and highlights the urgent need to revise and improve European dental curricula. These studies concluded that there are worrying gaps in students' understanding of pharmacology and antibiotic prescribing, which could have detrimental effects on patient safety (Guzmán-Álvarez *et al.*, 2012; Jain *et al.*, 2015). In the last included study, final-year medical, pharmacy and nursing students in Pakistan were shown to possess sufficient knowledge of antibiotic use; however, they were not equipped with international guidance or the knowledge to take an active role in antimicrobial stewardship programs (Raees *et al.*, 2023). It appears that students' understanding of antibiotics could be improved worldwide, particularly awareness of guidelines for prescribing and prophylaxis, correct dosages, alternative antibiotics when patients are allergic and understanding of pharmacology and antimicrobial stewardship.

2.3.4 Discussion

The existing literature consistently demonstrates that dental students' knowledge of antibiotic prophylaxis for the prevention of infective endocarditis is variable and frequently inadequate. Across multiple international studies, students show notable deficits in understanding indications, contraindications, antibiotic choice, timing, dosage and awareness of updated guidelines, with knowledge levels falling below those expected for safe independent practice (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012; Bahammam and Abdelaziz, 2015; AboAlSamh *et al.*, 2018; Struzycka *et al.*, 2019; Thanissorn *et al.*, 2022; Karaçam and Erdem, 2024). A major systematic review further

highlights significant variation in guideline compliance (40-81%) and knowledge (1.9-100%) amongst dental students and dentists regarding the timing and dosage of infective endocarditis prophylaxis (Cummins *et al.*, 2020). Importantly, these findings suggest that knowledge gaps are not isolated but reflect broader inconsistencies in education, guideline awareness, and clinical preparedness. Students demonstrate relatively better recognition of first-line antibiotic choices yet lack awareness of second-line options, specific cardiac conditions, and correct prescribing protocols, suggesting superficial rather than in-depth knowledge. This is particularly worrying given the clinical implications of inappropriate prescribing, including patient harm and contribution to antimicrobial resistance.

Furthermore, the literature indicates that these deficiencies are likely multifactorial. Limited clinical exposure, variability in teaching methods, and the existence of multiple guidelines all contribute to gaps in applied knowledge. The predominance of quantitative, cross-sectional studies restricts insights into how students interpret, engage with, and implement guidelines within clinical contexts. As shown by Cummins *et al.* (2020), there remains a deficiency of high-quality evidence exploring the underlying factors influencing students' knowledge and compliance, particularly from a qualitative perspective. In summary, the evidence suggests that the current undergraduate dental education may not sufficiently prepare students for the safe and confident prescribing of antibiotic prophylaxis for infective endocarditis. These findings underscore the necessity for further research, improved curricular alignment, and a more explicit emphasis on guideline-based practice to facilitate students' transition to independent clinical decision-making.

2.3.5 Limitations of the literature reviewed

Several limitations were identified within the reviewed literature. Most studies employed cross-sectional, questionnaire-based methodologies, which provide a snapshot of knowledge at a specific point in time and may overestimate understanding, as participants might consult guidelines during or subsequent to data collection (AboAlSamh *et al.*, 2018; Cummins *et al.*, 2020). Additionally, many studies relied on convenience sampling and were conducted within single institutions or limited geographic regions, thereby

introducing potential selection bias (Cummins *et al.*, 2020; Thanissorn *et al.*, 2022; Karaçam and Erdem, 2024). Furthermore, several questionnaires were limited in scope or overly simplistic, thereby limiting the depth of insight into students' overall preparedness to prescribe antibiotic prophylaxis appropriately (Bahammam and Abdelaziz, 2015). There was also considerable heterogeneity across studies regarding populations, educational settings, and outcome metrics, which complicates comparisons. Some investigations focused solely on dental students, while others included dentists, medical students, and recent graduates, further obscuring the interpretation of findings (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012; Karaçam and Erdem, 2024). Many studies examined antibiotic prescribing in a general context rather than specifically addressing infective endocarditis prophylaxis, thereby providing limited insights into cardiac antibiotic prophylaxis (Jain *et al.*, 2015; Wong, Mohan and Pau, 2016).

Critically, there exists a complete absence of qualitative research exploring dental students' experiences, perceptions, and educational needs concerning antibiotic prophylaxis for the prevention of infective endocarditis. Moreover, there is a scarcity of data from Ireland and broader Europe, despite the defined expectations outlined in the Graduating European Dentist Curriculum that graduates should practice evidence-based dentistry (Taskforce, 2022). The present study directly addresses these gaps by representing the first qualitative investigation into the experiences of final-year dental students pertaining to education, guidance, and clinical preparedness regarding infective endocarditis prophylaxis.

2.3.6 Limitations of this narrative literature review

This narrative literature review has certain limitations. The search strategy was confined to two databases (PubMed and The Cochrane Library), and although broad search terms were utilised, the overall search may not have been exhaustive, potentially leading to selection bias. The narrative structure of this review inherently represents a limitation, lacking in the methodological rigour and transparency characteristic of a systematic review. No predefined protocol or formal data extraction process was employed. Consequently, the synthesis of findings may be more susceptible to subjective

interpretation. A substantial portion of the available literature was indirect, with numerous studies focusing on antibiotic prescribing in a broader context rather than specifically on infective endocarditis prophylaxis.

Nonetheless, despite these limitations, this review provides valuable insights into the lack of awareness and engagement with antibiotic prophylaxis guidelines among dentists and dental students. Significant gaps within the current evidence base, notably the deficiency of qualitative research exploring students' experiences, perceptions, and clinical preparedness for practice, were highlighted. These findings suggest an obvious need for further research in this area, ideally using more methodologically consistent, homogeneous, and robust study designs, with qualitative or mixed methods approaches. Overall, the literature indicates that existing evidence is limited, heterogeneous, and predominantly quantitative. This underscores the necessity for the present study, which aims to address these gaps through qualitative exploration of final-year dental students' experiences with education, awareness of guidelines, and readiness to prescribe antibiotics for prophylaxis in clinical practice.

Methods

2.4 Qualitative approach and research paradigm

This study employed a qualitative descriptive research design, an approach suited to exploring participants' experiences and perspectives in a manner that remains close to their own words and accounts (Sandelowski, 2000). Qualitative descriptive studies are beneficial in educational research aimed at understanding participants' experiences, perceptions and interpretations of educational processes, without imposing or developing abstract theoretical frameworks (Sandelowski, 2000). This study was informed by a naturalistic and constructivist paradigm, in which knowledge and meaning are constructed through individuals' personal, social, educational and clinical environments. Accordingly, dental students' understanding of antibiotic prophylaxis to prevent infective endocarditis was explored in relation to their formal teaching, clinical training, exposure to patients with infective endocarditis, and their awareness and engagement with professional guidelines. The reporting of this study follows the Standards for Reporting Qualitative Research (SRQR) checklist (O'Brien *et al.*, 2014).

2.5 Context

Data collection took place during the 2024-2025 academic year at the School of Dental Science, Trinity College Dublin, within the context of undergraduate dental training. Teaching interventions within the dental program and the competency expectations for graduate dentists from the Irish Dental Council currently mirror "The Graduating European Dentist" (GED) curriculum (Taskforce, 2022). Antibiotic prophylaxis education within the dental curriculum reflects the Council Domains of safe and effective clinical practice, patient-centred care, the Council Areas of Competence of evidence-based practice, clinical information gathering and diagnoses and applying the scientific basis of oral health care (Taskforce, 2022). Students are educated regarding various antibiotic prophylaxis guidelines throughout their training, but are advised to adhere to the local HSE guidance (HSE, 2026) within the dental hospital.

2.5.1 Infective Endocarditis and Antibiotic Prophylaxis in the Undergraduate Curriculum

Learning outcomes related to antibiotic prophylaxis at Trinity College Dublin require students to demonstrate successful engagement with the scientific basis of dentistry and to demonstrate knowledge of pharmacology and therapeutics relevant to clinical practice (Third and Fourth Year). These were tailored to address the Irish Dental Council and GED Curriculum for Domain Two – Safe and effective clinical practice, area of competence – 2.1 evidence-based practice and Domain Three – Patient-centred care, areas of competence – 3.1 applying the scientific basis of oral health care, 3.3 treatment planning and 3.4 establishing and maintaining oral health (Taskforce, 2022).

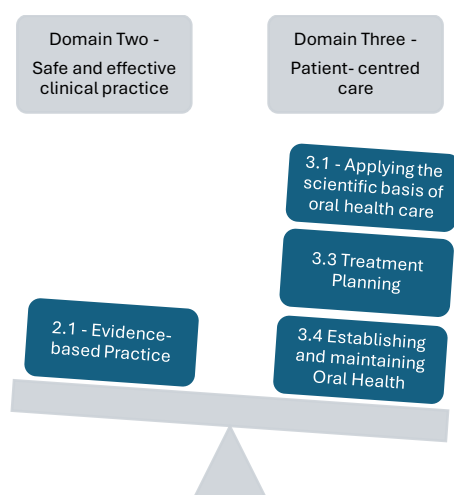


Figure 2: GED Curriculum Domains and Competencies

In the curriculum, specific learning outcomes related to antibiotic prophylaxis to prevent infective endocarditis appear in Third Year Pharmacology:



Figure 3: Antibiotic prophylaxis student learning outcomes in pharmacology

Broader learning outcomes within the Undergraduate teaching curriculum were drawn from the relevant GED learning outcomes as follows:

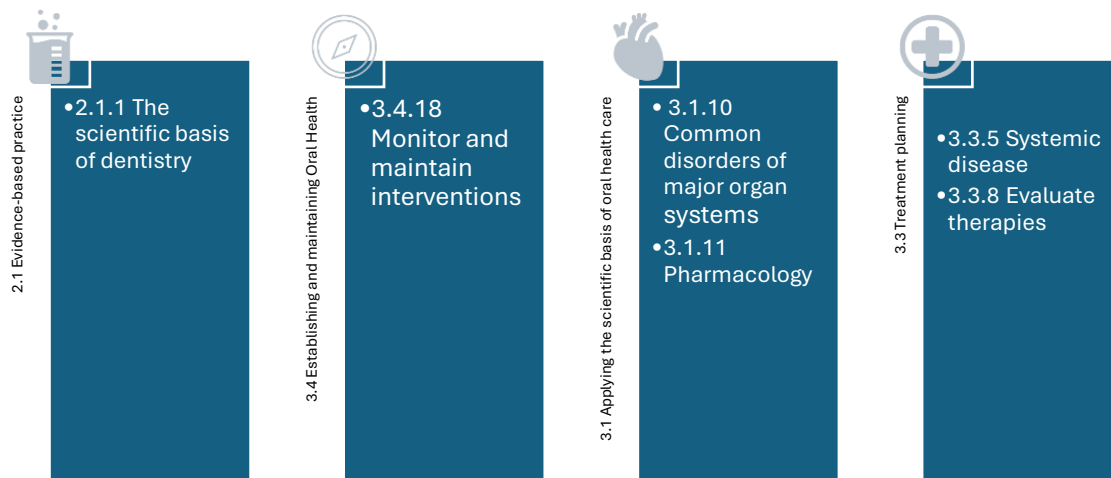


Figure 4: Broader undergraduate curriculum and GED learning outcomes

There is noticeable overlap among these learning outcomes. The scientific basis domain covers the pathophysiology and risk factors of infective endocarditis, while pharmacology provides the foundation for appropriate antibiotic choices, dosing, and timing. These elements are then integrated into patient-centred care, where students must apply this knowledge to treatment planning and prescribing decisions, whilst considering systemic health, responsible antimicrobial stewardship, and risk reduction. Overall, antibiotic

prophylaxis is not taught as a discrete curriculum component but rather as an integrated concept spanning multiple competencies. While the integrated approach reflects the GED curriculum, it may also contribute to variability in student understanding, as learning is spread across domains rather than reinforced through explicit longitudinal teaching and assessment.

Teaching is delivered through didactic lectures in physiology and pharmacology in Second and Third Year, complemented by problem-based learning (PBL) modules in Third and Fourth Year. Assessment of knowledge of infective endocarditis occurs through a relevant clinical scenario within the Objective Structured Clinical Examination (OSCE) in Third Year. Curriculum mapping indicates that there is no additional structured didactic teaching or formal assessment specifically focused antibiotic prophylaxis to prevent infective endocarditis during the Fourth or Fifth Year of clinical training. As such, the later stages of the program appear to rely more heavily on self-directed learning through PBL, clinical experience, exposure and supervision to reinforce students' understanding of prophylaxis prescribing practices. Student feedback is evaluated during Trinity Term for each cohort, through the dissemination of subject feedback forms to each student. All student feedback is subsequently collated and deliberated upon through ongoing meetings.

2.6 Sampling

A purposive sampling strategy was used. All registered final-year dental students enrolled in the Trinity College Dublin program during the 2024-2025 academic year were invited to participate. Recruitment was conducted through a gatekeeper, who distributed the invitation to participate via email, on behalf of the research team. The use of a gatekeeper minimised potential coercion and any pressure to participate. Participation in the study was entirely voluntary, students were informed that opting not to participate would have no impact on their academic standing. A total of 18 final-year dental students agreed to participate in the study. Participants were organised into four focus groups, each consisting of four to five students to facilitate group discussion and allow each participant adequate opportunity to contribute.

2.7 Ethical Issues

Ethical approval was obtained from the Research Ethics Committee, School of Dental Science & Dublin Dental University Hospital, on 2nd July 2024 (Appendix C). Prior to participation, all students received a participant information leaflet (Appendix D) outlining the study's purpose, the voluntary nature of participation, the procedures involved in data collection, and the measures implemented to ensure confidentiality. Students were invited to raise any questions before providing written informed consent (Appendix E). Several steps were taken to protect participants' confidentiality and anonymity, including removing all identifying information from transcripts and assigning each participant a unique participant code. No identifiable demographic information beyond gender and year of study was collected to further maintain anonymity. Audio recordings, transcripts, and research data were stored securely in accordance with Trinity College Dublin Data Protection policies and the General Data Protection Regulation (GDPR).

2.8 Pilot study, topic guide and data collection

Before data collection began, a semi-structured interview guide was created to cover key topics related to the research objectives, while allowing flexibility for participants to share new ideas or experiences (Shepherd, 2021). The guide was developed by the research team, experienced in qualitative research and dental education. In October 2025, a two-part in-person pilot study was conducted with four Fourth-year dental students, lasting about 32 minutes, and was recorded (Appendix F). This pilot helped test the recording equipment, seminar facility and provided feedback on the topic guide, as well as the style and wording of the questions. The pilot study was transcribed, analysed and the guide was revised to better suit the focus group interviews. Feedback from the pilot led to adding a question about improvements to the dental curriculum and refining questions before the main data collection.

The refined topic guide following the pilot study included the below lead-in topics and questions:

Understanding of antibiotic prophylaxis to prevent infective endocarditis in dentistry:

1. What do you know about antibiotic prophylaxis for cardiac patients within dentistry in Ireland/Australia and other parts of the world, such as the UK?
2. What guidelines are you currently aware of regarding antibiotic prophylaxis for cardiac patients in dentistry? Do you use any of these guidelines and if so, which one? Do you feel that the existing guidelines are sufficient?
3. Can you tell me more about the recommended antibiotics for prophylaxis and the dosages in relation to these antibiotics?
4. In what particular conditions or circumstances are antibiotic prophylaxis recommended to prevent infective endocarditis in dentistry?
5. Do you agree with the use of antibiotic prophylaxis for certain cardiac conditions in dental patients? Why/why not?

Educational experiences of antibiotic prophylaxis to prevent infective endocarditis in dentistry:

6. How have you been taught about antibiotic prophylaxis for patients with cardiac conditions within dentistry? Do you think this has been taught in a way that is applicable in a clinical setting?
7. What are your experiences of antibiotic prophylaxis to prevent infective endocarditis in dentistry within a clinical setting, if any, during your dental training?

Perceptions of antibiotic prophylaxis education during dental training:

8. Please describe any gaps you feel you have in your knowledge with respect to antibiotic prophylaxis prior to dental procedures for patients with cardiac conditions?
9. How would you rate the teaching you have received regarding antibiotic prophylaxis to prevent infective endocarditis? How about in terms of your preparedness to enter the workforce?

10. How confident are you with prescribing antibiotic prophylaxis for patients with cardiac conditions once you graduate?
11. What do you think would help increase your confidence with prescribing antibiotic prophylaxis to prevent infective endocarditis?
12. What changes or additions to the current school curriculum if any, would improve your understanding and knowledge of antibiotic prophylaxis use in dentistry?

Ending the interview:

13. Is there anything else you would like to add or that we haven't talked about?

Data were collected through face-to-face semi-structured focus group interviews, which encouraged interaction among participants and exploration of shared and divergent experiences. Focus groups were chosen as the most appropriate data collection method because they allow participants to interact, exchange perspectives and consider each other's responses, generating richer insights into shared educational experiences and differing viewpoints (Jenkinson *et al.*, 2019).

Each focus group interview was recorded and transcribed using an AI voice recorder (Chime Note). The recordings were transcribed verbatim, and all transcripts (Appendix G) were carefully checked and edited by the interviewer to ensure accuracy and completeness. In addition to audio recordings, field notes were taken during each focus group to capture contextual details and impressions. The unit of study was final-year undergraduate dental students. Participant characteristics included gender and year of study, but no other identifying demographic data were obtained to preserve anonymity.

2.9 Qualitative coding and Thematic Analysis

Transcripts were anonymised and imported into the qualitative data analysis software Delve to facilitate systematic coding and data management. Data analysis followed thematic content analysis principles, a systematic method for identifying patterns, themes

and meanings within qualitative data (Burnard, 1991). Analysis commenced with inductive open coding, in which transcripts were reviewed line-by-line to identify meaningful segments of text relevant to the research question. Codes were developed directly from the data and applied independently by two authors (VP and CP) to enhance analytical rigour.

Following the initial coding stage, both researchers compared their codes and engaged in iterative discussions to resolve discrepancies and refine them through consensus. Codes were then examined and organised into broader categories and subthemes using deductive closed coding. Data saturation was observed, as no new codes, perspectives or relevant insights emerged in the third and fourth focus group interviews. This repetition indicated that the collected data were sufficient to address the research aims, and conducting additional focus groups was unlikely to yield substantially new information. Therefore, data collection was concluded after the fourth focus group. Related categories were then synthesised into overarching themes that captured key aspects of students' experiences, perceptions of learning about antibiotic prophylaxis, engagement with guidelines and thoughts on future practice.

Benefits of qualitative coding include providing organisation, structure and a systematic method for examining data, raising awareness of potential biases in how data is analysed, accurately representing participants and enabling transparency so other researchers can methodically review the analysis performed (Thomas and Harden, 2008).

2.10 Researcher reflexivity and trustworthiness

Reflexivity was considered throughout this study. The principal researcher was an Oral Surgery postgraduate student and qualified dentist from Australia training within the same institution as the participants. Prior to commencing Oral Surgery studies, this student had a prior background in dental education and teaching of undergraduate and postgraduate dental students. The principal researcher was not involved in the teaching, assessment or clinical supervision of the participating students and did not hold authority over their academic progression. Power imbalances and response bias were minimised through

neutral, non-judgmental interviews, reassurance of anonymity and confirmation that participation would not affect academic standing. Recruitment via a gatekeeper and voluntary participation further reduced the pressures of participation or the possibility of coercion. Students were encouraged to speak openly about their perceptions without fear of judgement or academic consequences. These measures helped reduce, although could not entirely remove, the potential that participants might modify their responses because of a perceived power imbalance.

Other members of the research team included a Special Care Lecturer with qualitative research expertise and an Oral and Maxillofacial Surgery Consultant Lecturer with extensive clinical and academic experience. Both are experienced lecturers involved in undergraduate dental education, familiar with curriculum design, teaching methods, assessment and students' learning needs. During the development of the topic guide, researchers' backgrounds may have influenced the framing, wording and emphasis of questions, including a tendency to focus on the delivery and adequacy of teaching rather than allowing students' own learning experiences to emerge more freely. In addition, the professional roles held by the researcher team may have shaped assumptions about what students should have been taught and the knowledge they were expected to demonstrate.

To reduce the influence of these assumptions, the topic guide was piloted with fourth-year dental students before the main focus group interviews, providing an opportunity to evaluate whether questions were clear, open-ended and enabled participants to freely discuss their own experiences. Although researcher and teacher bias could not be completely eliminated, piloting the guide, using open-ended questions and maintaining reflexive discussion with their research team highlighted possible influences and reduced some impact on data collection and interpretation. The research team practised ongoing reflection of personal assumptions and expectations regarding students' knowledge and experiences of antibiotic prophylaxis throughout the study. As part of our reflexive awareness, we recognise that the professional roles, assumptions and experiences of all members of the research team could have influenced the design, conduct and interpretation of the study.

Rigour was enhanced through formal interview training, independent coding by two researchers and the use of verbatim quotes to ensure transparency. The interviewer received qualitative research lectures from Professor Sasha Scambler at King's College London, who has expertise in medical and dental qualitative research and completed a qualitative course on *Writing and Publishing Qualitative Research* at University College London (UCL). Ongoing mentoring and meetings were also held with a qualitative research supervisor throughout. Independent coding by two researchers strengthened analytical rigour and minimised individual bias during data analysis. The inclusion of verbatim participant quotations enhances transparency and enables readers to determine how findings are grounded in the data.

3. Results

A total of 18 final-year dental students were interviewed across four focus groups of approximately four to five participants: five students were male, whilst thirteen were female. There was excellent engagement amongst the participants within the focus groups. Students were vocal and eager to share their opinions. The in-person nature of the interviews allowed more natural communication. Students were able to respond directly to their peers, whilst their non-verbal cues and body language contributed to the flow of the conversation and assisted in facilitating discussion. This method prompted more open and engaged dialogue amongst students, which assisted in generating a deeper understanding of their perspectives.

Three themes and nine subthemes were identified (Figure 1): *Education* (Teaching and assessment, Clinical application during undergraduate training, Student perceptions and suggestions), *Use of guidelines* (Application, Awareness and Range of Guidelines) and *Future Practice* (Patient-related concerns, Reliance on Senior Support, Apprehensions around Prescribing).

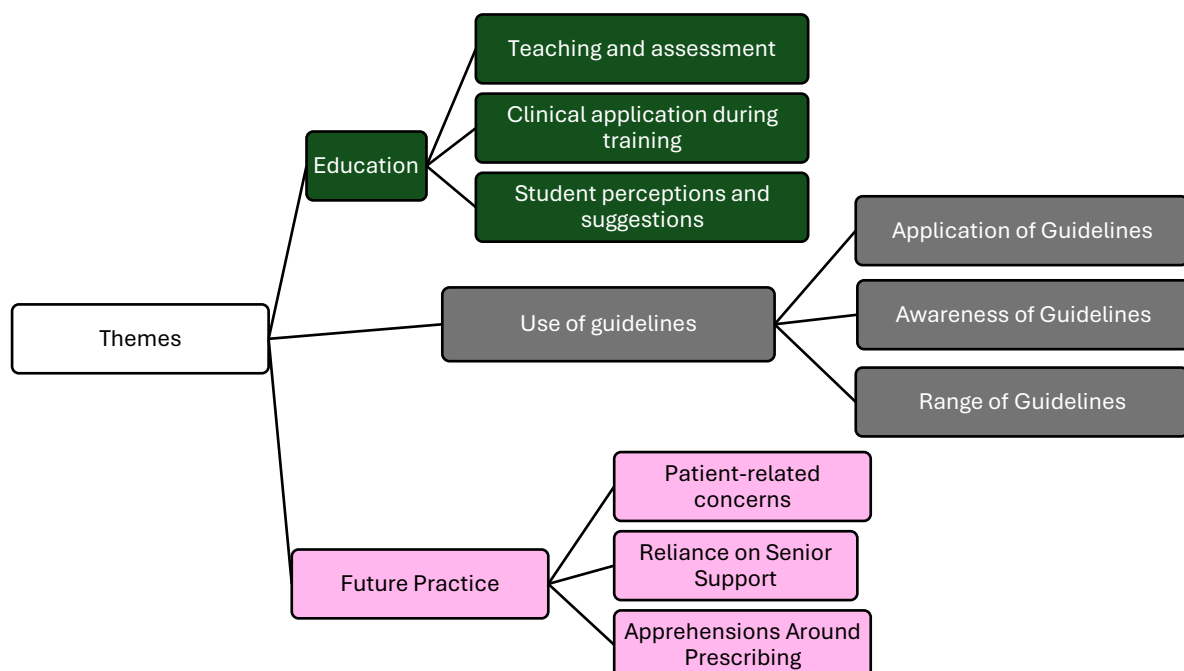


Figure 5: Themes and subthemes

3.1 Education

Students highlighted several limitations in how antibiotic prophylaxis is taught, especially within Problem-based learning (PBL). Participants pointed out inconsistencies, outdated resources, and lack of clinical exposure, which diminished their confidence and understanding. Students requested clearer, standardised teaching via lectures, improved access to current guidelines, greater clinical exposure, and relevant assessments. Although students heavily rely on clinical guidelines for decision-making, often prioritising them over their own judgment, they face difficulties in accessing and comprehending these guidelines.

3.1.1 Teaching and assessment

Students struggled with antibiotic prophylaxis education, particularly in PBL, due to an overwhelming amount of content, outdated resources, variable tutor input, and a lack of clarity about which guidelines to follow. PBL as a teaching methodology was consistently the focus of criticism. Few students found this method effective, and most felt there was considerable room for improvement:

“Again, like a 5 or 6 out of 10, like there’s still room for improvement” (P.18).

Students described the teaching of guidelines as particularly unsuitable for PBL as a teaching method and even overwhelming. Participants express concern that the self-directed learning component may result in misdirection or exacerbate their uncertainty, as there is a lack of sufficient confirmation or guidance regarding essential learning concepts:

“you’re kind of overwhelmed in PBL learning all this new stuff about cardiac disease and different defects and you don’t really understand it. So it’s hard to know at that point what the most important things are to take away and then when guidelines are being thrown at you as well, it’s just overwhelming” (P.9).

“think it gets a little bit lost in PBL, especially in second year because of each problem it has a lot of content and then, if you’ve not found the exact, correct information, you can kind of be on the wrong track, so you might have found like, I don’t know, didn’t get all the details of the guidelines down and then you’re not actually sure” (P.18).

The breadth of topics requiring coverage in PBL may lead to certain areas, such as infective endocarditis, being overlooked, which may affect how students view the importance of antibiotic prophylaxis:

“I just thought it wasn’t that relevant because again, it was kind of brushed over in PBL. So again, if it was maybe just highlighted with a bit more importance.” (P.11).

The references provided in PBL were observed to be outdated and excessively lengthy to navigate, thereby likely limiting their utility for signposting relevant evidence and guidelines. Students seem discouraged from reviewing PBL references due to the substantial volume and the inclusion of older evidence:

“We get maybe a really long list of references so it’s actually hard to even look through them and see which one is most appropriate. And then even if you do finally find one, it’s normally just really old, it’s tough to find better one” (P.11).

“And then the reading list sometimes is very outdated. So we are provided the reading list but some of the guidelines are not updated guidelines. So for example, I know SDCEP guidelines are frequently updated, whereas the reading list could be one from 2016 for example, versus one that could be out from 2022” (P.12).

The perceived inadequacy of accessibility to PBL references has led students to report limited awareness of the available evidence-based literature supporting the use of antibiotic prophylaxis, despite acknowledging that such resources would be beneficial to their understanding:

“ I think, I personally don’t know the literature that supports the use of antibiotic prophylaxis used for infective endocarditis or any of the other disorders that were listed or

conditions that were listed. So I think it would be good if we were given maybe some of the literature that supports its use or the literature that supports against its use to know exactly why we, whether or not there is enough evidence to suggest its use.” (P.12).

Variability in teaching quality was emphasised, with students reporting inconsistent messages from tutors:

“Yeah, even between the tutors in PBL, if you get one tutor, they might say one thing and another could say another” (P.9).

Students also observed that tutors and supervisors with different academic and clinical backgrounds delivered conflicting recommendations, thereby impacting the quality of education. The consensus indicates that tutors with extensive clinical experience, particularly in infective endocarditis or surgery, were regarded as delivering superior instructional sessions and, consequently, fostering increased engagement from students:

“And then a lot of the PBL tutors are non-clinicians so they would be mainly allowing us to go through the PBL process, but we would have the clinicians in our clinics who may not agree with the guidelines” (P.12).

“one person might be like really knowledgeable in that I know for like we were doing pathology last year and we had a guy, he was doing like Max facts as our PBL tutor so we’d have like really good sessions where it’s like other groups would be coming out with like they’d be out in like 10 or 15 minutes” (P.5).

“it does be heavily dependent on who your tutor was at the time, we’re obviously split up into I think eight groups and it depends on whether the tutor, for example, has an interest in kind of infective endocarditis or it could be for example, a public dental health specialist that doesn’t, doesn’t encounter this, you know, on a daily basis and it isn’t of that much interest to them, so they might just kind of skim over that and say, yeah, the guidelines are there.” (P.16)

More relaxed, variable teaching approaches and lesser perceived expectations from certain PBL tutors result in certain students not completing tasks expected of them or achieving set learning objectives, as they would with other tutors:

“Yeah and it depends who takes your PBL session. So like most of the time, a lot of times it can be just rubbish because the person who’s actually taking them doesn’t really care. The students understand that, so there’s no standards and then it becomes like, we’re just all reading. We’re just like all going in, relax and googling whatever. And then but then there’s some tutors who will actually hold it to a really high standard and they’ll actually ask you questions and they’ll quiz you and then they’ll actually force you, you’ll actually be like, oh, I actually kind of have to make common sense of this and then rationalise it.” (P.7).

The self-directed aspect of PBL and the way guidelines are taught faced significant criticism, with students questioning its effectiveness due to limited discussion and reduced motivation to engage with the guidance independently:

“I think the problem with problem-based learning as well, it’s maybe not the most effective way of teaching it because it’s as P15 was saying, it’s self-directed, So one person could go and when they come back to report, you know the whole guidelines off by heart and another person may not have even opened the documents and that’s not necessarily picked up” (P.17).

“Yeah, because the guidelines, it’s like we sit down, talk about it and then like when it comes to like the guidelines, it’s more like, oh yeah, just read the guidelines.. make sure you know that so you don’t actually kind of go through kind of situationally when they could come up or like, so you’re just left to your own devices to kind of read through them” (P.7).

Given the inadequacies of teaching guidelines within PBL, students emphasise the importance of integrating guidelines across the dental curriculum and of clearly indicating which guidelines should be followed:

“But I think it will be better if they then kind of confirmed which ones we should be following because how are you supposed to know whether you’re doing it right if someone doesn’t tell you?” (P.9).

“So maybe at most just if someone tells us specifically in an e-mail, follow these guidelines, here’s the link, keep up to date. Maybe that’s all we need.” (P.11).

Students perceive assessments as effective for reinforcing knowledge, especially concerning guidelines. They highlight the Third Year OSCEs as particularly helpful in promoting clinical thinking and practical application:

“I think the third year OSCE that we had was very good at kind of making you prioritise information and realise, OK, the guidelines are important and I need to know how to apply them” (P.9).

3.1.2 Clinical application during training

Lack of clinical exposure to patients at risk of infective endocarditis is evident throughout students’ undergraduate training. Most students have had no exposure; others may have had only one case, which they feel may be inadequate:

I think as well, like I’ve only given it once before. So, I suppose I wouldn’t say that’s great experience. So, I suppose maybe in the dental hospital if we have a little bit more patients or seeing it maybe more” (P.22).

“But I’ve never had a patient who’s at risk of infective endocarditis personally” (P. 11).

“Because I think Doctor [name of lecturer] sent me an e-mail about how to organize um getting antibiotic prophylaxis but I’ve never done it.” (P.6).

Students cite limited clinical exposure as a barrier to applying their knowledge of clinical guidelines, which hinders bridging the gap between theory and practice:

“I think the opportunity to apply what we learned in PBL. So little of us has had a patient, who would fall under requiring antibiotic prophylaxis.” (P.6).

Students shared that limited experience in managing patients at risk of infective endocarditis can affect understanding and adherence to antibiotic prophylaxis guidelines. This is further compounded by only teaching these guidelines in earlier years without providing practical clinical reinforcement:

“I do think also at the time, because we were in second or third year, I didn’t fully understand why guidelines were important because I hadn’t been treating patients or especially not treating anyone with severe cardiac disease to know” (P.11).

“and from my like level of experience, I wasn’t able to say you don’t need it this clinic or there’s no need for it this time.” (P.21).

3.1.3 Student perceptions and suggestions

Students were contemplative and very forthcoming with their perceptions of their educational experiences and suggestions to improve the teaching of antibiotic prophylaxis guidance. Students felt that they were at least adequately taught the skills to look up relevant guidelines, provided they were aware of which guidelines to follow:

“But I do think we’re equipped in the skills to search up guidelines, that we would be able to retrieve them, given time” (P.10).

Most were more critical and disappointed by their lack of adequate education on antibiotic prophylaxis guidelines, consistently rating the teaching as below average or poor:

“I was gonna say a solid 6 because we haven’t actually been taught that, we’ve been given guidelines, but I don’t think it’s actually been taught to us as such.” (P.20)

"I think it's been quite poor. OK I think that's evident in this room. We're all looking at different guidelines, mixing and matching. And if we all have the same, we were all one the same guidelines, that would also reflect better teaching." (P.11).

"So going off that I'd rate it poor." (P.5)

Students shared multiple suggestions to improve current teaching methods on antibiotic prophylaxis for the prevention of infective endocarditis. Many mentioned didactic teaching in the form of lectures during the later years of their training, for further clarity and reinforcement of correct guidance:

"I think probably a clear lecture on it as well so that we are sure of what guidelines we are actually following." (P.19).

"I think we need a lecture specifically on infective endocarditis. I think a lot of it's just been kind of PBL with the guidelines from the dental hospital on Blackboard and that's kind of it." (P.22).

Receiving a lecture may reduce students' lack of confidence and anxiety when prescribing antibiotic prophylaxis for the first time:

"I think there'd be a lot more anxiety and lack of confidence in my first experience with prescribing without the lecture than there would be if we did have a confirmation lecture or a follow up lecture." (P.10).

Some students expressed a preference for didactic teaching from a cardiologist and lecturers with more clinical experience, valuing real-world education over receiving purely theoretical, textbook-style information:

"Maybe a talk from a cardiologist to hear their point of view, maybe joint consult, maybe we could have like cardiologist and a dentist together, they would give the talk" (P.18).

“It’d be nice to have like a lecture on it or kind of someone that knows exactly, is like used to dealing with it that can tell us exactly what actually happens clinically instead of what the ideal would be or what a textbook is saying, why it’s done certain ways in certain countries” (P.20).

Students find that lectures are useful to refer to on topics they have been taught, in comparison with PBL, where notes are less beneficial:

“But also having a lecture’s handy because you have it then in your computer or no. I don’t know, sometimes seminar is good but you might bin the notes or it won’t stick or something, but when it’s actually in a lecture you tend to keep it when it’s filed and you’ll go back to it.” (P.13)

Students repeatedly suggested increasing clinical exposure to patients with infective endocarditis, proposing this could be assessed through mandatory logbook entries:

“Yeah, if every student could be exposed to one case before graduating, I think we definitely would have more confidence in practice”, “because we do have one logbook, do you know where we have to sign off certain cases, so that could be one area” (P.10)

Others recommended consolidating understanding through examination; students engage more actively or place greater emphasis on learning about topics when they are assessed:

“I think it’s important to just examine the high yield information, even though it may seem predictable, just to make sure that the student body understands exactly the importance of antibiotic prophylaxis” (P.12).

Students considered assessment of their understanding of guidelines to be more important than examination of specific questions relating to pathophysiology or cardiac conditions, as this better reflects their ability to apply knowledge in clinical practice:

I find that in second year and third year when we were learning pathophysiology, the guidelines should have been the high yield information that should have been examined rather than necessarily the ins and outs of certain cardiac conditions because then they would be able to see the gaps in knowledge within a class group if people are unable to state the guidelines in a clear, concise manner and show their understanding. So I think maybe improvement on the examination.” (P.12).

Students found Objective Structured Clinical Examinations (OSCEs) particularly effective in assessing knowledge of antibiotic prophylaxis:

“So there was also a question in the OSCE for antibiotic prophylaxis. So it kind of made us like know it better.” (P.8).

However, antibiotic prophylaxis to prevent infective endocarditis is currently examined only in Third Year OSCEs, rather than in the senior clinical years at Trinity College Dublin. Overall, students felt that current teaching methods for understanding antibiotic prophylaxis and engaging with guidelines to prevent infective endocarditis can be improved. PBL has limitations due to its self-directed approach and the variability of delivery depending on tutors. Students value structured didactic methods of delivery through lectures, increased clinical exposure and relevant assessment through practically applied OSCEs.

3.2 Use of Guidelines

3.2.1 Application of guidelines

Students demonstrated strong awareness of and reliance on clinical guidelines, viewing them as authoritative and integral to decision-making locally and in an international context. Most students would follow the local guidance of the country in which they are working:

“It’s more just a guideline to follow, not to do something against the guidelines of the country, it’s all about the place that we are working in.” (P. 21).

“So I would depending on where, if I’m working in the UK, I think I will follow the guidelines, the guidance of the country that I’m working in.” (P.12).

“I think we should probably adhere to the guidelines of the country we’re practising in.” (P.6).

Guidelines appear to overrule students’ own clinical judgement, leading them to follow guidance irrespective of their personal opinions on whether antibiotics are required:

“I’ll probably end up like, even though like I have my kind of opinions on it but again, I’d probably follow whatever they’re kind of recommending.” (P.5).

In contrast, some students considered not following NICE guidelines if they were working in the UK, given their European training and their own peace of mind when prescribing antibiotics. This reiterates the influence of undergraduate training on the use of guidelines:

“Probably feel tempted to prescribe anyway, just kind of selfishly as a cover for myself” (P.9)

“Cause I think that’s something we’re taught here. So, I think it’s something, yeah, I probably would just to protect myself as well.” (P.22).

3.2.2 Awareness of guidelines

Certain students showed a good awareness of the existence of guidelines in Ireland, particularly regarding clinical indications and which dental procedures they were recommended for:

“In Ireland it’s the HSE, they recommend it under certain conditions. So, for example, if the patient has an unrepaired cyanotic congenital heart defect, but just also as an example and the dental procedure is considered invasive then it is recommended.” (P.14)

“The HSE guidelines again, they have like the list of ones you don’t need it for. So, it goes like just an assessment or X-rays and that kind of stuff. And then it gives like examples of like as P6 mentioned. Like surgical procedure or manipulation of gingiva.” (P.5)

However, some of these students were unaware of any updates to guidance and did not appear to check for such updates routinely:

I didn’t know that the guidelines had changed in February, so that.” (P.13)

Students are uncertain about the year when HSE guidelines were introduced or last updated. They rarely access guidance or check when guidance was introduced:

“Maybe 2023? I have no idea.” (P.19)

“2019? Could be I’m not sure.” (P.18)

Students criticise the ease of access to guidelines within the dental hospital and state that greater accessibility to guidance on antibiotic prophylaxis for preventing infective endocarditis could improve their awareness of local guidelines. Barriers such as limited access hinder familiarity with and use of these guidelines, reducing engagement:

“I think maybe for lots of other students, is that, say, the hospital’s own guidelines, they could be quite difficult to access and say remotely, like you have to be in the hospital on certain computers to access them, whereas if they were more freely available or more easily accessed, I think students would be more inclined to access them more often and know them better.” (P.17).

Furthermore, in addition to a lack of awareness regarding which guidelines are referenced by the dental hospital, certain students exhibited a complete lack of awareness concerning

both local and international guidelines overall. These students appeared confused about the names of the guidelines and the countries of their origin, as the multitude of guidelines available internationally can be overwhelming and hinder understanding:

“I hadn’t actually heard of the HSE guidelines before yesterday. I was always under the assumption that we have like just the dental hospital ones that were modified from, not sure what they were modified from but.” (P.15)

“Was it from the NICE ones? Um, I can’t remember. They are the ones that we follow.” (P.21).

“SDCEP, I don’t know if they have infective endocarditis guidelines, do they?” (P.20).

“Isn’t it in the US that they use the NICE guidelines?” (P.6).

The differences among international guidelines are often not well understood; unfamiliarity with the various guidance documents affects awareness of specific details. When students struggle to comprehend or recognise which local guidelines they are following, they find it even more difficult to differentiate these from other guidelines:

“But I’m not sure exactly what the difference in our ones are compared to, compared to the guidelines.” (P.14)

Students often overlook details such as antibiotic regimens due to a lack of insight and comprehensive understanding of guidance. Notably, dosage information frequently confuses many students, which is understandable given the variation in recommended doses—ranging from SDCEP’s previous recommendation of three grams of amoxicillin (SDCEP, 2018) to HSE’s two grams (HSE, 2026)—attributable to the availability of amoxicillin sachets containing three grams within the UK. However, confusion regarding the measurement units of antibiotics (milligrams versus grams) and incorrect dosages is highly concerning:

“ we had a patient who had a history of infective endocarditis and they were given the medication Amoxicillin 3 milligrams or 3 grams, I’m not really sure?” (P.12).

“I know there are differences, in some guidelines recommend one gram of Amoxicillin whereas other guidelines recommend two grams pre-operatively” (P.17).

There are ambiguity and uncertainty about the appropriate prescription for patients with specific drug allergies, particularly given the multiple alternatives available for those with milder and severe allergies, and drug contraindications during pregnancy. Additionally, students are perplexed by recent modifications transitioning from clindamycin to clarithromycin, as well as the underlying reasons for these changes:

“One’s pregnancy, Doxycycline, I think. But I’m not entirely sure for like moderate to severe allergies.” (P.5).

“I think I’ve also seen Clindamycin 600 milligrams, but I’m not exactly sure why we do Clindamycin over Clarithromycin.” (P.12)

Although students are able to identify cardiac conditions that warrant antibiotic prophylaxis, they perceive their overall understanding of cardiac pathophysiology to be quite inadequate. This deficiency arises from the considerable amount of time elapsed since the cardiac pathophysiology lectures were delivered and the failure to bridge the gap between theoretical knowledge of cardiac conditions and the clinical application of guidelines:

“Yeah I’d say my cardiac knowledge overall is very poor and I wouldn’t actually be able to tell you exactly why we do or don’t”. (P.9).

“I have a very small amount of knowledge and that’s from the cardiac physiology lecture in 3rd year that touched off of infective endocarditis and a little bit on rheumatic fever as well.” (P.12).

“Honest I don’t fully understand why these specific patients are more at risk of infective endocarditis, what the physiology is going on.” (P.11).

The lack of comprehensive understanding of cardiac conditions also extends to limited awareness of infective endocarditis. Students reported that they would be unable to recognise its signs or symptoms in a clinical setting, lack confidence in what to expect or the possible consequences of infective endocarditis from their treatment:

“I think one of the things maybe I wouldn’t be so confident in, we touched on there maybe like signs and symptoms that maybe after the procedure, like in the days and weeks that something is not quite right” (P.17).

As a result, students might not fully grasp the clinical reasoning behind using antibiotic prophylaxis in specific cases to prevent infective endocarditis. This underscores the crucial connection between theoretical understanding, practical experience, and clinical exposure, which together form the foundation for awareness of antibiotic prophylaxis:

“Yeah, I just, I remember kind of falling into that trick before, like not knowing much of the difference between a valve and a stent and then kind of learning that you don’t give it for the stent.” (P.5)

3.2.3 Range of guidelines

The limited engagement and awareness of guidelines among students are significantly influenced by the plethora of available antibiotic prophylaxis guidelines designed to prevent infective endocarditis. Many students experience feelings of being overwhelmed, confused, and uncertain about which guidelines to follow, due to the array of options.

Students struggle to identify guidelines employed by the local dental hospital and its source, which is not clearly communicated, as well as those used internationally, including

the differences in specific details across these guidelines. It appears that students do not rely solely on a single guideline; rather, they are inundated by multiple sources and attempt to synthesise information from each:

“Yeah. I’m actually confused now as to which they’re based on. I know we have hospital guidelines that we can access from the computers in the hospital” (P.9)

“But I was going to say that we follow the British ones, I think. But I’m not sure.” (P.10).

“Because of course I think we all know information about the guidelines but we don’t know which guideline it’s from and I think it’d be good to know exactly oh, I’m getting this piece of information from this guideline or this other guideline.” (P.12)

This variation of guidance, available in turn, influences students’ confidence regarding which guidelines they should adhere to. Students tend to revert to their local hospital guidance; however, they consistently indicate that they are unaware of the origin of these guidelines. The abundance of international guidelines creates confusion among students, particularly those from the UK and the US. Interestingly, this confusion often causes students to overlook clearer local guidelines like the HSE in Ireland:

“I’m not familiar with who lays out the conditions, but I am familiar with the different organisations like the AHA and the British BSAC and the NICE guidelines for, on like the dosing of prophylaxis. OK, But I’m just familiar with the DDUH criteria, which doesn’t follow the NICE guidelines. I think it might, but I’m not confident.” (P.11).

“I think the American society of cardiac patients or cardiology I think are the ones that we use in this hospital, but I could be wrong. I’m not 100% sure.” (P.12).

In certain situations, students have chosen to independently research guidelines for antibiotic prophylaxis in infective endocarditis and subsequently question whether these are incorporated within internal protocols. Students indicate that internal guidance is only

effective if it is explicitly clear; otherwise, it can lead to confusion and necessitate consulting external sources:

“OK so that might be why we’re coming up with so many different guidelines because we would have gone off and researched infective endocarditis guidelines and find different ones and then because we’re not 100% sure what guidelines the dental hospital are following” (P.10).

3.3 Future Practice

3.3.1 Patient-Related Concerns

When considering antibiotic prophylaxis, the risk of patients developing infective endocarditis was at the forefront of students’ minds. Students expressed fears and a reasonable awareness of the condition’s potential life-threatening consequences. Although students have likely never encountered patients with infective endocarditis, they understand the significant morbidity and mortality risks associated with the condition and place emphasis on the role of antibiotic prophylaxis and prevention:

“prevention is better than cure in the case of infective endocarditis and it does carry a high mortality and morbidity” (P.10)

“Yeah, I think the risk, but not that I’ve experienced anyone getting infective endocarditis from procedures I’ve done, but kind of knowing what we’ve been taught and like the cover for it and then going back to oh, don’t bother giving any. I’d feel quite cautious. The risk, potential risk being there, I’d be quite scared.” (P.5).

However, students were also particularly concerned about adverse reactions such as allergies to antibiotics when administering antibiotic prophylaxis and weigh up the risks between anaphylaxis and the development of infective endocarditis. They acknowledge that the prescribing clinician bears the responsibility for adverse effects associated with the administered medication:

“you’re monitoring to look out for signs of allergy as well because ultimately you’re responsible” (P.10)

One student suggested that additional precautions may be necessary when prescribing prophylactic antibiotics to patients who had not previously taken them, such as monitoring, demonstrating their perceived duty of care towards patients in practice:

“I think it might depend on if you have concerns regarding the patient’s allergies or if they haven’t had the antibiotic before. If they hadn’t had it before, you might want to keep an eye on them in your surgery” (P.17).

When recommending antibiotic prophylaxis, students prioritise patient autonomy and education. They justify its use by referencing established guidelines and highlighting the importance of shared decision-making. Although students appear to adopt patient-centred care principles when considering antibiotic prophylaxis, their approach remains predominantly rooted in guideline-based practice. Their clinical reasoning, potentially influenced by inexperience, is largely mediated through adherence to established protocols:

“Also we need to have like a reason why we are giving it, as patients who are humans who know what, what is happening to me to give that reason why we are giving it and our reason will always be that there’s a guideline” (P.21).

“kind of laid out what the guidelines are now and explained that under our guidelines they’re not at risk of infective endocarditis” (P.9).

However, this may exacerbate students’ concerns and anxieties about insufficient knowledge of the correct guidelines, as such deficits could undermine patients’ confidence and trust in their abilities. Given the significance students place on guidance, their lack of familiarity and consequent confusion are closely linked to their perceptions of how patients view them, as well as to their own self-confidence:

“I think that’s where my gap maybe is and yeah, seconding guessing which guideline if a patient did ask me or what guidelines are you using, I think that would look quite bad if I wasn’t aware which guideline I was specifically referring to.” (P.12)

“Or even if you refer to a guideline and then if they went and looked it up and saw that Ireland doesn’t actually follow those, that would also look bad perhaps if we were able to figure out which ones we’re supposed to use.” (P.11)

Students have found that some patients anticipate antibiotic prophylaxis even when their cardiac condition or history does not elevate their risk of infective endocarditis. However, determine their need for antibiotic prophylaxis based on guideline criteria:

“I had a similar experience in oral surgery as well, actually, where someone had a heart condition that didn’t fall into the guidelines and had been getting antibiotic prophylaxis for years and then was really confused as to why they wouldn’t be getting it, for whatever procedure was going on.” (P.9).

Another challenge, besides managing patient expectations, is communicating antibiotic prophylaxis information to patients with language barriers or limited English proficiency. In addition to developing effective communication skills to build rapport with patients, *“getting consent for antibiotics”* (P.18), students must also justify antibiotic use and communicate this to patients who do not understand English, often relying on translation services:

“she didn’t speak any English, so it’s a bit more difficult to communicate it through Google Translate. So I think we had to call her daughter who spoke English and then explain it to her and then she would explain it on the other side and eventually she understood it. And we advised her on the day of the extractions to come in with her daughter or someone who spoke English” (P.11).

Lastly, within this subtheme, students confront the concepts of medical paternalism versus patient autonomy, particularly contemplating the substantial risk associated with patients developing infective endocarditis. Some students assert that professional judgment should guide the administration of antibiotic prophylaxis, rather than relying on patients to perform this task correctly themselves. This also stems from their perceived professional liability and responsibility, should patients not take their antibiotic prophylaxis at the right time:

"I think basically there is kind of professional judgement you know, the practitioner would know the patient best and what they may or may not be capable of." (P.17)

"if they say they took it at home and they said they took it at the right time. And then for example, if they went on to develop infective endocarditis, you would kind of question yourself then wonder if it was, you know, it was your own kind of responsibility there." (P.15).

However, some students suggest informing patients about the risks, placing the onus on the patient to adhere to the antibiotic prophylaxis appropriately and trusting that the patient comprehends and will take the antibiotic safely as instructed prior to their treatment. The focus is on providing sufficient patient education and respecting autonomy:

"If they were completely informed and they fully understood the consequence, maybe not taking it at the right time, I think, then it would be OK to let them take it before they come in." (P.9).

3.3.2 Reliance on Senior Support

Students demonstrate a lack of confidence in prescribing antibiotic prophylaxis as newly graduated clinicians by relying on senior practitioners. Multiple students report asking the patient's general practitioner (GP) about the need for prophylaxis to prevent infective endocarditis, rather than making their own recommendations. Students feel that GPs are

better placed to understand patients' medical conditions and would trust their opinion over their own, even when it may affect dental treatment:

"it's always like better to follow because they are the general doctors. They are, and our problem is more about medical condition, that they are more experts in the general body" (P.21).

"and the GP, I would trust their medical knowledge really." (P.19).

Students demonstrated a low threshold for consulting the patient's GP, potentially exacerbated by clinical supervisors' encouragement for students to seek GP advice rather than adhere strictly to established guidelines. There is an inherent reliance on medical professionals for guidance, rather than prioritising internal protocols or consulting updated evidence and guidelines:

"or consult the GP, the GP just to double check." (P.6).

"I've also had an experience with older supervisors recommending contacting the GP to see if the patient needs antibiotic prophylaxis because of a history of rheumatic fever and so even though it's not in our guidelines, they were encouraging me to investigate further and possibly prescribe." (P.10).

In addition to coordinating with general practitioners, numerous students report consulting with the patient's cardiologist. These students regard their specialist medical expertise more highly than established guidelines and express willingness to follow prophylaxis recommendations provided by cardiologists over published guidance:

"I'd probably be more inclined to consult the cardiologist beforehand and see that they're OK with doing it without the prophylaxis." (P.20).

"I think we will, like message or send a letter to the cardiologist and ask for what he thinks about it, mentioning the treatment plan that we want to do and if he's happy for giving the antibiotic, we will go for it, but if he's not, then yeah." (P.21).

Some students view managing patients with cardiac conditions and antibiotic prophylaxis as outside their scope as general dental practitioners and believe they should seek specialist advice instead. They are reluctant to make independent prescribing decisions:

"I think being a general like feeling as a general dental practitioner, so I'm not a specialist, so I would probably consult with the cardiologist or someone first before making any decision." (P.14).

It was also recommended to consult both the patient's GP and cardiologist before giving antibiotic prophylaxis, depending on multidisciplinary advice and input. A discrepancy exists between students' stated reliance on formal clinical guidelines and their tendency to defer to individual clinicians' advice here, students favour perceived authority over guideline-based protocols when they lack confidence in prescribing:

"I think we will be able to like give it once we are all like allowed in the place to give or like the place that we are practising and after consulting the GP, the physician, the cardiologist and if they are happy, it's always like a team because it's like, like multidisciplinary approach" (P.21).

"We stick to the cardiologist um like guidelines that he give the patient and we stick to the GP instructions regarding taking antibiotic prophylaxis before every single dental appointment, to avoid any adverse complications." (P.21).

Nevertheless, when students are unable to establish immediate contact with a patient's general practitioner, they may feel compelled to make independent clinical decisions regarding antibiotic prophylaxis, irrespective of their expertise or confidence in preventing infective endocarditis:

“I suppose it depends on where we work. If I was in a very remote area in Ireland, like a small village where for example, a GP was miles away and wouldn’t answer the phone, I would probably make the decision myself.” (P.18).

Some students rely on patients' accounts of what their GPs and cardiologists have previously advised about antibiotic prophylaxis, rather than consulting healthcare professionals or referring to clinical guidelines. This practice can be professionally irresponsible, as the public should be guided by the clinician’s own medical training and expertise:

“Like most of the people that have, that I’ve heard of that have one of these conditions, they’ve often been told by their cardiologist or by their GP that they will need prophylaxis. So then in that case I think I’d be happy enough to go with it, without consulting.” (P.20).

Alternatively, instead of consulting medical practitioners, students indicated that they also depend on senior dental colleagues for advice regarding antibiotic prophylaxis to prevent infective endocarditis, such as the *“principal dentist”* (P.7) or *“someone who has been working longer”* (P.5). This approach may be more clinically appropriate than relying on patients; however, it still reflects a fundamental lack of confidence and a desire for support after graduation:

“I think having clinicians that have a higher clinical standing, so having people that are very like much older, more educated in the field so that I can ask a question if I’m unsure and not making the decision entirely on my own, I think is what I would refer to as my safety blanket. And having, making an educated guess is always, you’re more confident in that when other people agree with your decisions.” (P.12).

Students note that in private practice, the owner(s) should be consulted or involved in the administration of antibiotic prophylaxis, rather than the treating clinician making the sole decision. Students appear to automatically defer to a more senior person for advice, as long as they are present, and assume they are not always expected to make independent clinical decisions:

"I suppose if you're working in the practice of someone I suppose like alongside, you have to consult someone, I suppose it's not a position you probably completely make by yourself" (P.22).

When operating within various jurisdictions, students may seek confirmation from non-clinical senior administrative personnel rather than making independent clinical decisions regarding antibiotic prophylaxis. Dependence on non-medical sources for verification may pose a risk of adopting a procedural rather than evidence-based approach to prescribing:

"I suppose coming from an Irish background, you'd probably be more familiar with what you've known and what you've been told in university. So perhaps then we would probably be more likely to administer antibiotic prophylaxis. But yeah, I suppose it might depend on, it is something you probably speak with your practice manager about as well before doing it." (P.17).

Students' hesitancy and lack of confidence in prescribing stems from a lack of independence or autonomy when prescribing as students during their training, where responsibility for prescribing decisions ultimately lies with supervising clinicians:

"And legally we can't prescribe at the moment, so it would be the clinician's final, like they would have the final responsibility to make sure it's correct." (P.10).

Participants suggest that continued professional development (CPD) in antibiotic prophylaxis after graduation may enhance newly qualified dentists' understanding of infective endocarditis and their confidence to prescribe independently. This highlights an underlying desire for further education beyond what has been provided:

"So perhaps having courses that we have to do as graduate dentists yearly to update our knowledge on the guidelines that are present etc, to urge that and up to date continued professional development." (P.12).

3.3.3 Apprehension around prescribing

Students explore the issues surrounding antibiotic prescribing that may influence their views or clinical decision-making. They discuss inappropriate prescriptions or the administration of antibiotics in different clinical scenarios when they are not indicated:

“I’ve seen people prescribe antibiotics for that when it mightn’t be necessary.” (P.10).

Students examined factors that may influence decisions against recommending antibiotic prophylaxis, such as costs and legal considerations, while also acknowledging the increasing concerns regarding antimicrobial resistance and stewardship. These issues have significant implications for prescribing practices related to antibiotic prophylaxis, particularly in the UK:

“Also the cost as well.” (P.19).

“I assume it’s the antimicrobial resistance that’s like got a lot bigger and like it’s a big concern. So, I’d say I presume that’s the only reason why. Maybe they have some research on like that, the incidence of infective endocarditis from dental procedures is low, but I don’t actually fully know.” (P.5).

“But I think also the increased risk of antimicrobial resistance poses a threat to like the future of medicine.” (P.12).

Regardless of the potential reasons against prescribing antibiotic prophylaxis routinely, students appear to view antibiotic prophylaxis as a form of legal protection, where medico-legal responsibility influences clinical decision-making, rather than patient safety alone:

“I was just going to say going back to your question with the Americans, why they might give it more, I know they have more say medical legal, you know, cases over there so it

might be more trying to cover yourself with a legal standpoint in case the patient was to develop infective endocarditis.” (P.14).

4. Discussion

This study delved into final-year dental students' perceptions of education, guidance and preparedness for future practice in antibiotic prophylaxis to prevent infective endocarditis. Consistent with the limited available evidence, the findings illustrate that students' understanding is variable, often fragmented, and strongly influenced by inconsistencies in teaching, limited clinical exposure and confusion around clinical guidance. Importantly, this study broadens existing quantitative research by offering novel qualitative insight into how students experience and perceive their education in this area. Three key themes were identified: Education, Use of Guidelines and Future Practice.

4.1 Main findings for Education

Students were consistently critical of their education on antibiotic prophylaxis to prevent infective endocarditis within PBL. Although PBL is designed to encourage self-directed learning, participants found it inconsistent, highly dependent on tutor engagement, and insufficient for developing deep clinical understanding. Participants found PBL challenging to engage with due to the complexities within each problem and the broad range of topics covered, which made it easy to overlook the importance of topics like antibiotic prophylaxis and correct guideline usage. The broad range of topics in PBL has led to many references that students find hard to navigate, as they are lengthy and outdated. While some references on antibiotic prophylaxis for preventing infective endocarditis are included, students are unfamiliar with them and might benefit more from clear guidance towards key guidelines rather than numerous outdated references. There is also no dedicated section for guidelines within PBL references, so they can be difficult to find amongst the other articles and topics.

Research on PBL has highlighted these weaknesses: the most common complaint among students (64%) was the varying implementation styles of tutors, where different behaviours and attitudes affected the quality of students' education (Ateş *et al.*, 2010). Students felt that tutors did not guide them adequately, already held negative perceptions of PBL, and came unprepared for sessions (Ateş *et al.*, 2010). Conversely, tutors found

that students also arrived unprepared for sessions, appeared uninterested in learning, and may lack the necessary study habits to benefit from self-directed learning (Ateş *et al.*, 2010). Tutors reported that students tended to study solely to pass examinations; consequently, some would not contribute to discussions or exhibit behaviours expected of PBL (Ateş *et al.*, 2010). Variability amongst PBL groups with the same tutors has also been reported in the literature, where studies have shown discrepancies in performance depending on productivity within tutorial groups (Dolmans *et al.*, 2002). Recent evidence has highlighted barriers to implementing PBL within medical research, including a lack of resources, limited awareness of individual learning objectives, students' low motivation, large class sizes, and information overload (Tefera *et al.*, 2024). Students from a Swedish Medical College perceived that they would have benefited more from formal lectures, did not find that PBL suited all courses within their curriculum, criticised the varying quality of tutors, felt some tutors were not involved enough, and believed that overall lectures and tutorial programs within their medical program could be improved (Szabó *et al.*, 2015). This indicates that, worldwide, students have found it difficult to learn through PBL, highlighting weaknesses of delivering education via this method in dental or medical teaching.

Within the ADEE GED Framework (Taskforce, 2022), students are expected to competently demonstrate evidence-based decision-making and safe prescribing practices. However, the variability in learning described by students suggests that current teaching methods may not be sufficiently addressing these competencies in practice. One of the key issues identified was the lack of explicit teaching of which cardiac antibiotic prophylaxis guidelines should be followed. Students appeared confused and uncertain, given the vast amount of guidance available, but also because they have received conflicting sources of information from different supervisors and tutors, resulting in a lack of clarity and inconsistent learning. This lack of certainty and explicit instructions for students is problematic within a field that is already riddled with conflicting international guidance.

Furthermore, students highlighted that the importance of antibiotic prophylaxis was often lost or brushed over within the curriculum, reflecting the challenges of curriculum overload, where the quantity of content given can cause certain topics to receive less

emphasis (Maart, Adam and Frantz, 2023). Participants emphasised that guidelines should be integrated across the dental curriculum more effectively and national guidelines should be made explicitly clear to students. In addition, students felt that their knowledge of guidelines is currently being assessed well and should continue to do so, through examination methods such as OSCEs. Assessment emerged as a key factor of learning; however, the current curriculum only assesses students' knowledge of antibiotic prophylaxis to prevent infective endocarditis in earlier years, with no reinforcement during senior clinical years. This lack of longitudinal assessment may lead to knowledge attrition and insufficient preparedness for practice after graduation. The absence of antibiotic prophylaxis assessment in later clinical years represents a missed opportunity for consolidating knowledge at a critical stage of training. As students transition towards independent practice, it becomes increasingly important to boost confidence and clinical readiness.

Another significant educational finding within this study was the lack of clinical exposure to patients requiring antibiotic prophylaxis to prevent infective endocarditis. Multiple students reported having little to no direct experience observing or managing such cases during their undergraduate training. Their lack of exposure has potential ramifications. Experiential learning is pivotal to clinical competence, and the absence of opportunities to apply knowledge in practice can affect students' ability to contextualise and consolidate understanding (Villarroel Henríquez, Castillo Rabanal and Santana Abásolo, 2025). Within the GED framework (Taskforce, 2022), competence in clinical decision-making is attributed to theoretical knowledge but also practical application in real clinical scenarios. The lack of such exposure appears to contribute directly to participants' lack of confidence, their difficulty in applying guidelines appropriately and apprehensions with prescribing in future practice. Students themselves identified their gap in knowledge and suggested that mandatory exposure to at least one relevant clinical case would improve preparedness for practice. The proposal to formalise this through mandatory logbook entries emphasises the need for structured integration of clinical experiences within the dental curriculum.

The exploration of student perceptions and suggestions in this study reveals that, although students believe they have developed adequate skills to independently find

clinical guidelines, this does not necessarily mean they have a meaningful understanding or can confidently apply them. It also does not imply that students are locating the most relevant guidelines for their practice or locality. Students report that although they are capable of retrieving guidance, uncertainty surrounding which guidelines to follow drastically undermines this perceived skill. This study has shown that not only do students require direct access to clear information, but also clinical exposure to interpret and apply what has been taught. Students were largely dissatisfied with their current educational experience, describing their teaching of antibiotic prophylaxis as inconsistent and lacking. The perception that guidelines are simply given but not taught in PBL suggests a passive and self-directed mode of learning, where students are given the responsibility to interpret complex and sometimes conflicting information without sufficient support or contextualisation.

A prominent suggestion from students in the findings was their clear preference for didactic teaching, especially in the later stages of training. Students repeatedly emphasised the importance of structured lectures to clarify antibiotic prophylaxis guidelines, reduce ambiguity, and strengthen cardiac knowledge before starting independent practice. Lectures were not only commended for their clarity but also for their permanence and structure as a resource that could be revisited, in contrast to the less-structured and informal nature of PBL-derived notes. This indicates that students value accessible, reliable and clinically pertinent teaching materials, particularly for high-risk topics such as prevention of infective endocarditis.

Students also highlighted the importance of expert-led teaching, seeking input from clinicians with direct experience in managing patients at risk of infective endocarditis, such as senior dental practitioners or specialist cardiologists. This implies a need to bridge the gap between theoretical knowledge and real-world clinical application, suggesting that current teaching may lack sufficient clinical context. Students believe that incorporating multidisciplinary perspectives could deepen their understanding of both the rationale and practical implementation of antibiotic prophylaxis. In addition to improving teaching delivery, participants highly advocated increased clinical exposure to treating patients requiring antibiotic prophylaxis to prevent infective endocarditis. As mentioned

previously, the suggestion that all students should manage at least one such case prior to graduating reflects their awareness of the impact of experiential learning in developing clinical confidence and competence.

Overall, these findings illustrate a disconnect between current educational approaches and students' perceived learning needs. The reliance on self-directed learning, variation in teaching and limited reinforcement in senior clinical years may hinder the development of core competencies from GED (Taskforce, 2022), which emphasises the importance of competent evidence-based decision-making and safe prescribing. While students are expected to engage with clinical guidelines, they require clearer guidance, structured instruction, clinical exposure, and aligned assessment strategies to effectively translate this knowledge into safe and proficient clinical practice. These insights from participants provide compelling rationale for curriculum reform, particularly concerning the methods by which guideline-based topics are taught, reinforced, and evaluated within undergraduate dental education.

4.2 Main findings for Use of Guidelines

When exploring the application of guidelines, students relied heavily on using clinical guidance, consistently recognising them as authoritative and pivotal to clinical decision-making. Students were strongly inclined to defer to guideline recommendations, often prioritising these over their own developing clinical judgement. This reliance was demonstrated at both local and international levels, with students showing eagerness to adapt to prescribing guidelines depending on the country in which they are working. These perceptions indicate that students recognise the implications of following established standards of care and are concerned about potential medico-legal consequences when deviating from professional guidelines. However, this reliance on guidelines does appear to sacrifice students' own clinical reasoning, where participants noted that they would follow national recommendations even when these conflicted with their own personal judgment or comfort. In some circumstances, students appeared to prescribe defensively as a means of protecting themselves rather than solely for the patient's best interests.

These findings suggest that undergraduate training significantly influences students' prescribing behaviours, as they tend to internalise the norms and practices learned during their education, which then affect their approach to guideline use in future practice. While adherence to guidelines is essential for safe patient care, excessive reliance without critical reasoning may hinder the development of clinical autonomy or personalised patient care. This is particularly concerning if students lack a deeper understanding of the rationale behind guidelines and cardiac conditions, as it could compromise patient care through over-prescribing or inappropriate prescribing practices. Lack of thorough awareness of guidelines, knowledge of infective endocarditis and clinical exposure may contribute to students viewing guidelines as prescriptive rules, rather than tools to enhance and inform appropriate decision-making.

Participants exhibited varying levels of awareness regarding antibiotic prophylaxis guidelines. Some students were familiar with general indications, while others lacked awareness of both local and international guidance. Among those aware of local guidelines, knowledge was typically limited to broad procedural indications or specific high-risk cardiac conditions, rather than a comprehensive understanding of the entire guideline content. This implies that students may selectively retain information they deem clinically relevant or likely to be examined, while lacking a holistic grasp of the guidance as a whole. Alarming, students showed little awareness of updates to guidelines; most could not identify when the guidelines were last amended and did not routinely check for updates independently. This contradicts the expectations from the GED framework for new graduate dentists to practise based on contemporaneous, evidence-based practices (Taskforce, 2022). In the context of antibiotic prescribing, where recommendations are continually evolving in response to emerging evidence and concerns about antimicrobial resistance and side effects, failing to stay updated may have serious implications for patient safety. For example, the recent HSE (HSE, 2026) change from prescribing clindamycin to azithromycin/clarithromycin for those with penicillin allergies highlights this, as clindamycin has been linked to a higher risk of *Clostridioides difficile* colitis and other severe adverse reactions.

The accessibility of guidelines has become an important contributing factor to this lack of awareness. Students reported difficulty in locating local hospital guidelines, especially outside of clinical environments, which seemed to hinder their ability to engage with and review guidance independently. This emphasises that awareness is influenced not only by teaching but also by the practical accessibility of resources within the learning environment. If guidelines are not readily available, students are less likely to consult them regularly and tend not to search for them themselves, which fosters a lack of familiarity and confidence with antibiotic prophylaxis.

Besides limited awareness of guidelines, students were significantly uncertain about specific prescribing details. Confusion regarding antibiotic regimens, including dosage, timing, and alternatives in cases of allergy, was evident throughout the data. Students often expressed the need to consult guidelines in real time when making prescribing decisions, recognising that this could undermine patient confidence, especially if they struggled to find the correct guidelines initially. Furthermore, although students can list certain cardiac conditions linked to the risk of infective endocarditis, they admitted to having a poor understanding of the underlying pathophysiology. Without understanding why patients with those conditions need antibiotic prophylaxis, students rely on memorising criteria and mnemonics rather than developing deeper clinical insight. This is further worsened by students stating they had little awareness of signs and symptoms of infective endocarditis, implying they may not fully grasp the clinical implications of inadequate prevention. This data suggests that awareness of guidelines is often incomplete and superficial.

The range of available guidance, both locally and internationally, has been recognised as a significant source of confusion among students. While some students demonstrated awareness of various guideline bodies, including those from Ireland, the UK, and the US, they consistently experienced uncertainty regarding which guidelines were pertinent within their clinical environment. This lack of clarity appears to lead to fragmented knowledge, wherein students hold isolated fragments of information without clear understanding of their sources or the appropriate application in a clinical context. The presence of local hospital guidelines, without clear explanation of their origins or how they

align with national or international standards, increases students' confusion. Students are uncertain whether these protocols are based on Irish, European, or UK guidance, revealing the lack of clear instructions on how to locate and implement them. This reflects students' own unclear understanding of prescribing, as they cannot identify the source and rationale behind the guidelines they are expected to follow.

Variability between guidelines leads to a lack of awareness, as differences in antibiotic regimens or prophylaxis indications create uncertainty about best practices. Without clear and direct information, students find it difficult to reconcile conflicting messages, often hesitating or seeking validation from senior colleagues and supervisors. The diversity of guidelines among different international healthcare settings presents an added challenge within dental education. The existence of multiple guidelines, each developed under different clinical settings and based on varying interpretations of evidence, creates a complex learning environment. Without explicit instruction and clear guidance amid this vast array, students find it difficult to navigate the important and intricate field of antibiotic prophylaxis prescribing. Our qualitative findings mirror similar deficits in understanding, awareness and application of guidelines amongst dental students internationally within quantitative research (Ahmadi-Motamayel, Vaziri and Roshanaei, 2012; Bahammam and Abdelaziz, 2015; Thanissorn *et al.*, 2022; Karaçam and Erdem, 2024). Greater curricular clarity and alignment may be necessary to ensure students meet the guidelines and expectations outlined by the GED framework for critically appraising evidence, interpreting clinical guidelines, and applying this knowledge. This entails explicitly identifying the guidelines relevant to the local context, improving resource accessibility, and adopting teaching methods that emphasise both theoretical understanding and practical application of guidance.

4.3 Main Findings for Future Practice

A central finding from this study was that students' approach to antibiotic prophylaxis in practice is strongly grounded in concerns about patient safety, their risk of infective endocarditis, and perceived responsibility to patients. Students demonstrated clear

awareness of the potentially devastating consequences of infective endocarditis, frequently referencing its associated morbidity and mortality. This awareness appears to guide a thoughtful approach to prescribing, weighing the potential harms against the benefits in clinical decision-making. Students balance the risks of infective endocarditis with those of antibiotic use, especially allergic reactions. Although students are new to the field of antibiotic prescribing, they strive to make correct decisions by considering antibiotic prophylaxis holistically and balancing the risk of infective endocarditis against adverse drug reactions. In some cases, this has led some students to consider measures such as monitoring patients who have not previously received a specific antibiotic. This reflects the development of professional responsibility and duty of care during their senior years of training, which aligns closely with GED competencies (Taskforce, 2022) related to patient-centred care.

Participants also strongly emphasised the importance of patient communication and shared decision-making. The utilisation of guidelines was frequently referenced as a means of justifying clinical decisions to patients, suggesting that guidelines serve as both clinical tools and reassurance for patients and practitioners. However, reliance on guidelines in patient interactions reveals underlying insecurities, such as inadequate understanding of cardiac conditions and correct guidance, which may affect patient trust and confidence. Managing patient expectations was noted as challenging for students, especially when patients had already received antibiotic prophylaxis despite not meeting current guideline recommendations. Some students observed these difficulties during specialist oral surgery assessment clinics yet found guidelines particularly helpful in supporting clinical justification when choosing not to prescribe. This highlights the importance of clear and consistent antibiotic prophylaxis prescribing within the profession, as variation in prescribing practices may not only reflect suboptimal care but also influence patient demands and expectations.

Communication barriers, such as foreign languages, appeared to further complicate discussions with patients. Students noted challenges in conveying complex information regarding antibiotic prophylaxis to patients with limited English proficiency, often having to rely on intermediaries such as accompanying family members. Students acknowledged

the importance of informed consent and the additional demands that communication barriers impose on clinicians to ensure patients understand what is involved in their treatment. Students' viewpoints revealed an ongoing tension between professional responsibility and ensuring patient autonomy. While some students strongly emphasised the significance of informed consent and patient involvement in decision-making, others expressed concerns about patients' ability to adhere to medical instructions, particularly regarding timing and antibiotic administration. In such circumstances, students tend to adopt more paternalistic views towards medical management. These differing perspectives illustrate the complexity of shared decision-making in practice, especially for newly graduated clinicians entering the workforce, and highlight the need to balance respect for patient autonomy with the obligation to provide safe and effective care.

A key aspect of students' considerations for future practice was their reliance on senior clinicians, colleagues, and medical professionals when deciding on antibiotic prophylaxis. Although local guidelines are in place, many students reported a low threshold for contacting general practitioners or cardiologists, especially for patients with more complex medical histories. While this approach shows caution in patient care, it also highlights limited confidence in making independent clinical decisions and possibly a reluctance to accept responsibility for prescribing. Students often mention the perceived expertise of medical practitioners, particularly regarding systemic conditions. Some participants appear to view antibiotic prophylaxis as mainly within the scope of medical professionals rather than dental practitioners. This likely stems from their limited medical knowledge concerning cardiac conditions and antibiotic prophylaxis. Such preconceived ideas may restrict the development of professional autonomy, confidence, and the use of tailored guidelines for dental clinicians.

The influence of clinical supervisors during students' undergraduate training is very evident, especially when students have been instructed to seek additional medical input in cases where guidelines clearly state that antibiotics are not indicated. This may contribute to students' existing uncertainty and reinforce reliance on external factors rather than guideline-based decision-making. In some instances, students perceived managing patients at risk of infective endocarditis as beyond the scope of a general dental

practitioner, revealing a potential gap in undergraduate training where they do not feel adequately prepared to manage medically complex patients independently. Besides consulting medical professionals, students may rely on senior dental colleagues in practice regarding antibiotic prophylaxis if they are unsure. When uncertain about antibiotic prescribing or guidance, students suggest consulting the practice owner, other senior colleagues, or even a practice manager. This further emphasises their lack of confidence in making independent prescribing decisions. This may be linked to their own experiences of not prescribing independently and reliance on clinical supervisors during training.

Students describe situations in which they may be expected to make decisions independently in future practice, such as in remote settings where support from colleagues may be limited. In these cases, students mentioned they would feel compelled to rely on their own clinical judgement, despite feeling underprepared. This implies that current undergraduate training may not adequately prepare students to practise independently in roles where immediate support might not always be accessible. Participants' lack of confidence and uncertainty in antibiotic prophylaxis is further emphasised by choosing to rely on patients' reports of previous advice in some circumstances. Students therefore recognise their own limitations and suggest that continued professional development in antibiotic prophylaxis and infective endocarditis prevention after graduation could enhance confidence and understanding. Students seem to be aware of gaps in undergraduate education and how these can impact their clinical decision-making.

Students' perceptions regarding antibiotic prescribing have been further shaped by various concerns, including issues of inappropriate prescribing, medico-legal risks, and antimicrobial resistance. These factors appear to influence decision-making in a complex and occasionally conflicting manner. Students demonstrated awareness of inappropriate prescribing practices, both through their personal experiences and observations of others. This indicates an understanding that antibiotics are often overprescribed in clinical practice, potentially resulting in mixed messages about appropriate use for both patients and practitioners. Medico-legal considerations emerged as a significant concern when

prescribing antibiotics, with students perceiving antibiotic prophylaxis, particularly in certain healthcare settings, as a form of legal safeguarding against potential adverse outcomes. Such perceptions may promote defensive prescribing, wherein decisions are driven by fear of legal repercussions rather than by clinical judgment or the best interests of patients. This behaviour may stem from inexperience or lack of confidence in correct antibiotic usage, thereby undermining principles of evidence-based practice and contributing to unnecessary antibiotic prescriptions.

Nonetheless, students did acknowledge the importance of antimicrobial resistance and antimicrobial stewardship, reflecting an understanding of the broader public health implications associated with antibiotic administration. However, they appeared unable to reconcile this knowledge with conflicting guidelines and the risks associated with infective endocarditis. Additionally, factors such as cost were mentioned as potential influences on prescribing behaviour, notably within the context of international healthcare settings such as in the UK. This indicates that students possess a degree of awareness regarding the complexity of clinical decision-making, where multiple factors extend beyond simply clinical indications. Overall, these findings underpin students' lack of confidence and independent clinical reasoning expected upon graduation. Addressing these gaps necessitates a stronger emphasis on fostering clinical autonomy, decision-making capabilities, and confidence within the undergraduate curriculum.

4.4 Comparative Studies

To date, no similar qualitative studies have been published exploring dental students' knowledge of infective endocarditis prophylaxis, perceptions of education, engagement with guidelines and preparedness for future practice. Limited quantitative data on this topic align with findings that students demonstrate variable knowledge, uncertainty regarding guidelines and a lack of confidence in prescribing, reiterating concerns about preparedness for future clinical practice. However, qualitative research has proven beneficial when evaluating clinician attitudes and experiences, hence studies do exist related to antibiotic prophylaxis in other fields involving dentists rather than students.

Recently, a qualitative study published in 2025 explored Swedish dentists' attitudes towards antibiotic prophylaxis in dental implant surgery (Momand, Götrick and Hansson, 2025). Dentists were particularly frustrated by the lack of evidence-based guidelines for prophylaxis in implant surgery, and as a result, antibiotic prescribing practices varied widely, influenced by treatment complexity, clinical experience and patient-specific factors (Momand, Götrick and Hansson, 2025). The complexity of antibiotic prophylaxis was highlighted, with similar challenges including balancing evidence-based medicine with tailored patient care, minimising patient complications and the risk of infection, whilst considering other risks such as antibiotic resistance (Momand, Götrick and Hansson, 2025). Addressing this complexity prompts clearer guidelines and increased understanding and knowledge. Although not specifically related to infective endocarditis guidelines or student education, this study used a similar study design and methodology, employing interviews, and highlighted confusion amongst clinicians in the face of antibiotic prophylaxis due to a lack of clear guidance.

Qualitative research has also extended to patients' perspectives and their understanding of NICE guidance (Soheilipour *et al.*, 2011). In-depth interviews examined patients' opinions that could influence the implementation of NICE recommendations on antibiotic prophylaxis before dental procedures (Soheilipour *et al.*, 2011). Patients found the rationale behind NICE guidance unclear and believed they faced minimal risk of adverse effects from antibiotics based on their previous use (Soheilipour *et al.*, 2011). Consequently, they expressed concerns about the risk of infective endocarditis and feared that changes in standard care in the future might leave them vulnerable in the meantime (Soheilipour *et al.*, 2011). Interestingly, patients highlighted the importance of the characteristics of the clinician advising them about the guidance when deciding whether to accept their recommendations, preferring to be informed by a trusted clinician who seemed knowledgeable (Soheilipour *et al.*, 2011). Patients valued receiving information from an experienced, trustworthy clinician who respected their autonomy (Soheilipour *et al.*, 2011). This highlights a concern raised in our study: dental students might risk losing patients' trust if they lack sufficient expertise or knowledge about the guidance. Nevertheless, students recognised the importance of patient autonomy and appeared aware of patient expectations regarding antibiotic prophylaxis.

In Canada, a qualitative study was conducted to gain insights into the perspectives of national dentistry sector experts on the factors contributing to dental antibiotic overprescribing and antimicrobial stewardship strategies (Martine *et al.*, 2024). Data revealed that dentists' outdated antibiotic prescribing practices stem from gaps in knowledge caused by inadequate continuing education, lack of standardisation in the dental curriculum, mismatch between theoretical and clinical training in dentistry, as well as a lack of clear guidance (Martine *et al.*, 2024). The study showed that there is currently no consistency in teaching antimicrobial resistance and stewardship courses, with varying hours dedicated to this topic in dental schools and a lack of clinical application of antimicrobial prescribing principles, highlighting a clear gap between theory and practice (Martine *et al.*, 2024). Since there are no set protocols for prescribing for patients in dental teaching hospitals, overprescribing tends to occur as supervisors want to ensure they are 'covering the bases' or simply 'just in case' (Martine *et al.*, 2024). Although these findings were obtained from experienced dental experts rather than dental students, they still highlight similar core issues, including a lack of structured education on antibiotic prescribing, insufficient clinical application during training, the absence of clear guidelines, and a tendency to overprescribe as a protective measure, often more to avoid legal issues than for the patient's best interests. This study demonstrates that on an international level, antibiotic prescribing can be inconsistent, originating from inadequate teaching during dental training and heightened by a lack of clear guidance.

Dentists were recruited to participate in a qualitative study to understand perceptions of factors influencing antibiotic prescribing decisions (Hughes *et al.*, 2022). Barriers to evidence-based prescribing identified included access to resources, influence from peers and other clinicians, clinical experience and judgement, fears about consequences, and the clinical setting itself (Hughes *et al.*, 2022). Dentists reported relying on guidelines and expressed a need for guidance that is directly relevant to their practice setting, such as point-of-care guidance or local policies (Hughes *et al.*, 2022). Difficulties in accessing current and relevant guidelines hindered the use of national guidelines in clinical practice (Hughes *et al.*, 2022), which reflects students' struggles and deterrence from accessing prophylaxis guidelines in the dental teaching hospital. Access to antibiotic prescribing

guidelines has proven to influence appropriate use of guidance by both dentists and dental students alike.

The existing qualitative literature provides valuable insights into antibiotic prescribing practices, decision-making processes, engagement with guidelines, and perspectives from qualified dentists, dental experts, and patients. These studies offer significant contextual parallels, reaffirming challenges such as ambiguity in guideline interpretation, diverse prescribing practices, limited access to comprehensive national guidelines, and the influence of medico-legal considerations on patient management. The themes identified within this body of research mirror those observed in the present study, indicating that such issues may originate during undergraduate training and persist into professional practice. Nevertheless, a notable gap remains, as there is a conspicuous absence of qualitative studies directly comparable to our research.

Qualitative research in dental education holds particular value; unlike survey-based studies that merely identify gaps in knowledge or guideline adherence, qualitative methodologies have the potential to elucidate the underlying reasons for these gaps and to interpret how students perceive and apply their education. Methods such as focus groups and interviews facilitate rich, contextual exploration of students' perceptions of their education, their navigation of uncertainty, and their development of clinical reasoning and decision-making skills. The importance of qualitative approaches in medical training has been widely recognised, especially for their capacity to understand participants' experiences and inform educational improvements (Cleland, 2017). Without research targeted at dental students, the factors influencing these behaviours remain insufficiently understood. This study offers novel insights into the existing literature and underscores the critical need for further qualitative investigations into dental students' experiences, educational requirements, and clinical preparedness concerning antibiotic prophylaxis for infective endocarditis. Such research is essential for enhancing curriculum development and fostering safe prescribing practices.

5. Strengths and limitations

5.1 Strengths

A major strength of this study is its innovative qualitative design, addressing a notable gap in current literature. Previous research on this topic has primarily been quantitative, focusing on knowledge levels and guideline adherence through survey methods. While these studies provide useful baseline data, they offer limited understanding of the deeper factors influencing students' perceptions, comprehension, and experiences of antibiotic prophylaxis. By adopting a qualitative descriptive approach, this study offers a more detailed and nuanced exploration of dental students' experiences with education and engagement related to antibiotic prophylaxis for preventing infective endocarditis.

Utilising face-to-face focus group interviews further enhanced the study by encouraging dynamic interaction among participants. This format allows students to build on each other's responses, discuss differing opinions, and reflect collectively on mutual experiences. Such interaction is especially valuable in exploring specialised educational and clinical topics, where viewpoints are shaped not only by personal experiences but also by peer discussion and social context, particularly when students learn collectively. The group setting captured a broader range of perspectives within the available time and facilitated the emergence of insights that might not have been uncovered through individual interviews alone. Additionally, the study was grounded in a naturalistic and constructivist paradigm, recognising that students' perceptions are influenced by their social, educational, and clinical environments. This approach enhances the validity of the findings by ensuring they reflect participants' real-life experiences in their own words.

The rigour and trustworthiness of the study were strengthened through various measures. The research team's expertise and training in both clinical dentistry and qualitative research methods bolstered the study's validity. The team comprised the lead researcher, who underwent training in qualitative methods, and academic supervisors with extensive clinical and qualitative research experience, reinforcing methodological rigour. This was further supported by independent coding conducted by two researchers,

followed by discussion and consensus to minimise lone researcher bias. Both inductive and deductive coding processes were employed, allowing themes to emerge naturally from the data while maintaining systematic organisation and interpretation. Furthermore, verbatim quotations were extensively used to ensure transparency and clearly link data to themes. Reflexivity was upheld throughout the research process, acknowledging that the backgrounds of researchers in dentistry and education may impact data collection and interpretation. The principal researcher, as a postgraduate dental student, recognised the potential for shared educational experiences with participants that could lead to assumptions. This was mitigated through continuous reflection on preconceptions and heightened self-awareness to prevent researcher bias during interviews.

This study also benefits from its contextual relevance, focusing on final-year dental students within an undergraduate program aligned with the ADEE GED framework. This provides a valuable opportunity to assess current undergraduate training and its effectiveness in meeting the competencies expected of graduates, especially regarding evidence-based practice and safe prescribing. Consequently, this research may prompt other educational programs to review their training related to antibiotic prophylaxis, ensuring students are well-prepared for clinical practice and aligned with key competency frameworks such as the GED. The findings have direct implications for curriculum development, both within Ireland and across Europe.

5.2 Limitations

Despite these strengths, several limitations should be considered when evaluating the study. Firstly, the study was conducted only within a single institution, involving final-year dental students from one dental school in Ireland. While this allowed for an in-depth exploration of a specific educational setting, it does not necessarily reflect teaching practices from other programs and institutions. Another limitation relates to the inherent nature of qualitative research; qualitative methodologies are designed to provide in-depth, specific insights into participants' experiences rather than produce findings that are generalisable to larger populations. As such, the sample size is small and reflects the views of a specific cohort of final-year dental students within a single institution. Although

statistical generalisability is not encouraged, it is worth noting that transferability may be more appropriate within qualitative research, where researchers can determine the relevance of the findings to their own contexts.

Potential biases include selection bias arising from purposive sampling and the utilisation of a gatekeeper, as volunteers may have demonstrated greater engagement or critique of the subject matter. In addition, students may overestimate or underestimate their own knowledge and abilities, and responses may be influenced by social desirability bias. While smaller groups, encouragement from the lead researcher to answer honestly, and confirmation that there will be no judgment may help mitigate this, the statements given may still be influenced by how other participants perceive the speaker.

Demographic data were confined to gender and study year, thereby enhancing the preservation of anonymity but limiting the investigation of variables such as prior clinical experience or educational background. Approximately 75% of the student cohort are undergraduate students without prior university degrees, while the remaining 25% are international postgraduate students from countries such as Canada and Singapore, possessing prior degrees with science backgrounds, which could influence their awareness of guidelines or critique of curricula. Although a semi-structured guide and pilot testing strengthened the study design, dependence on AI transcription reviewed solely by the primary interviewer may affect accuracy.

Data collection relied on self-reported perceptions and experiences, which may not necessarily illustrate actual clinical behaviour or competence. There was a limitation related to the timing of data collection, which occurred during the first trimester of undergraduate training due to scheduling constraints. Therefore, this study does not cover learning in the final phases of training—a period of consolidation and preparation for practice that may lead to shifts in perspectives not captured here.

Since the focus groups were conducted, the SDCEP implementation advice (Programme Development Team, 2026) was updated in March 2026 and is now presented on a dedicated informational website, aligning more closely with current HSE guidelines on

discontinuing Clindamycin as an alternative for penicillin allergy and on the recommended amoxicillin dosage of two grams. Additionally, the HSE (HSE, 2026) revised the presentation format of its infective endocarditis prophylaxis guidelines in March 2026, making them available as a document. While the guidelines themselves were not revised, the change in format may have influenced students' perceptions of how guidelines are conveyed. Furthermore, the new SDCEP guidance (Programme Development Team, 2026) could have reduced students' confusion about international guidelines, as it is more user-friendly and informative than before. However, this assumes that students were informed of the guideline updates and chose to access them beforehand; given the results from the study, this is unlikely to have happened.

6. Implications

Findings from this study have important implications for undergraduate dental education—particularly in integrated curriculum design and delivery, clinical practice, policy and future research. Nevertheless, given that this research adopts a qualitative methodology, the findings are not inherently generalisable. Although broader inferences may be made, they should be interpreted within the confines of qualitative research paradigms. The suggestions and recommendations derived from this study are also rooted in the specific educational and clinical contexts where the research was conducted, and thus, should be considered accordingly.

6.1 Implications for Undergraduate Dental Education

This study has direct implications for integrated curriculum design and delivery within the local context of undergraduate dental education at Trinity College Dublin. Findings clearly show the need for greater curricular clarity, consistency, and alignment in the teaching of antibiotic prophylaxis for infective endocarditis. While these findings are of local significance, certain issues may also apply to other undergraduate dental programs encountering similar challenges. Firstly, in terms of content delivery, didactic teaching on the prevention of infective endocarditis should be conducted during senior clinical years, with clear references to current national and international guidelines. This should be delivered through lectures by clinical experts. Students highlighted the value of didactic teaching in clarifying expectations, reducing ambiguity, and consolidating knowledge. They also emphasised the importance of interdisciplinary teaching, including input from cardiologists, which could further enrich their understanding of broader medical concepts. Currently, didactic lectures on infective endocarditis antibiotic prophylaxis are only provided in physiology and pharmacology during the Second and Third Years, resulting in a lack of reinforcement on antibiotic prophylaxis throughout their senior clinical years.

This has caused confusion, decreased confidence, and poor retention of knowledge; hence, a spiral curriculum approach where topics are revisited with increasing difficulty

would promote deeper learning and understanding (Harden, 1999). The spiral curriculum builds on previously taught topics or subjects, with students revisiting these topics at higher levels of difficulty; new information is related to prior learning, and students' competence improves with each iteration (Harden, 1999). This can be introduced through lectures and assessments in the Fourth and Fifth Years.

Nonetheless, findings also suggest that theoretical education alone is insufficient. Students appear apprehensive and uncertain about prescribing antibiotic prophylaxis in future practice. They also report limited to no clinical exposure to patients at risk of requiring antibiotic prophylaxis. Therefore, all students should encounter at least one patient at risk of infective endocarditis during clinical training. When teaching antibiotic prophylaxis for infective endocarditis in both didactic and clinical settings, there is a distinct necessity for structured, explicit teaching. Students must receive clear instruction on the appropriate use of antibiotic prophylaxis, including which guidelines to follow locally, to minimise ambiguity or confusion before entering practice. The importance of regularly reviewing updates to both local and international guidelines should also be strongly emphasised.

Secondly, assessment of understanding of antibiotic prophylaxis to prevent infective endocarditis should be initiated through mandatory logbook entries of patients at risk of infective endocarditis, thereby ensuring that each student has exposure to managing these patients. Clinical examinations such as OSCEs or VIVAs (Viva Voce) should also take place in the final years of training rather than just the Third Year, to ensure students are adequately prepared prior to graduation. Greater use of OSCEs, case-based assessments, and clinical logbooks supports the evaluation of clinical reasoning and preparedness for practice, aligning with competency-based dental education models (Lin, Lim and Braga, 2025). In the findings, students emphasised the benefits of assessing the application of guidelines as a supplement to theoretical knowledge and found the use of OSCEs beneficial for evaluating clinical application.

Finally, a suitable forum for student evaluation of teaching methods within educational programs is essential. Student evaluation forms specifically for PBL and the teaching of

antibiotic prophylaxis should be developed and distributed during senior clinical years to give students the opportunity to offer constructive feedback on their educational experiences. Evidence demonstrates that structured student feedback is integral to curriculum development and continuous improvement in dental education (Henzi *et al.*, 2006).

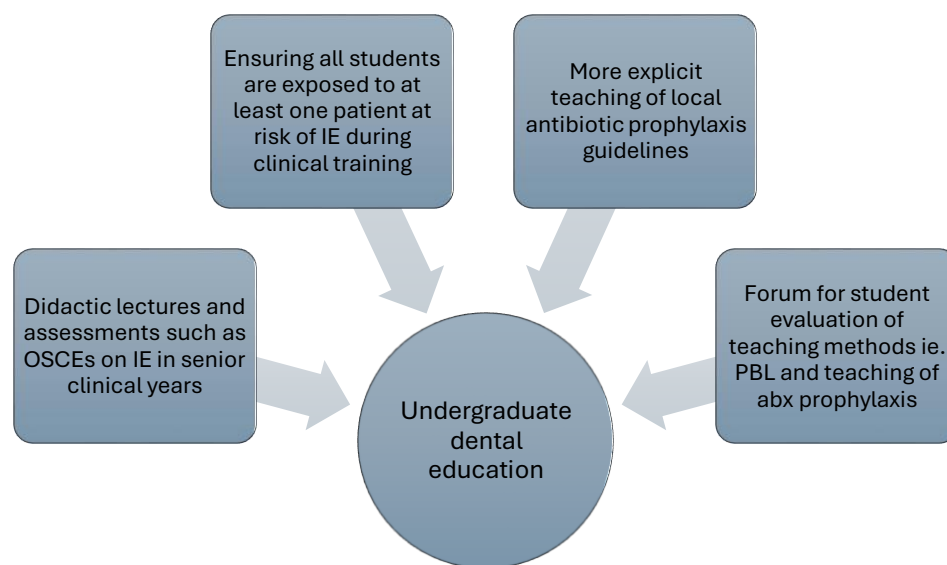


Figure 6: Recommendations for undergraduate dental education

6.2 Implications for Clinical Practice

These findings raise important considerations about preparedness for autonomous clinical practice and patient safety. Given the serious risk of mortality linked to infective endocarditis (Chen *et al.*, 2022), prevention is essential to protect susceptible individuals. Inadequate or improper prescribing exposes patients to considerable, unnecessary risks. Students tend to adopt risk-averse prescribing, often driven by concerns over adverse outcomes such as infective endocarditis or medico-legal repercussions. Such tendencies may result in inappropriate prescribing that does not adhere to antimicrobial stewardship principles. Furthermore, students demonstrated a lack of confidence in recognising infective endocarditis and acknowledged insufficient understanding of its underlying pathophysiology. Consequently, they appeared to rely heavily on external support from

general practitioners, cardiologists, and other senior colleagues, thereby highlighting their struggles with prescribing autonomously. Participants also expressed apprehension about communicating guideline-based decisions to patients, particularly when patient expectations conflicted with clinical recommendations. These issues underscore the urgent need to ensure that students are adequately prepared and educated prior to entering the workforce, through enhanced clinical exposure during training—aimed at increasing confidence and fostering appropriate prescribing behaviours in practice, thereby reducing both under- and over-prescribing.

A lack of confidence in making independent decisions can be addressed through interdisciplinary teaching and collaborative efforts, including input from cardiologists, as well as through reinforcement of professional responsibilities and the integration of safe, independent practice concepts throughout undergraduate education. Additionally, improving communication skills within undergraduate curricula may help new graduate dentists manage complex patient situations more effectively, especially when explaining the rationale for prescribing or withholding antibiotics. Reinforcing adherence to correct guidelines will also bolster the confidence of newly qualified clinicians in discussing these matters with patients, ensuring that their decisions are both evidence-based and patient-centred. To mitigate the risks of defensive prescribing driven by medico-legal fears, it is essential that graduates receive comprehensive training to develop confidence in their knowledge and to thoroughly understand the rationale behind guidelines, thereby reducing unnecessary prescribing motivated by fear rather than clinical necessity. Findings from this study, prompting curriculum review and reform to improve dental education and students' confidence with prescribing antibiotic prophylaxis to prevent infective endocarditis upon graduating, will therefore have profound impacts on patient safety and best clinical practice.

6.3 Implications for Policy and Guideline Implementation

The existence of numerous, sometimes varying and conflicting international guidelines has presented a significant source of confusion for students. The data indicate that there is a pressing need to emphasise local guidelines and their application within clinical teaching

environments more clearly. It is essential to ensure that students are explicitly informed about the specific guidelines they are expected to follow throughout their undergraduate education, particularly during their senior years, to ensure they are fully aware of and confident in adhering to the appropriate standards upon graduation. The implementation of clearer national signposting of guidelines within undergraduate training and early career practice is recommended. Clinical settings such as hospitals, universities, and dental practices should endeavour to improve the accessibility and usability of guidelines to foster greater engagement, awareness, and adoption. Students have reported difficulty in accessing local guidance within teaching hospitals, suggesting that the provision of more user-friendly formats, including digital accessibility on desktops or remote devices, could enhance awareness and application.

On a broader level, the findings advocate for increased alignment between educational institutions and clinical guidelines to ensure consistency in teaching by lecturers and clinical supervisors, as well as in practice expectations. Given the variability and confusion experienced by students worldwide (AboAlSamh *et al.*, 2018; Struzycka *et al.*, 2019; Cummins *et al.*, 2020; Thanissorn *et al.*, 2022; Karaçam and Erdem, 2024), the adoption of a universal, internationally standardised guidance document—developed with input from countries with existing guidelines or under the auspices of an internationally recognised organisation such as the World Health Organisation (WHO) (Thornhill *et al.*, 2024), may serve to reduce ambiguity. This approach would amalgamate core principles across international guidelines, such as those concerning cardiac conditions, recommended antibiotic regimens, and procedural indications, thereby ensuring consistency and clarity in clinical decision-making across all nations.

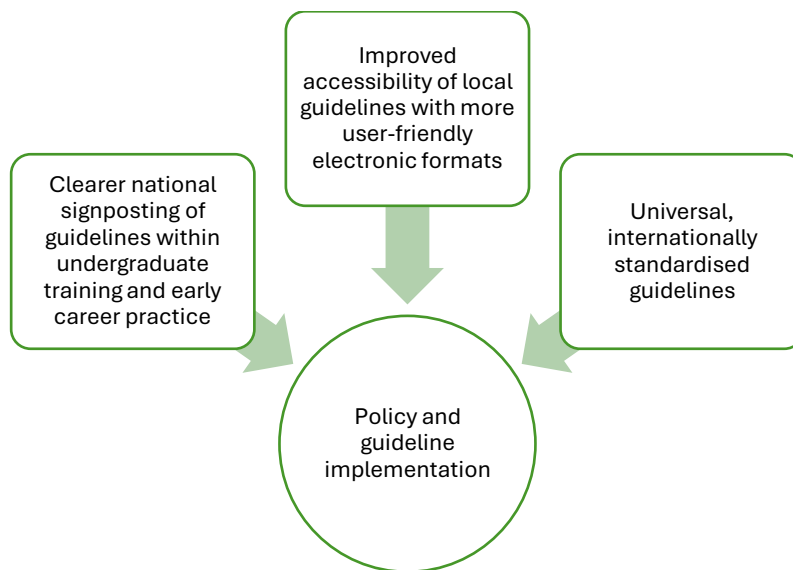


Figure 7: Recommendations in policy and guideline implementation

6.4 Implications for Future Research

This study underscores the necessity for further investigation into educational experiences, decision-making processes, and preparedness for practice concerning antibiotic prophylaxis to prevent infective endocarditis. As the first of its kind, this qualitative research fills a gap in existing literature, which predominantly assesses knowledge through questionnaires with limited insights into factors influencing learning and confidence. Future research should consider the following:

- Multi-institutional studies across various dental schools to examine variability and differing curricula
- Longitudinal studies to observe how understanding and prescribing practices develop post-graduation
- The impact of clinical supervisors and lecturers on prescribing behaviours
- The evaluation of targeted educational interventions, including structured teaching and increased clinical exposure

Such endeavours would enhance the current evidence base, deepen the understanding of students' knowledge, education, and engagement with antibiotic prophylaxis guidelines,

and provide a more comprehensive perspective on how undergraduate education can promote safe and effective patient care.

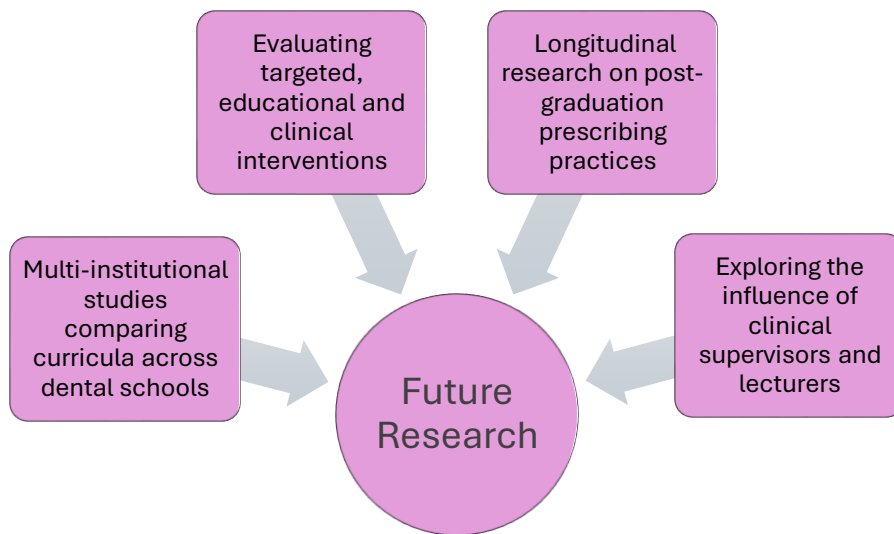


Figure 8: Recommendations for future research

7. Conclusion

This study provides a novel qualitative exploration of final-year dental students' educational experiences, awareness of antibiotic prophylaxis guidelines, knowledge of infective endocarditis, and readiness for clinical practice. In doing so, it addresses a significant gap in the current literature, which has mainly focused on quantitative assessments of knowledge and guideline adherence. By capturing students' thoughts and experiences, this research offers a more comprehensive understanding of the factors influencing their learning and clinical decision-making.

The data indicate that while students are aware of antibiotic prophylaxis guidelines and recognise their importance in clinical practice, their understanding is often fragmented and accompanied by considerable uncertainty. Variations in international guidance, unclear directives on which specific guidelines to follow, and difficulties accessing local protocols lead to confusion and diminished confidence. Importantly, students tend to rely heavily on guidelines to ensure safe practice, but this dependence is not always supported by a thorough understanding of the rationale behind the recommendations.

Educational experiences are a key contributing factor to these challenges. Although foundational knowledge is introduced in the early years, there is a lack of reinforcement and clinical integration during the final years of training. The absence of structured teaching, limited clinical exposure to patients at risk of infective endocarditis and inconsistent assessment contribute to a disconnect between theoretical learning and practical application. Consequently, students report feeling underprepared for autonomous prescribing and decision-making upon graduation.

Concerns about future practice further highlight this lack of preparedness, with students expressing anxieties regarding patient safety, medico-legal implications, and their own clinical judgment—often expecting to rely on senior colleagues or other medical professionals when uncertain. While multidisciplinary collaboration is essential in patient care, this reliance reflects limited confidence in independent decision-making. Additionally, perceptions of antibiotic prophylaxis as a form of legal protection suggest

potential for defensive prescribing behaviours, which can impact antimicrobial stewardship.

Despite these challenges, students demonstrate insight into their educational needs and offer valuable suggestions for improvement. These include clearer, more consistent and explicit teaching of guidelines, increased clinical exposure, opportunities for interdisciplinary learning, and enhanced assessment of guideline application. These recommendations align with GED expectations (Taskforce, 2022) and underscore the importance of curriculum reform to support both knowledge acquisition and clinical competence. Providing students with a formal method of evaluation to give feedback on their education will be highly beneficial in ensuring that their educational needs and GED expectations (Taskforce, 2022) are met.

Ultimately, the implications of this study extend beyond undergraduate education to clinical practice, policy, and future research. The gaps in understanding of infective endocarditis highlight the necessity for stronger clinical integration within undergraduate training. Increasing clinical exposure, emphasising the rationale behind guidelines, offering structured teaching, and developing effective communication skills are essential for newly qualified clinicians to deliver safe, evidence-based, holistic patient care. At a policy level, the variability and lack of clear international and local guidance significantly contribute to students' confusion. Greater alignment between educational institutions and clinical practice, alongside clearer signposting of national guidance, may enhance confidence and engagement. The standardisation of international approaches to antibiotic prophylaxis guidelines could further reduce ambiguity and promote consistency in clinical decision-making.

Finally, this study identifies a critical gap in qualitative research exploring dental students' experiences and perceptions of antibiotic prophylaxis to prevent infective endocarditis. Further research is required to examine educational strategies across different institutions, understand how prescribing behaviours evolve over time, and to evaluate the effectiveness of targeted curricular interventions. Addressing these challenges is vital to

ensure that future dentists are equipped to make confident, evidence-based decisions that protect patient outcomes and encourage responsible antibiotic use.

8. References

2024 exceptional surveillance of prophylaxis against infective endocarditis (NICE guideline CG64) (2024). NICE.

AboAlSamh, A. *et al.* (2018) 'Dental Students' Knowledge and Attitudes towards Antibiotic Prescribing Guidelines in Riyadh, Saudi Arabia', *Pharmacy (Basel, Switzerland)*, 6(2). Available at: <https://doi.org/10.3390/pharmacy6020042>.

Ahmadi-Motamayel, F., Vaziri, S. and Roshanaei, G. (2012) 'Knowledge of General Dentists and Senior Dental Students in Iran about Prevention of Infective Endocarditis', *Chonnam medical journal*, 48(1), pp. 15–20.

Ateş, Ö. *et al.* (2010) 'STRENGTHS AND WEAKNESSES OF PROBLEM-BASED LEARNING IN ENGINEERING EDUCATION: STUDENTS' AND TUTORS' PERSPECTIVES MÜHENDİSLİK EĞİTİMİNDE PROBLEME DAYALI ÖĞRENMENİN GÜÇLÜ VE ZAYIF YÖNLERİ: ÖĞRENCİ VE ÖĞRETİM ELEMANLARININ BAKIŞ AÇILARI', *BUCA EĞİTİM FAKÜLTESİ DERGİSİ* [Preprint]. Available at: <https://dergipark.org.tr/tr/download/article-file/231688>.

Baddal, B., Lajunen, T.J. and Sullman, M.J.M. (2022) 'Knowledge, attitudes and behaviours regarding antibiotics use among Cypriot university students: a multi-disciplinary survey', *BMC medical education*, 22(1), p. 847.

Baddour, L.M. *et al.* (2015) 'Infective endocarditis in adults: Diagnosis, antimicrobial therapy, and management of complications: A scientific statement for healthcare professionals from the American Heart Association', *Circulation*, 132(15), pp. 1435–1486.

Baddour, L.M. *et al.* (2023) 'Nondental invasive procedures and risk of infective endocarditis: Time for a revisit: A science advisory from the American heart association', *Circulation*, 148(19), pp. 1529–1541.

Bahammam, M.A. and Abdelaziz, N.M. (2015) 'Awareness of Antimicrobial Prophylaxis for Infective Endocarditis Among Dental Students and Interns at a Teaching Hospital in Jeddah, Saudi Arabia', *The open dentistry journal*, 9, pp. 176–180.

- Burnard, P. (1991) 'A method of analysing interview transcripts in qualitative research', *Nurse education today*, 11(6), pp. 461–466.
- Chen, H. *et al.* (2022) 'The Global, Regional, and National Burden and Trends of Infective Endocarditis From 1990 to 2019: Results From the Global Burden of Disease Study 2019', *Frontiers of medicine*, 9, p. 774224.
- Cikes, M. *et al.* (2020) 'Students' Practices and Knowledge on Antimicrobial Usage and Resistance in Split, Croatia: The Education of Future Prescribers', *Microbial drug resistance*, 26(6), pp. 623–629.
- Cleland, J.A. (2017) 'The qualitative orientation in medical education research', *Korean Journal of Medical Education*, 29(2), pp. 61–71.
- Cummins, J. *et al.* (2020) 'Knowledge and Compliance of Dentists' and Dental Students' With Respect to Relevant Guidelines for Prescribing Antibiotic Prophylaxis for the Prevention of Infective Endocarditis: A Systematic Review', *The journal of evidence-based dental practice*, 20(1), p. 101311.
- Dayer, M.J. *et al.* (2015) 'Incidence of infective endocarditis in England, 2000-13: a secular trend, interrupted time-series analysis', *The Lancet*, 385(9974), pp. 1219–1228.
- Dolmans, D.H.J.M. *et al.* (2002) 'Trends in research on the tutor in problem-based learning: conclusions and implications for educational practice and research', *Medical Teacher*, 24(2), pp. 173–180.
- Doshi, A. *et al.* (2017) 'Knowledge and practices of Indian dental students regarding the prescription of antibiotics and analgesics', *Clujul medical (1957)*, 90(4), pp. 431–437.
- Expert Group (2025) *Indications for surgical antibiotic prophylaxis in dentistry, Therapeutic Guidelines*. Available at: <https://www.tg.org.au> (Accessed: 15 April 2026).
- Flasche, S. and Atkins, K.E. (2018) 'Balancing benefits and risks of antibiotic use', *The Journal of Infectious Diseases*, 218(9), pp. 1351–1353.

- Guzmán-Álvarez, R. *et al.* (2012) 'Knowledge of drug prescription in dentistry students', *Drug, healthcare and patient safety*, 4, pp. 55–59.
- Harden, R.M. (1999) 'What is a spiral curriculum?', *Medical Teacher*, 21(2), pp. 141–143.
- Henzi, D. *et al.* (2006) 'North American dental students' perspectives about their clinical education', *Journal of Dental Education*, 70(4), pp. 361–377.
- HSE (2026) *Antibiotic Prophylaxis of Infective Endocarditis for Dental Procedures*, HSE. Available at:
https://assets.hse.ie/media/documents/Antibiotic_prophylaxis_of_infective_endocarditis_for_dental_procedures_guideline.pdf (Accessed: 18 April 2026).
- Hughes, A.M. *et al.* (2022) 'A qualitative approach to examining antimicrobial prescribing in the outpatient dental setting', *Antimicrobial Stewardship & Healthcare Epidemiology*, 2(1), p. e102.
- Infective Endocarditis* (2024) American Heart Association. Available at:
<https://www.heart.org/en/health-topics/infective-endocarditis> (Accessed: 5 February 2024).
- Jain, A. *et al.* (2015) 'Knowledge regarding prescription of drugs among dental students: A descriptive study', *Journal of basic and clinical physiology and pharmacology*, 7(1), pp. 12–16.
- Jenkinson, H. *et al.* (2019) 'The value of groupwork knowledge and skills in focus group research: A focus group approach with marginalized teens regarding access to third-level education', *International Journal of Qualitative Methods*, 18, p. 160940691988185.
- Karaçam, K. and Erdem, R.Z. (2024) 'The level of knowledge of medical and dental students regarding prophylaxis for infective endocarditis', *Journal of dental education* [Preprint]. Available at: <https://doi.org/10.1002/jdd.13553>.
- Lean, S.S.H. *et al.* (2023) 'Prophylactic antibiotic use for infective endocarditis: a systematic review and meta-analysis', *BMJ Open*, 13(8), p. e077026.

Lin, G.S.S., Lim, T.W. and Braga, M.M. (2025) 'Embracing competency-based education for modern dental practice', *The Asia Pacific Scholar*, 10(2), pp. 8–12.

Lockhart, P.B. *et al.* (2022) 'Factors that affect dentists' use of antibiotic prophylaxis: Findings from The National Dental Practice-Based Research Network questionnaire', *Journal of the American Dental Association* (1939), 153(6), pp. 552–562.

Maart, R.D., Adam, R.Z. and Frantz, J.M. (2023) 'Strategies to implement competencies as it relates to a competency framework in a dental undergraduate curriculum: A systematic review', *European Journal of Dental Education: Official Journal of the Association for Dental Education in Europe*, 27(3), pp. 746–755.

Martine, C. *et al.* (2024) 'Dental antimicrobial stewardship: a qualitative study of perspectives among Canadian dentistry sector leaders and experts in antimicrobial stewardship', *JAC-Antimicrobial Resistance*, 6(3), p. dlae082.

Momand, P., Götrick, B. and Hansson, K. (2025) 'Antibiotic prophylaxis in dental implant surgery - A qualitative study on the attitudes and routines of Swedish dentists', *BMC Oral Health*, 25(1), p. 1807.

Mubarak, A. *et al.* (2024) 'Knowledge and Attitude Toward Antibiotic Prescription Among Dental Students and Interns at Multiple Universities in Saudi Arabia', *Cureus*, 16(1), p. e51777.

NICE (2008) *Prophylaxis against infective endocarditis*. Centre for Clinical Practice at NICE. Available at: <https://www.nice.org.uk/guidance/cg64/evidence/full-guideline-pdf-196759981>.

NICE (2024) *Prophylaxis against infective endocarditis: antimicrobial prophylaxis against infective endocarditis in adults and children undergoing interventional procedures*. Available at: <https://www.nice.org.uk/guidance/cg64/chapter/Recommendations>.

Nisabwe, L. *et al.* (2020) 'Knowledge and attitudes towards antibiotic use and resistance among undergraduate healthcare students at University of Rwanda', *Journal of pharmaceutical policy and practice*, 13, p. 7.

O'Brien, B.C. *et al.* (2014) 'Standards for reporting qualitative research', *Academic Medicine: Journal of the Association of American Medical Colleges*, 89(9), pp. 1245–1251.

Programme Development Team (2026) *Antibiotic Prophylaxis Against Infective Endocarditis implementation advice, Scottish Dental Clinical Effectiveness Programme*. Available at: <https://www.sdcep.org.uk/published-guidance/antibiotic-prophylaxis/> (Accessed: 13 April 2026).

Raees, I. *et al.* (2023) 'Understanding of Final Year Medical, Pharmacy and Nursing Students in Pakistan towards Antibiotic Use, Antimicrobial Resistance and Stewardship: Findings and Implications', *Antibiotics (Basel, Switzerland)*, 12(1). Available at: <https://doi.org/10.3390/antibiotics12010135>.

Sandelowski, M. (2000) 'Whatever happened to qualitative description?', *Research in nursing & health*, 23(4), pp. 334–340.

SDCEP (2018) *Implementation Advice for National Institute for Health and Care Excellence (NICE) Clinical Guideline 64 Prophylaxis Against Infective Endocarditis, Scottish Dental Clinical Effectiveness Programme*. Available at: <https://www.sdcep.org.uk/media/qvpj2kfb/sdcep-antibiotic-prophylaxis-implementation-advice.pdf> (Accessed: 5 January 2024).

Shepherd, V. (2021) 'Supplementary file 1. Topic guide for qualitative interviews', *Journal of Medical Ethics*, 47, pp. e1–e8.

Sheppard, M.N. (2025) 'Infective endocarditis', *Diagnostic Histopathology (Oxford, England)* [Preprint]. Available at: <https://doi.org/10.1016/j.mpdhp.2025.11.002>.

Sirinoglu Capan, B., Duman, C. and Kalaoglu, E.E. (2023) 'Antibiotic prescribing practices for prophylaxis and therapy of oral/dental infections in pediatric patients - results of a cross-sectional study in Turkey', *GMS hygiene and infection control*, 18, p. Doc11.

Soheilipour, S. *et al.* (2011) 'Antibiotic prophylaxis in dentistry: part II. A qualitative study of patient perspectives and understanding of the NICE guideline', *British Dental Journal*, 211(1), p. E2.

Struzycka, I. *et al.* (2019) 'Knowledge of antibiotics and antimicrobial resistance amongst final year dental students of Polish medical schools-A cross-sectional study', *European journal of dental education: official journal of the Association for Dental Education in Europe*, 23(3), pp. 295–303.

Szabó, Z. *et al.* (2015) 'How students perceive problem-based learning (PBL) group tutorials at a Swedish medical college', *MedEd Publish* [Preprint]. Available at: <https://doi.org/10.15694/mep.2015.006.0017>.

Task Force of the European Society of Cardiology (2023) *2023 ESC Guidelines for the management of endocarditis*, *European Society of Cardiology*. Available at: <https://www.escardio.org/Guidelines/Clinical-Practice-Guidelines/Endocarditis-Guidelines> (Accessed: 5 February 2024).

Taskforce, G.E.D. (2022) *Graduating European Dentist Curriculum*, *ADEE*. Available at: <https://adee.org/graduating-european-dentist/graduating-european-dentist-curriculum> (Accessed: 25 January 2026).

Tefera, A.S. *et al.* (2024) 'Barriers to implementing problem-based learning at the school of medicine of Debre Berhan University, Ethiopia', *BMC Medical Education*, 24(1), p. 501.

Thanissorn, C. *et al.* (2022) 'Australian dental students' knowledge on antibiotics prophylaxis for dental procedures', *BMC oral health*, 22(1), p. 633.

Thomas, J. and Harden, A. (2008) 'Methods for the thematic synthesis of qualitative research in systematic reviews', *BMC Medical Research Methodology*, 8(1), p. 45.

Thornhill, M. *et al.* (2024) 'Endocarditis prevention: time for a review of NICE guidance', *The Lancet regional health. Europe*, 39, p. 100876.

Thornhill, M.H. *et al.* (2022) 'Antibiotic Prophylaxis Against Infective Endocarditis Before Invasive Dental Procedures', *Journal of the American College of Cardiology*, 80(11), pp. 1029–1041.

Tubiana, S. *et al.* (2017) 'Dental procedures, antibiotic prophylaxis, and endocarditis among people with prosthetic heart valves: nationwide population based cohort and a case crossover study', *BMJ (Clinical Research Ed.)*, 358, p. j3776.

Villarroel Henríquez, V., Castillo Rabanal, I. and Santana Abásolo, J. (2025) 'Applying Kolb's experiential learning cycle for deep learning: A systematic literature review', *Social Sciences & Humanities Open*, 12(102096), p. 102096.

Wong, Y.C., Mohan, M. and Pau, A. (2016) 'Dental students' compliance with antibiotic prescribing guidelines for dental infections in children', *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 34(4), pp. 348–353.

9. Appendices

9.1 Appendix A – Table of Comparison of International Antibiotic Prophylaxis Dental Guidelines

Guideline	High-risk cardiac patients eligible	Dental procedures covered	First-line antibiotic	Penicillin allergy / alternatives	Overall stance
HSE, 2024	Previous IE; prosthetic valves/valve repair material; transcatheter aortic or pulmonary prostheses; VADs; untreated cyanotic CHD; certain repaired CHD (post-operative palliative shunts, conduits or other prosthesis) first 6 months after procedure; consider transcatheter mitral/tricuspid repair; consider heart transplant recipients	Extractions; oral surgery; periodontal, implant surgery; biopsies; scaling; root canal procedures; invasive procedures on established implants	Amoxicillin 2 g orally 30–60 min before	- Cefalexin 2g (not in severe penicillin allergy), azithromycin/clarithromycin 500 mg, doxycycline 100 mg; - Ceftriaxone 1g IM or iV if unable to take oral; - Clindamycin not recommended	Targeted prophylaxis recommended for defined high-risk groups
AHA, 2021	Prosthetic valves including transcatheter-implanted prostheses and homografts, prosthetic material used for cardiac valve repair ie annuloplasty, previous IE; unrepaired CHD or repaired CHD with residual shunts or valvular regurgitation at the site /adjacent to site of a prosthetic patch/device, cardiac transplant with valve regurgitation	All dental procedures involving manipulation of gingival tissue or periapical region of teeth or perforation of the oral mucosa	Amoxicillin 2 g orally 30-60 minutes before	- Cephalexin 2 g, azithromycin/clarithromycin 500 mg, doxycycline 100 mg; - Cefazolin/ceftriaxone 1g IM or IV if unable to take oral medicine; - Clindamycin not recommended	Targeted prophylaxis recommended for defined high-risk groups

Guideline	High-risk cardiac patients eligible	Dental procedures covered	First-line antibiotic	Penicillin allergy / alternatives	Overall stance
TGA, 2025	Prosthetic cardiac valve including transcatheter-implanted prosthesis or homograft, prosthetic material sued for cardiac valve repair such as annuloplasty rings and chords, previous IE, congenital heart disease but only if it involves: unrepaired cyanotic defects including palliative shunts and conduits, repaired defects with residual defects at or adjacent to the site of prosthetic patch or device, rheumatic heart disease, consult cardiologist for patients with heart transplant who have developed cardiac valvulopathy	Only those involving manipulation of the gingival or periapical tissue or perforation of the oral mucosa e.g. extraction, implant placement, biopsy, removal of soft tissue or bone, subgingival scaling and root planing, repairing avulsed teeth	Amoxicillin 2 g orally 60 min before	- Amoxicillin/ampicillin 2g IM or IV if oral not possible; - Cefalexin 2g for delayed non-severe penicillin hypersensitivity - Doxycycline 100mg orally 60 mins before procedure OR - Azithromycin 500mg oral for severe hypersensitivity reaction to penicillin - IV : amoxicillin 2g or cefazolin 2g (non severe – hypersensitivity to penicillin), azithromycin 500mg (severe hypersensitivity to penicillin)	Targeted prophylaxis recommended for defined high-risk groups
SDCEP, 2026	High-risk patients only	Dental extractions, incision and drainage of abscess, all oral surgical procedures, periodontal and endodontic surgery, placement of dental implants, uncovering implants and components that are sub-mucosal	Amoxicillin 2g capsules or 3g sachet 30-60 minutes before procedure	- Azithromycin/clarithromycin 500mg - Clindamycin no longer recommended. - If oral not tolerated, amoxicillin 2g IV, in penicillin allergy clarithromycin 500mg IV	Targeted prophylaxis recommended for defined high-risk groups, if moderate risk – patients do not require prophylaxis unless already specified by the patient's cardiac team

Guideline	High-risk cardiac patients eligible	Dental procedures covered	First-line antibiotic	Penicillin allergy / alternatives	Overall stance
ESC, 2023	High-risk cardiac patients only	Dental extractions, oral surgery procedures (periodontal surgery, implant surgery, oral biopsies) and dental procedures involving manipulation of the gingival or periapical region of the teeth (including scaling and root canal procedures)	Amoxicillin 2g orally 30-60 minutes before procedure	- If oral not tolerated, Ampicillin 2g IM or IV, azithromycin/clarithromycin 500mg orally if allergic to penicillin, if non severe allergy/no history of anaphylaxis with penicillin cephalexin 2g orally, cefazolin or ceftriaxone 1g IM or IV if allergy to penicillin and can not tolerate oral	Targeted prophylaxis recommended for defined high-risk groups
NICE, 2016	No routine prophylaxis recommendation	Routine dental procedures generally not covered for prophylaxis	Not routinely recommended	Not routinely recommended	Does not recommend routine prophylaxis, see the SDCEP implementation advice for patients at high risk of infective endocarditis

9.2 Appendix B - Infographic of Comparison of International Antibiotic Prophylaxis Dental Guidelines

Global Consensus: Where Guidelines Align						
 Targeted Prophylaxis Focus Most international guidelines (HSE, AHA, TGA, SDCEP, ESC) recommend antibiotic prophylaxis only for clearly defined high-risk patients rather than the general population.						
	HSE (2024)	AHA (2021)	TGA (2025)	SDCEP (2026)	ESC (2023)	NICE (2016)
DEFINING "HIGH-RISK": PATIENT POPULATIONS	Previous IE, prosthetic valves/repair material, transcatheter aortic/pulmonary prostheses, VADs, untreated cyanotic CHD, and specific transcatheter mitral/tricuspid repairs.	Prosthetic valves/repair material, previous IE, selected CHD, and cardiac transplant recipients who present with valve regurgitation.	Prosthetic valves/repair material, previous IE, selected CHD, and specifically highlights rheumatic heart disease as a high-risk factor.	Limits prophylaxis to "High-risk only" and explicitly states that moderate-risk patients do not require prophylaxis unless specifically advised by a cardiac team.	Includes previous IE, prosthetic valves/repair material, transcatheter aortic/pulmonary prostheses, VADs, and untreated cyanotic CHD.	Prophylaxis is not routinely recommended for dental procedures. Directs clinicians to SDCEP implementation advice for "high-risk" patients.
INDICATED DENTAL PROCEDURES	Explicitly lists extractions, oral surgery, periodontal/im plant surgery, root canal procedures, and biopsies as requiring prophylaxis.	Uses a more generalized definition: any dental procedure involving gingival tissue manipulation, the periapical region, or oral mucosa perforation.	Broad definition: any dental procedure involving gingival tissue manipulation, the periapical region, or oral mucosa perforation.	Explicitly lists extractions, oral surgery, periodontal/im plant surgery, root canal procedures, and biopsies as requiring prophylaxis.	Aligns with HSE/AHA, specifically mentioning extractions, oral surgery, scaling, and root canal procedures as high-risk activities.	Prophylaxis is not routinely recommended for dental procedures.
SPECIFIC FIRST-LINE ANTIBIOTIC REGIMENS	Amoxicillin 2 g PO, administered 30–60 minutes before the procedure.	Amoxicillin 2 g PO, administered 30–60 minutes before the procedure.	Amoxicillin 2 g PO, administered exactly 60 minutes before the procedure.	Amoxicillin 2 g via capsules OR a 3 g sachet, administered 30–60 minutes before the procedure.	Amoxicillin 2 g PO, administered 30–60 minutes before the procedure.	Prophylaxis is not routinely recommended for dental procedures.
KEY DIFFERENCES AND CLINICAL OUTLIERS						
 THE NICE 2016 "NO ROUTINE PROPHYLAXIS" STANCE: NICE remains the primary outlier by not recommending routine prophylaxis, though it directs clinicians to SDCEP implementation advice for "high-risk" patients.  RECENT TRENDS IN ANTIBIOTIC STEWARDSHIP: Most recent guidance (HSE, AHA, ESC, SDCEP) has moved away from clindamycin use entirely, favoring targeted prophylaxis for only a small, high-risk group.						

NotebookLM

9.3 Appendix C - Ethical Approval Letter



DUBLIN DENTAL
UNIVERSITY HOSPITAL
OSPIDEÁL DÉADACH
OLLSCOILE ÁTHA CLIATH

Research Ethics Committee
School of Dental Science &
Dublin Dental University Hospital
Lincoln Place
Dublin 2
Ireland

02nd July 2024

RE: “Final year dental students’ perceptions of education and guidance in Ireland and Australia regarding antibiotic prophylaxis to prevent infective endocarditis in dentistry”

REC Reference: DSREC2024-04

Dear Dr Phan,

Thank you for your recent application to the Dental School Research Ethics Committee (DSREC). Your application has been granted ethical approval. Please quote the above reference in all future correspondence.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Gary Moran'.

Prof. Gary Moran
Associate Professor in Microbiology
Chair DSREC
School of Dental Science and
Dublin Dental University Hospital,

Dublin Dental University Hospital

T : +353 1 612 7245

Ospidéal Déadach Ollscoile Átha Cliath

E : gpmoran@dental.tcd.ie

9.4 Appendix D – Participant Information Leaflet

Participant Information Leaflet

Study Title	Final year Irish dental students' perceptions of antibiotic prophylaxis to prevent infective endocarditis.
Research Site(s)	Dublin Dental University Hospital
Principal Investigator(s) and Co-Investigator(s) (Study Team) (insert names, titles and contact details including Trinity School/Department/Unit)	Dr Vy Phan Postgraduate – Oral Surgery Vy.phan@dental.tcd.ie Mr Dermot Pierse Course Director – Oral Surgery Dermot.pierse@dental.tcd.ie
Data Controller	Trinity College Dublin (research data) Dublin Dental University Hospital
Data Protection Officer (Research Data)	Data Protection Officer Secretary's Office Trinity College Dublin Dublin 2

We would like to invite you to take part in a research study that is being carried out by Dr Vy Phan, Postgraduate student in Oral Surgery at Dublin Dental University Hospital.

Before you decide whether or not you wish to take part, please take time to read this information leaflet carefully and discuss it with your family, friends or GP if you wish.

If there is anything which is not clear, or if you would like more information, please ask the researchers. You should understand the benefits and any risks of taking part in this study so that you can make a decision that is right for you.

Do I have to take part?

No, you don't have to take part in this study. It is entirely voluntary and up to you. If you decide not to take part, it won't affect your current or future education. Don't feel rushed or under pressure to take part or to make a quick decision. You can change your mind and opt out at any time even if the study has started.

This leaflet has six parts:

Part 1 - The Study

Part 2 - Data Protection

Part 3 - Approval, Organising and Funding

Part 4 - Future Research

Part 5 - Further Information

Part 6 – Next steps

Part 1 - The Study

Why have I been invited to take part?

We are interested in understanding experiences of final year dental students in Ireland relating to antibiotic prophylaxis to prevent infective endocarditis in dentistry, particularly clinical exposure and education during dental training. You are being invited to participate in this study because you are a final year dental student, have responded to the email and contacted us for additional information. We are hoping to have 30 participants in the study.

Why is this study being done?

Currently there are no studies about dental students' or dentists' perceptions or knowledge of antibiotic prophylaxis within Ireland and very few have been conducted in Europe. All the current available studies are quantitative in nature hence qualitative research was selected to provide a newer in-depth perspective into dental students' understanding of antibiotic prophylaxis and their education, greater context and detail around the topic and aims to capture Irish dental student cohorts. This research topic is important as it addresses gaps in the literature on dental students' knowledge, compliance, perceptions of antibiotic prophylaxis guidelines and educational experiences.

What does taking part involve?

If you decide to take part, a member of the research team will discuss this information leaflet and consent form with you. You will be given a copy of your signed consent form and this leaflet to keep.

We will arrange a time and location for your focus group interview with Dr Vy Phan. Focus groups will consist of approximately 4-5 participants and interviews will run for 60 minutes. With your permission, the interviews will be audio recorded. During the interview you will be asked questions about your understanding, experiences of antibiotic prophylaxis to prevent infective endocarditis in dentistry and perceptions of your education on this topic throughout your dental training.

We will transcribe the interview and you will have an opportunity to check the transcript if you wish.

What are the possible benefits of taking part?

Taking part in this study may not directly benefit you. However, we hope that this research may help us to better understand dental students' understanding, experiences and perceptions of antibiotic prophylaxis to prevent infective endocarditis in dentistry. This in turn may result in new guidelines and improvements in antibiotic prophylaxis education.

Catering and coffee monetary vouchers will be provided as a token of appreciation for your time and involvement in the research study.

Are there any possible disadvantages or risks from taking part?

There are no known risks involved in this study. At all times, the well-being of participants takes priority over research activities.

In the event of the interview triggering an emotional event, the interviewer will stop the session and advise you to contact TCD Student Counselling services which offers various support to TCD students. There is a very low risk of any emotional concerns during the interviews as the research topic focusses on education and experiences and does not involve sensitive or emotionally triggering topics.

Data Breach: we take many measures to ensure the confidentiality of all data and the risk to you of a breach of confidentiality is considered very low. There is a risk that a connection to your identity could be made, however great care will be taken to mitigate this, participants will be de-identified and all comments made by each participant will be pseudoanonymised therefore this would be highly unlikely.

What will happen to the results of the study?

The study results will form part of the principal researcher's thesis, a component of a Doctorate of Surgical Dentistry (Oral Surgery) degree. The final version will be available to read in the DDUH library once approved. The results of this study may be published in academic journals in the future. Subjects will be thanked as a group for their participation, but no individual will be identified at any stage nor disclosure of any information that would reveal your identity. Quotations and transcripts from the focus group interviews will be included.

Part 2 - Data Protection

What information about me (personal data) will be used for this study

We will use the audio recording of your interview and the final transcript. We will be asking for your understanding of antibiotic prophylaxis to prevent infective endocarditis in dentistry, comments, concerns and suggestions about antibiotic prophylaxis education. Comments will be pseudoanonymised with a subject number assigned to each participant. The key to the number pairing will be kept in a locked cabinet that is only accessible by the lead researcher in a secure office in DDUH. The consent form must be kept on file for 7 years as per GDPR regulations. These will also be in a locked cabinet in DDUH. Your medical records will not be accessed.

Who will access my personal data?

Identifiable data will be accessed only by the principal investigator. Pseudoanonymised data will be shared with the research supervisor, co-supervisor, collaborators and potentially other members of the Oral Surgery department DDUH. Once anonymised, data cannot be traced back to a particular subject.

How is the information kept confidential and secure?

Your privacy is important to us. We take many steps to make sure that we protect your confidentiality. We replace your name with a code at the hospital site to ensure your confidentiality. Only the hospital site can link the research data back to you. A Data Protection Risk Assessment was conducted and the risk to personal data was deemed low.

Electronic research data will only be accessible to the research team and is held securely on a restricted DDUH server that is password protected. The principal investigator and co-investigators are governed by a professional code of ethics to maintain your confidentiality. Consent forms are kept on file for 7 years as per GDPR regulations. These will be stored in a locked cabinet in DDUH.

The principal investigator and research supervisors involved in this project have also conducted training in data protection law and practice.

How long will my personal data be needed??

All personal data for example coded transcripts will be retained for a period of 5 years in line with TCD's retention policy and then destroyed by electronic means or shredding of paperwork.

Consent forms will be stored for 7 years as per GDPR requirements. At the point in time where research is destroyed, the link between you and your personal data will be securely deleted.

The audio recording of the interview will be retained until it has been transcribed and the content verified after which it will be securely deleted.

What is the lawful (legal) basis to use my personal data?

By law¹, we can use your personal information for scientific research² (in the public's best Interest³). We will only use your personal data for this research project and if you consent, future research on antibiotic prophylaxis dental education which we hope will improve education and patient outcomes. We will also ask for your consent as a requirement of Irish law (Health Research Regulations), but we do not rely on this as our legal basis under GDPR.

1 The European General Data Protection Regulation (GDPR)

2 Article 9(2)(j))

3 (Article 6(1)(e)

What are my rights under Data Protection law?

You are entitled to:

- *object to our use of your personal data or any further use;*
- *request access to your personal data and to receive a copy of it;*
- *request inaccurate personal data be corrected or deleted;*
- *request restriction of our use of your personal data ;*
- *request deletion of your personal data.*

By law you can exercise the above rights in relation to your personal data, unless the request would make it impossible or very difficult to conduct the research. For example, if the study is about to be published then we may not be able to delete data as it would impact on the results.

You can exercise these rights by contacting the principal investigator, Dr Vy Phan (vy.phan@dental.tcd.ie) or the Trinity College Data Protection Officer, Secretary's Office, Trinity College Dublin, Dublin 2, Ireland. Email: dataprotection@tcd.ie. Website: www.dataprotection.ie

Part 3 - Approval, Organising and Funding

Has this study been approved by a research ethics committee?

Yes, this study has been approved by Dublin Dental University Hospital Research Ethics Committee on 2nd July 2024.

Who is organising and funding this study?

This study forms part of the Oral Surgery DChDent degree thesis of the lead researcher, Dr Vy Phan. A study budget is provided by DDUH for this purpose, however there is no external funding granted and results will not be utilised for commercial purposes.

Will I be paid for taking part?

Catering and/or a token gesture of 20 euros in coffee vouchers are being given to each participant.

Part 4 - Future Research

Will my personal data be used in future studies?

There are currently no further studies planned at this time, however if significant results are identified with your consent, the pseudoanonymised data of the group collectively may be used as comparison against other class groups. Any such research would be carried out within 5 years of the start of this project and future studies would require ethical approval for new data collected. No identifiable data will be included in this research or any future research project and after 5 years, all personal data stored as part of this research will be destroyed.

To access any data held by the research team, researchers must get ethical approval from an independent research ethics committee and sign and adhere to a legal contract outlining how the data are to be used and kept confidential. You can withdraw your consent to future use at any stage.

Part 5 - Further Information

What happens if I change my mind?

Your participation in this study is voluntary and you can change your mind even if the study has started. You do not have to give a reason for changing your mind. This will not affect your education or academic progress in any way. If you would like to withdraw from the study, please contact Dr Vy Phan [vy.phan@dental.tcd.ie] who can organise this for you.

We will discuss if you are happy for us to continue to use information about you (personal data) which has already been collected. If you do not consent to your personal data being retained for this study, we will delete any information that could identify you. Please note that we will not be able to remove personal data which has been shared or pooled for use in publication before your request for deletion.

We will not contact you again.

Who should I contact for information or concerns?

If you have any concerns or questions, you can contact:

*Principal Investigator: Dr Vy Phan, Postgraduate student in Oral Surgery
vy.phan@dental.tcd.ie*

*Research Supervisor: Mr Dermot Pierse, Course Director in Oral Surgery
Dermot.pierse@dental.tcd.ie*

If you have any questions in relation to your rights under data protection law, you can contact the Data Protection Officer, Trinity College Dublin: Data Protection Officer, Secretary's Office, Trinity College Dublin, Dublin 2, Ireland. Email: dataprotection@tcd.ie. Website: www.dataprotection.ie (remove if site DPO is contact point).

Under GDPR, if you are not satisfied with how your data is being processed, you have the right to raise a concern with the Office of the Data Protection Commission, 21 Fitzwilliam Square South, Dublin 2, Ireland. Website: www.dataprotection.ie

Part 6 - Next Steps

Will I be contacted again?

If you would like to take part in this study, please sign the Consent Form on the next page. Once dates for the focus groups have been confirmed, you will be contacted by the principal investigator in small groups and invited to participate.

Thanks

Thank you for taking the time to read this Participant Information Leaflet. You will be given a copy of this Leaflet and the signed Consent Form to keep. Please retain these in case they are needed for future reference.

9.5 Appendix E Participant Consent Form

INFORMED CONSENT FORM

STUDY: Final-year Irish dental students' perceptions of antibiotic prophylaxis to prevent infective endocarditis.

Recruitment Site: Dublin Dental University Hospital

There are **two sections** in this form.

Section 1 contains statements of understanding and asks you to tick each if you understand. Please ask any questions you may have when reading each of the statements.

Section 2 asks for your informed consent. Please select either 'yes' or 'no' to indicate your choice.

Thank you for participating.

The end of this form is for the researchers to complete.

1. General Understanding	Tick
I confirm that I have read and understood the Information Leaflet for the above study. The information has been fully explained to me and I have been able to ask questions, all of which have been answered to my satisfaction.	
I understand that taking part in this study is entirely voluntary. I understand that not taking part will have no negative impact on me.	
I understand that I can leave this study at any time without giving a reason. I understand that leaving this study will not affect my (insert detail as applicable - e.g. medical care), now or in the future.	
I understand that I will not be paid for taking part in this study (aside from coffee vouchers issued as a token gesture) or receive any benefits from any products developed as a result of this research study.	
I understand that there are no direct benefits to me from participating in this study. I understand that results from analysis of my personal information will not be given to me.	
I know how to contact the research team if I need to.	
By ticking each box above and choosing my options below <u>and</u> signing this document I agree to participate in 'X' study as described in the Participant Information Leaflet.	

2. Consent	
I agree to take part in this research study, having been fully informed of the risks and benefits in the participant information leaflet provided to me.	Yes No ☐ ☐
I agree to the use of information about me (personal data) including information from focus group meetings being used by the research team for this research study as described in the participant information leaflet.	Yes No ☐ ☐
I agree to information about me (personal data) being shared with other academic research institutions, Universities or hospitals for the purpose of research in the area of antibiotic prophylaxis dental education. (i) In Europe (ii) Internationally	Yes No ☐ ☐
I agree to being contacted by researchers by e-mail/phone as part of this research study.	Yes No ☐ ☐

Participant Name (Block Capitals)	Participant Signature	Date

Witness Name (Block Capitals)	Witness Signature	Date

To be completed by the Principal Investigator or nominee.

I, the undersigned, have taken the time to fully explain to the above participant the nature and purpose of this study in a way that they could understand.

I have explained the risks and possible benefits involved. I have invited them to ask questions on any aspect of the study that concerned them.

I have given a copy of the participant information leaflet and consent form to the participant with contact details of the study team.

Researcher name _____

Title and qualifications _____

Signature

Date

Copies to be created and retained: 1 for Participant, 1 for PI and 1 for Hospital Records (where appropriate).

9.6 Appendix F - Pilot Study Transcript

Interviewer: I

Participants: P1, P2, P3, P4

I: OK. We've just started recording there.

I: Now we're just going to start and just ask you guys what you know about antibiotic prophylaxis for cardiac patients within dentistry in Ireland and other parts of the world, such as the UK. Do we know much about antibiotic prophylaxis for cardiac patients?

P1: They are used as a preventative measure to prevent adverse effects following procedures, so you don't want things like prosthetic valves to be exposed to bacteria.

I: OK, Yeah, great. So, what, what other circumstances would you be prescribing antibiotic prophylaxis to prevent infective endocarditis? So you mentioned prosthetic valves, do we know about other conditions?

P3: Cardiac stents?

P2: I think if there are any congenital heart defects with residual defects or with cyanotic heart disease or residual defects following like surgery, bowel surgery, transplants.

P1: It's cardiac transplant patients that develop cardiac valvulopathy I think where it's required as well.

P2: There's four on our guidelines. AHA?

I: OK, so someone mentioned stents. So what do we think about stents? Do we prescribe antibiotic prophylaxis for stents or what are your thoughts on that?

P1: For metal ones, yes. And then within six months of replacement obviously required.

I: Alright. And I think you mentioned some guidelines there. You said there were four conditions on the guidelines. Can you talk a bit more about which guidelines you're referring to?

P4: It's the NICE guidelines that we use.

P2: No it's the AHA ones.

P1: It's the NICE guidelines that don't recommend antibiotic prophylaxis.

I: And apart from AHA, are there any other guidelines we have or are AHA ones the main ones that we tend to use?

P4: There's the SDCEP ones as well.

P2: We're told in the dental hospital just to use the DDUH guidelines, but they haven't been updated, but they run off the AHA.

I: OK, that's very good. And has anyone seen the HSE guidelines? Are you aware of the HSE guidelines?

P2: Yep.

I: So you've seen that. And has anyone ever shown you guidelines or what's your experience being with seeing these guidelines in practice? Or when you've been studying?

P4: We've been exposed to them in PBL.

P2: So they just, yeah, we've done infective endocarditis a few times. Yeah, that's always brought up or it's brought up in that, in kind of heart conditions section and in perio as well, they would often bring up.

I: OK.

P3: They usually bring it up in the context of AHA versus NICE guidelines and tell us to follow the AHA ones. That's always how it's kind of summarised for us.

I: OK. Yep, that's very good. And when they've said not to use the NICE guidelines, is there a reason you're given or why do you think we wouldn't be using the NICE guidelines?

P1: Kind of a precaution, kind of. The AHA tend to err on the side of caution. Whereas the NICE guidelines try to prevent antibiotic resistance more so than preventing infective endocarditis.

I: Yep. OK, that's very good. And do you guys agree with the use of antibiotic prophylaxis, for certain cardiac conditions? Do you think we should be following the AHA guidelines rather than NICE guidelines? What do you think of it all?

P2: Yeah, I think so 'cause I think for us as students as well, it kind of gives you a bit of peace of mind, If you know that your patient has any form or kind of heart defect that fits within those guidelines. It gives you a better peace of mind knowing that they have that sort of protection underlying.

P4: Especially if you are performing the invasive procedures. Yeah, you'd be more comfortable doing that with antibiotic prophylaxis.

P3: I think also just when we're weighing like pros versus cons and risk versus benefits, I think there's more of a benefit to have that protection versus the risks of resistance considering it's like such a limited dose, you're doing it one off generally. And just again, the protection.

P1: it's only used for like a very small number of conditions. They don't use it for every kind of cardiac condition.

P2: It's only a very small, yeah, it's very specific in terms of conditions and procedures that you don't do it for. It's only if you are doing anything invasive like extractions or root debridement or anything that has a risk of bleeding and bacteria and all that kind of thing.

I: Did someone mention invasive dental procedures? So what would be considered invasive dental procedures do you think, for use of antibiotic prophylaxis in these patients, what type of procedures?

P1: Any kind of thing that involves bleeding. So anything that will cause bleeding of the tissues or manipulation of the gingival tissues .Yeah.

P4: So everything that could be subgingival as well.

I: Mm-hmm. Great. And if you're not sure about which procedures would be under that category or which procedures you would use it for, what would you use to decide whether or not antibiotics are required?

I: As undergraduate students, what would you do if you had a patient and you weren't sure if the procedure was actually meant for antibiotic prophylaxis? What would you do at this stage?

P3: I would ask our supervisor or reach out to their specialist or their GP to get some more information on the case

P1: Even on the guidelines, there is a list of like procedures that I recommended for as antibiotic prophylaxis and then others that they don't indicate.

I: OK, great. Now we're going to have a look at your sort of level of understanding and what you think your level of understanding at the moment is for the use of antibiotic prophylaxis for cardiac patients. So what would you rate your level of understanding to be?

P3: Moderate.

I: OK. And why do you say moderate?

P3: I still think I would second guess myself before I would feel comfortable doing it on my own, like making that decision on my own to prescribe someone antibiotic prophylaxis. I still feel like I have a little bit of, um, I guess second guessing myself and needing that assurance from my supervisor. Also just understanding I guess, yeah, like what procedures would really

warrant it? Again, weighing the benefits and risks and knowing when it would actually be necessary.

I: OK, and what is what are everyone else's thoughts? Are you hearing what P3 is saying, would you say you're at a moderate level of understanding or greater?

P2: Yeah, I think so. I think it always comes with experience because I personally haven't had, I haven't treated any patients that are in that risk category or done any procedures within the risk category as well. So, I haven't prescribed it myself. So I think it would come with experience.

P4: The more you do it as like if you're more exposed to something and you're used to it, yeah.

I: And you've mentioned PBL a few times, so with your exposure at the moment, none of you have actually prescribed or seen a supervisor prescribe antibiotic prophylaxis for cardiac patients?

P1: I've had one patient.

I: So you've done it once, P1. OK. So apart from that experience, we mentioned PBL. So when do when did you learn about antibiotic prophylaxis for PBL?

P4: Second year?

P2: I think we kind of we've done it every year since second year. It's been very much a recurring topic because it's so important. So it was definitely done last year as well. And we did because the PBL is split into blocks. So there was a block on cardiac disease, infective endocarditis was one of the problems within that. And so it was touched on in that and it would have been touched on the second year. And I'd say we'll do it again this year. We already did do it briefly. My group did anyway.

P1: Yeah, we did it in oral surgery.

I: And do you think it would be beneficial to do it again in PBL or to have reminders in 4th and 5th year? Or do you think you've covered enough ground on it? What, what are your thoughts on the theoretical side or the sort of lectures you've had?

P1: I think that's quite important to keep reinforcing it. I think the more they do, the more understanding people will gain on and the more comfortable they are when they actually have a patient who requires it.

P4: And there's not a lot of content like when you look at it, it's pretty straightforward when you know what to do and what not to do. So if they do keep repeating it, they'll eventually sink in.

P2: And also if guidelines get updated, it's important that we are kept up to date on those as well. So if it's done every year, if there are any updates or any changes, we're aware of them.

P3: I think that's the only confusion that I have with the PBL and antibiotic prophylaxis is that even our tutors who are guiding us were like, we don't actually know at this point in time which guidelines you guys are using. And so it was sort of. Yeah. A bit wishy washy, are we using the nice or the AHA or they just like they're kind of I think a little bit more clarity on exactly what guidelines you should be following with the beneficial? Mm-hmm. Yeah. But I think that also comes with things being updated and maybe the tutors not being as up to date.

P2: I think it would be nice to have like a lecture from someone in the oral surgery department to just kind of solidify that which guidelines because again, PBL isn't because it's all kind of self research people come back with all sorts guidelines and it may not be clear depending on your group as well, because we all have different groups and different tutors. I think it would be nice to have a lecture from someone from oral surgery who deals with that on a daily basis.

P3: But we may still get yeah. In oral surgery or oral pathology.

P1: Yeah, we probably are two together this year, I'd say.

I: So what I'm hearing is that there might be a bit of variability in the PBL. You might have different tutors. You've mentioned as well, P3, that there might be different supervisors as well with differing opinions and it would be beneficial to continue to reinforce with lectures, but maybe as a group rather than separate PBL, do you think potentially? And, why the oral surgery department specifically? Is it because you haven't been exposed to any oral surgery lectures on it? Or is there a reason that it would be beneficial for oral surgery to put on those lectures?

P4: I think they'd have the most knowledge of everyone else.

P2: Yeah, because they would be doing the most, really, oral surgery or perio would be doing the most. So I'd say one of those departments, but because oral surgery would deal with it every day because there's so many patients that would require it.

I: All right, OK, I'm just going to bring it back to just the tutors and supervisors having differing opinions on which guidelines to use. Are there specific supervisors or are there specific departments where you think it's more confusing? Where do you feel that there's the most confusion with the guidelines?

P3: I'm just remembering back to our PBL sessions.

I: OK.

P3: Where all that they really have to go off of was the tutor guidelines, that said, like students should know AHA or whatever it is. But then when we would press back and be like, oh, well, we also found these guidelines, what about those. They'd be like, I don't know, just follow the AHA. And so when you were kind of asking us why do you follow the AHA versus NICE? I don't know if we ever actually were taught why there's a difference in why we do use one versus the other. I think it would be beneficial for us to know.

P1: Cause the tutors aren't necessarily all clinicians. Some of them have PhDs in different departments in the hospital, but they're not the dentists. So they wouldn't know which guidelines we follow or why.

P2: Yeah, especially in second year when it was first introduced to us because the kind of tutors for PBL become more clinical as you progress. Whereas in second year it could have been anyone who put it in someone from like, microbiology department or somewhere else which they obviously, 'cause they're not doing that clinically, they wouldn't, they may not be aware and they would just say, oh, refer to the hospital guidelines. But the hospital, we know that the hospital guidelines haven't been updated because it's still recommended that it's 3 grams amoxicillin, but we know from the HSE, but it's two and that the drug has changed, the amoxicillin like replacement. But that's just yeah, I think the, the dental hospital needs updating if they're going to be telling us to use that, you know, because if we go in with that knowledge, then we're not really correct as such. So, yeah.

I: No, that's a good point there. Someone just mentioned some updated guidelines and we just talked about Clindamycin. Can you guys tell me a bit more about that? When did that change, do you think or when did you hear of this? When do you think the guidelines have switched?

P4: We only heard about it like the start of this year.

P1: Yeah, it was pretty recent. When we did our endo course in second year, we were told that if they have an allergy to Penicillin, you give Clindamycin. And then we reviewed it this year in PBL, we were told that it had changed.

P4: Yeah to Clarithromycin?

P2: then the HSE guideline says Cephalexin.

P3: So yeah, see my PBL group didn't even cover that. So the first time I actually heard that was in our locals clinic, that it had switched over.

I: OK, no, that's very interesting. So with Cephalexin, what do we know of Cephalexin, is that on the current guidelines or is that something else? So we've said no longer Clindamycin and what, what our thoughts or what is our knowledge on prescribing Cephalexin, versus Clarithromycin or Azithromycin? Do we know much about that?

P2: I think it was due to the risk of, was it like QT prolongation in patients with cardiac arrhythmias or something like that because Clarithromycin, they're macrolides and they have that risk whereas Cephalexin is a different class of antibiotics. So it doesn't carry that risk. But, I think on the HSE it does say not to prescribe Cephalexin if they're, if they've very severe allergies to Amoxicillin but I'm not sure.

I: Yeah. OK. Yeah, that's all very interesting. OK. So we're going to move on a little bit more and we've mentioned the PBLs and we've touched on this, but I just wanted to go through it again and basically, do you feel you've been taught in a way that is applicable for a clinical session? So I think a few of you mentioned sometimes you have tutors that have PhDs or may not be working as a dentist. So do you feel the way so far that you've been taught about antibiotic prophylaxis, is that in a way that you can apply clinically or do you feel like it's more theoretical and more sort of, not as applicable in a clinical setting?

P4: It's definitely more theoretical, like the way PBL is set up in itself, it's theoretical. You're just all throwing ideas, making a document that's kind of, the session ends and nobody really looks back at the document.

P1: Yeah, I think it's good. It's like an introduction, but then there should be somewhere it's applied clinically so that you have a brief understanding before you go in and then you see how it actually applies to patients.

I: Great. Now, how confident are you guys with prescribing antibiotic prophylaxis for patients with cardiac conditions once you graduate? I know we touched on that earlier and we said we had a moderate level of understanding, but how confident do you feel at the moment if you had to do it on your own?

P3: Not very confident. Yeah, I definitely would want a second opinion before I feel confident doing it on my own stage.

P2: I think it would be different as well when you graduate, if you go into private practice, it's a different sort of process to what we do here such because we have to go get a supervisor to sign it off and then you have the patient wait there for an hour. Whereas in private practice, if you don't have the Amoxicillin or the antibiotic yourself, you have to send them to the pharmacy with a prescription, to get it beforehand. So I think it's, it would be very different. I don't think we have, we don't have that experience as such.

P1: So yeah, also in the building here, they have to take it in front of the person who dispenses it whereas, if you're in private practice, do you make the time to go out and watch them take it and then bring them back in? And if you're running behind is the exact time to take the pill the same for when you wait to start treatment?

I: So I'm hearing that the lack of confidence at the moment might be because of the differences in private practice. And would you say the lack of confidence, so you mentioned that we have the guidelines, even with the guidelines, do you feel that you would still not be as confident prescribing for yourself? Why is that or do you think you do feel confident enough with the guidelines?

P3: I feel like the guidelines definitely help, they would make me feel like OK, well if it's on there and I'm kind of checking those boxes of, like this patient has X and so I'm giving Y, that does make it easier.

P1: Also you'd have to remember to constantly check that in Ireland we do still use the AHA guidelines and if the AHA guidelines have been updated and we no longer follow them, and if the HSE ones become updated, do we then start following them? Then there's a lot of confusion for which ones you should be. Like monitoring, right.

I: So it's not just that the guidelines are there, it's which ones to use and which ones are updated.

P2: And if we were kind of told straight, like straight up which one to follow here, that's I think that's the main area of confusion because we don't know here kind of which one we're supposed to go with.

P1: Yeah, but that's it, will be still be using the same one.

P3: Where do we get that information that it is updated or changed? Nobody's really told us like how to access that or like how to go about that.

I: Yeah. OK. So at the moment, how would you access the guidelines?

P1: The AHA ones I think are online.

P2: Yeah and the same with the HSE, it's on the HSE website. I can just search antibiotic prophylaxis.

I: .Right. And we're just going to move along now, just more towards the dental training and if you have any gaps at the moment in your knowledge of antibiotics and what those gaps would be if you do have them? Are there any gaps in your knowledge currently? Can you talk a bit more about that.

P1: We don't understand why the four procedures that are on the AHA guidelines need antibiotic prophylaxis more than the ones that they weren't recommended for. It could be explained a bit better.

P2: Yeah we were never told why as such.

P1: Yeah, we were just so that if they have it, give antibiotics, but they didn't say why it would require more than something.

I: OK. And what do you think would help improve that understanding? So you're saying if we don't understand why, if that was explained to you better, why we're prescribing for those things? Is there anything else you feel in your training that could help improve your understanding of gaps or even improve your confidence in prescribing? What else could be done?

P4: Well, last year we'd have PBL session recap lectures sometimes. If we had some of them for like oral surgery, the block we just finished, I feel like that would be so beneficial because it would be so clear cut, everyone would understand it more. And I'd be more confident studying, because I know what to focus on instead of just searching every guideline and then I am just getting confused.

I: Yeah, OK.

P3: I also think more clinical exposure. So I know we've been getting a little bit of it in locals and I think that's actually been helping to make us more comfortable. Even just seeing the protocol of like, this is what you do, this is how you get it, this is where you sit them down like and this how you explain what you're doing, even those kind of things. Seeing it clinically by a supervisor or a clinician is really helpful, I find rather than like what we talked about PBL being more theoretical, it's really important I think for us to see it from a clinical perspective and see how it actually functions.

I: Great, OK.

P2: And if we had a lecture such that kind of focused in on antibiotic prophylaxis like PBL, when we've done it, it's been kind of part of a problem and a very small part of the problem as such. So in a way, sometimes I'd say a lot of people kind of skim over it because it seems

like such a small part of a big problem. But it's very important for us to know clinically, maybe more so than some of the other things that we do in PBL. So I think if we have lectures that are solely focused on prophylaxis, like I know we have a lecture in a few weeks on anticoagulants and some of those guidelines. So I think if we have the same kind of thing just referring to prophylaxis, that would be very beneficial.

P4: Yeah, 'cause like in PBL, they present you with scenario or a story, and it's so easy to lose track of what you're focusing on because there's gonna be like 6 things going on in the same scenario. So you could so easily overlook something really important.

I: Great, OK, Is there anything else you guys wanted to add or that we haven't talked about for this particular topic? Or do you think we've covered everything, does anyone want to add?

P3: Is there ever a situation that you wouldn't be able to describe either or like is there ever a time where it's like you can't prescribe the Amoxicillin?

P1: Or the alternative yeah, would anyone develop an allergy to Clindamycin or something like that?

P3: And are there guidelines if someone can't take either of those, what to do then?

I: So the guidelines actually do say, the HSE guidelines will tell you. So someone mentioned here if you can't prescribe Amoxicillin, the next line is Cephalexin, but it is for mild not for severe penicillin allergies and some cases of patients, it would be very hard to tell. And who is going to make that call for an allergy, right? Then there is the next line, that's been the updated guidelines with Azithromycin. If the patient can't tolerate that, OK, then it could be the clinician's decision at that point or liaising with the, you know, cardiologist or cardiothoracic surgeon to determine, at what point what you prescribe. And generally there are on the guidelines, there'll be oral and they'll also be, you know, different forms of, routes of doing it as well as different medications on the guidelines. So, but there may be times where

if you do feel like you need to have more experience or you need to liaise with a specialist, OK, and also to assess, maybe speak to a patient's GP when it comes to intolerance with certain antibiotics.

P1: OK. If they can't take antibiotics as tablets and they require a liquid suspension, do you still prescribe the same amount that you want? Let's say if you've got two grams of Amoxicillin, do you just say they put suspension or do you change the amount?

I: Yeah, So the suspension will tell you concentration. So it'll be dependent on the concentration. OK So 5ml or 10 ml depending on what it is, could be 250mg. So then if you want 2g, then you have to up that by 8 times, OK. So if it's either 250mg and 5ml, and if you need 2g then you need 40ml and some might have it 500mg in 5ml. So it will depend on the concentration and it's usually, the suspension is a paediatric dose. So what will happen, is depending on what pharmacy will stock the suspension, you just need to check that concentration and then equate that in millilitres, if that makes sense. OK, so you'd still be the same 2g, but you need the mills there. And we do have that suspension available here, but patients can also get that outside as well. OK, alright, so I'm going to stop this first part now. Let's see if I can stop that there.

Part One audio concludes.

PART 2

I; Oh, great. So moving on to the Part 2 of the pilot study, where we're just going to ask for your feedback and your experience, going through that semi structured interview with those questions. So what did you think about the wording of the questions? Were there any terms or concepts were unclear? How did you find the wording for the questions?

P3: When you were asking us to rate like how we're feeling about things? I feel like I over thought if you wanted like number scale, like mild, moderate, like, I don't know. So maybe just giving us like a scale of 1 to 10, giving us maybe a little bit of a scale to go off of.

I: Yeah, that's a fair point. So that was a bit of.. I guess, not as concise. OK, great. And were there any questions you thought that were repetitive or unnecessary?

P2: I don't think so. Because like each question kind of sparked a new topic, as such for us to kind of think of. So we think they were relevant and there was nothing really not relevant.

I: And there's no questions that you think would be ideally removed? We would like to keep those questions here, that would be beneficial for the next group? OK. Now were there any aspects that we may have missed in those questions? Were there any additional questions you can think of that might be helpful to kind of get down to students' understanding and perceptions of antibiotic prophylaxis.

P3: I mean, you got to it in the questions with the answers, but maybe asking specifically what we think might be a good suggestion for like alterations or additions to the curriculum. Like we mentioned maybe doing a one off lecture, but that wasn't something that was explicitly asked, like what do you think should change? So maybe that would be helpful.

P1: I'm just wondering maybe the dosages of certain antibiotics because I think people are quite clear on the dosage of amoxicillin. But then when it gets into Clindamycin and all that, there's quite a large way of changing it, 500 or 600 milligrammes or something like that.

I: So specific questions, yeah, to tell your understanding? Good and you were mentioning just you're specifically thinking P3, of the curriculum or what modifications in the actual..

P3: Suggestions or modifications.

I: And were any questions maybe too broad or too narrow? Do you think there were any questions that may be a bit too narrow or too broad?

P4: What was the first question?

I: Fair enough. Let's go back to that. It was what do you know about antibiotic prophylaxis for cardiac patients within dentistry in Ireland and other parts of the world.

P4: No.. It's a good opener.

P2: It is.

P4: It's broad.

I: I heard maybe getting more specific when we're asking about your knowledge, looking at dosages and things. OK. And why do you think that would be beneficial if we were asking those questions?

P4: Because then you can really see if the students understand it or not 'cause we could be saying yeah, know all of that, but they probably don't. Yeah. So if you do ask them..

P2: So you can see kind of what guidelines people have been learning by what like drugs, they say. Uh, so you'll, see what variation there is with the new guidelines, so which ones we're supposed to use and such.

I: Very good. Thank you. Now, did the order of the questions make sense? How did it flow? Do you think the structure or do you think there could have been any changes with the order or the sequence of these questions?

P4: Yeah, thought it was all good.

All participants nodding in agreement.

I: And any questions that made you feel uncomfortable or were you nervous about answering any questions?

P4: No.

P2: No.

All participants shaking their head.

I: Making my life very easy. OK. Now just so this is just any feedback for myself in terms of explaining, did I explain the purpose of the study enough or what we're doing in the interview process clearly? Do you think you would have wanted a better understanding or explanation at the start? Did you kind of understand what you were doing and why we did the questions?

P2: Yeah, OK.

I: And the tone, just the way that everyone was speaking and how we're in this room with the recorder, do you think that was OK and would be suitable for everyone else?

P4: Yep.

P2: Yeah.

I: Anything else you wanted to share about the interview process? If you think about your 5th year student colleagues, what they'd benefit from a similar sort of interview style, is there anything you think that could help them make it easier for them or to share their experiences?

P3: There was one of the questions or if you went off it, but when you were asking us if we have had any experience with prescribing antibiotics or seeing a supervisor do it, I think that was a good question just to get us kind of also gauging where we've been at and what we've been exposed to. And I think it's good. I also, this is just a personal thing, but I find like I kind of get lost on what the question was when we start getting into the conversation. So I don't know, maybe it's possible to have a print out or like put up the question somewhere so that we can kind of look back to it so we don't get lost while we're in the discussion.

I: Uh-huh.

P2: Yeah, that would be a good idea. Just to keep on track.

P4: Yeah, to keep on track.

P2: Even if the list of questions in front of them so that they could kind of stay on topic and not go off topic. It might be more beneficial for you to have it that way as well.

P3: I'm just not sure if you want people seeing the questions you're going to ask so they won't change their answers then. But that's what I'm saying, if you could even put the question somehow.

P4: So we can like look back to it or go back to it because I find.

P3: don't know if she's able to something like that where we can refer back just so we don't get lost in our own discussion.

I: OK, No, very good. Thank you for that. And just, just the last point, very similar was just any improvements but you guys have covered that? Just it would be helpful you're saying to have the questions in front of you? OK. And just a question, someone said so we don't get lost into the discussion. Why do you think that's a good or if that's a bad thing? To get lost into the discussion. Is it because you feel like it would be inconvenient for me or is it because you feel like you would dwell into too many things or go on a tangent, and why do you think you don't want to necessarily get lost into the discussion?

P3: Yeah, I guess just so we don't go off topic too far so I guess to keep the study kind of a little bit more structured and like you said, your questions go in a specific order and it's a flow so I don't I wouldn't want us like bogging down on something that maybe isn't as important for us to look at or that we're going to get to in a different kind of aspect a bit later. But yeah, I guess having the discussion or it going on tangents isn't necessarily a bad thing

P1: Or if you want like several perspectives and one person answers your question but then veers off and then another person kind of goes off the tail of their tangent instead of answering the initial question.

I: Yeah. OK, very helpful. Thank you. I'll stop that.

Part 2 audio recording ends.

9.7 Appendix G - Focus Group Transcripts

FOCUS GROUP ONE TRANSCRIPT 25/11/24

Interviewer: I

Participants: P5, P6, P7, P8

I: OK. So that's currently recording there now guys. Great. OK. So I'm going to start the focus group interview question with what you all know about antibiotic prophylaxis for cardiac patients within dentistry in Ireland, Australia and other parts of the world such as the UK?

P5: So I suppose each follows different sets of guidelines. I know the HSE follows the European cardiology ones I think, and whereas I think the UK, I think they've scrapped mostly antibiotic prophylaxis for like these sorts of cases and then I wouldn't know about the rest of the world to be honest.

I: Yeah, no that's great. Does anyone know of any other guidelines?

P6: NICE guidelines.

I: OK. Yeah. Do we know much about the NICE guidelines, where are they normally used?

P6: Isn't it in the US that they use the NICE guidelines?

P7: I thought, no, isn't it the European guidelines?

P5: No, there's the European cardiology ones and I know that HSE use them. I think UK could go off NICE, but not 100% sure. And there are the American, the AHA, the American Heart Association, but that's not definite that's just something...

I: No, that's great. So you guys have brought up a couple of guidelines. So yes, the UK uses the NICE guidelines. We also have the European, American Heart Association... Does anyone know what guidelines we use in Ireland? Or which one do you think they should use? Or which ones we do use?

P7: The European ones.

P5: Is it the ECS or the European cardiology ones?

I: Yeah. OK, great. So we do look at them. What about, does anyone know about the HSE guidelines or DDUH guidelines? Has anyone come across those yet?

P5: I looked at the HSE ones, I think the DDUH uses them.

P7: Yeah, I think. And do you want us to name out like the different say with previous, people with previous infective endocarditis? They get.. they go undergo antibiotic prophylaxis. Those with congenital heart defects and cardiac valvulopathy as well. There's one more..

P8: Prosthetic valves I think.

P5: Congenital, previous IE and then.

P7: There's four yeah.

P8: But I think not all congenital ones.

P6: Yeah, No, it's like cyanotic ones or something like that, right.

I: Yeah. Good. So you guys are with those guidelines or the conditions you're mentioning, are you referring to the HSE ones now?

P7: Yeah. And they're the ones in the DDUH, right?

I: Great. Yeah, OK. Yeah, right. So these are the HSE ones. And does anyone know specifically about what the DDUH ones say? Or are they the same as the HSE?

P5: I just go to the HSE.

I: Yeah, OK. Any other guidelines that we know of? Has anyone come across the SDCEP guidelines for antibiotic prophylaxis? It's OK if you haven't but does anyone?

P5: Yeah, but not for antibiotic prophylaxis. I know they have like the anticoagulant ones.

P7: For MRONJ yeah but not for the DDUH, I just thought the DDUH, with DDUH I suppose it's HSE in one bracket. Try to keep it simple.

I: Excellent. That's OK. And has anyone opened the DDUH guidelines at all? About antibiotic prophylaxis.

P6: Once, yeah, yeah.

I: Oh, OK. And was that in theatre or when were you told to look at it?

P5: In Oral Surgery.

I: OK. And was that this year or was it ..?

P5: it was in the start of 4th year.

I: OK, Yeah. And can you tell me a bit more, do you remember what you found when you looked at the DDUH guidelines or was it too long ago?

P5: I remember it saying something along the lines of either 2 grams or three grams of Amoxicillin pre-op, but then I think that has changed to a certain extent, so it's a bit unclear now.

P7: I remember I was reading 2 grams, 1 hour pre op and, and then if allergic to Amoxicillin you take Clindamycin. Or yeah. Or is it either Azithromycin as well? One of those two, 600 milligrams though and again 1 hour pre-op. OK.

I: Yep, does anyone want to add to that or does that sounds about right? We all agree with that one?

P5: Yeah, I think I saw on the HSE. So it was the two grams of Amoxicillin like 30 minutes to an hour beforehand. And then if it wasn't given beforehand, it could be up to two hours afterwards for the high risk patients. And then if there's the Penicillin allergy, was it Clindamycin? Like 500 milligrams, sorry, I think.

P8: Yeah I saw 500 milligrams.

P5: To be honest, I just presumed DDUH goes off HSE, so I haven't looked at the DDUH guidance.

P8: I thought the DDUH was like 625 for Clindamycin. Something like... it was different?

(Pause)

I: You guys are all doing really good, don't worry. Yeah. So DDUH guidelines actually say refer to HSE now. Yeah. So the previous guidelines are quite dated. SO 3 grams of Amoxicillin. And

also used to have Clindamycin. So that's fine, great, thank you for that. Now, so which guidelines do you guys use? So you've all mentioned HSE. Is that the only guidelines you've been told to use in..?

P5: Yeah.

I: OK, excellent. And do you think that these guidelines are sufficient? So are these HSE guidelines enough?

P5: I suppose I haven't come across like much cases of it. So, I haven't seen, but it seems to be OK.

P6: I agree with P5 because most of the patients I've seen have not really had major heart problems. So I haven't really been too familiar with the guidelines since I haven't used it.

I: OK.

P7: I haven't come across like too many with like and then people vary sometimes with the, if you've had... previous say depending on your time, your time frame and it's been a long time, you know, you don't necessarily need the antibiotics as as.. it's not as strongly recommended some. So it varies. And then we haven't had again the same kind of quantity of people with like severe, erm say heart defects or infective endocarditis, not too many like patients that I've seen.

I: OK, yeah.

P6: I've only heard or seen one patient that needed prophylaxis and that was in the special care rotation. So I'm not too sure if we would get the opportunity to see one in our own clinics.

P7: And then a lot of times when we do see them, we're not like saying, you know, it's like you're manipulating the gingiva. It's like there's certain, certain treatments that you're actually going to be giving the antibiotics for. So I don't think a lot of times we're on oral surgery. So it's more like we were assessing the patient. So we weren't actually giving it. Yeah, but they would say, you know, whoever was there in charge, would say, oh, this person will get the prophylaxis before they get the extraction or whatever they were doing.

I: OK, Right. And you mentioned procedures that you would give it for. Do we know much about the procedures, which procedures that we would generally use antibiotic prophylaxis for to prevent infective endocarditis?

P6: Invasive ones such as any surgical procedures, surgical extractions, implant placement.

P7: Anything that like manipulates your kind of suppose gum, that could cause bleeding so even like even putting on a rubber dam or deep scaling.

I: Yeah excellent so subgingival procedures. And how about endo or root canal procedures, do we know if we need antibiotic prophylaxis for that?

P5: I think so yeah for endo as well. Because you're kind of periapical, going down that way.

P7: And you're putting on a clamp and rubber dam. So you kind of again going down, just going a bit subgingival, pinching.. bleeding.

I: Yeah, great. And these procedures that you're telling me, how do you know about them? Have you been taught, shown or where are you getting these lists of procedures from or just your own knowledge?

P5: The HSE guidelines again, they have like the list of ones you don't need it for. So it goes like just an assessment or X-rays and that kind of stuff. And then it gives like examples of like as P6 mentioned. Like surgical procedures or manipulation of gingiva. And just from the HSE really.

I: Great. And how are you accessing the HSE guidelines or how are you shown to initially use the HSE guidelines?

P5: I think just told to look them up. just keep having time, like if it's in PBL or anything on about infective endocarditis, I just look up HSE guidelines.

I: So we just search ourselves online?

I: Yeah. OK. Very good. Thank you. Now we touched on this about the recommended antibiotics for prophylaxis and the dosages. So we talked about Amoxicillin. What dose do you think we would be giving?

P8: 2 grams.

I: Yeah. And if someone's allergic, has a mild allergy, do you know what we would prescribe for a mild allergy to Amoxicillin? Or say severe allergy, either one?

P7: Someone was saying well Clindamycin. Or Azithromycin?

I: Any others?

P5: Yeah I know on .. um sorry I keep going on about the HSE. So when it says the Amoxicillin, then it says allergy, there's three other ones, there is the Doxycycline and Clindamycin. I don't know what the other one is. And then there's like a little note on the contraindications for each.

I: Yeah.

P5: One's pregnancy, Doxycycline, I think. But I'm not entirely sure for like moderate to severe allergies.

I: Yeah, yeah. OK. No, that's fine. Now you mentioned HSE a few times. That's good because we do use that here in DDUH and Ireland generally. Does anyone know when they were last updated? Did anyone hear about the last time these HSE guidelines or, or when you think they were updated if you had to guess?

P7:

2010.

I: OK, yeah. Is anyone else thinking something else or around 2010?

P6: 2012?

I: So a little while ago. Yeah, OK, interesting. Just to I guess, pop this in the conversation. The NICE guidelines actually were originally introduced in 2008 when they said not to use antibiotic prophylaxis. It was quite a long time. They've revised their guidance since, but only changed the wording. So on that topic, does anyone have I guess, any information or any thoughts on the NICE guidelines? Or not really? It's not really something that you've thought about?

P7: No, not really.

P5: No, I just saw that they didn't, like their guidelines said like they didn't need them. And then there was like, I saw like something like Sheffield University mentioning kind of going back over the NICE guidelines and kind of suggesting that they need to like revise them but that's it really.

I: And say with the NICE guidelines, in the instance they suggest not to prescribe antibiotics for patients in the same way that we do. What are your thoughts on that? So if you were to work in the UK or if someone was to ask you, or you were to meet a UK colleague who wouldn't be prescribing antibiotic prophylaxis for cardiac patients the same way we would. So if they had a prosthetic valve, or cyanotic congenital heart disease, what do you think about that?

P7: I think I would still go with giving them the antibiotics just for like kind of peace of mind I suppose mainly, and it's been around for .. they have been around for a while in a lot of places so I'll go for that.

P5: Yeah, I think the risk, but not that I've experienced anyone getting infective endocarditis from procedures I've done, but kind of knowing what we've been taught and like the cover for it and then going back to oh, don't bother giving any. I'd feel quite cautious. The risk, potential risk being there, I'd be quite scared.

I: Yeah. You feel the same. You would prefer to prescribe it. OK. And so you were in the UK, though you were working in the UK and their guidelines say not to prescribe it, would you still go ahead?

P7: Yeah I'd still prescribe it.

P6: I'd say maybe not. I think we should probably adhere to the guidelines of the country we're practising in.

P5: Yeah, I probably would agree. I'll probably end up like, even though like I have my kind of opinions on it but again, I'd probably follow whatever they're kind of recommending.

I: OK. And does anyone have any, I suppose opinions or thoughts as to maybe why NICE has not recommended antibiotic prophylaxis or is that not really something we've thought about?

P5: I assume it's the antimicrobial resistance that's like got a lot bigger and like it's a big concern. So I'd say I presume that's the only reason why. Maybe they have some research on like that, the incidence of infective endocarditis from dental procedures is low, but I don't actually fully know.

I: Yeah, that's OK.

P7: I totally agree with that as well.

P6: Something to do with stewardship.

I: Yeah, great. OK, we'll move on now. So we've already talked about the conditions and circumstances in which antibiotic prophylaxis is recommended. So I think P7, you covered that quite well and we've.. and just with the question of do we agree with the use of antibiotics prophylaxis. So I'd say universally we all seem to agree with it?

(All mmhmm in agreement)

I: OK, great. All right. So moving on to our educational experiences now at Trinity and in DDUH. So how have you been taught about antibiotic prophylaxis for patients with cardiac conditions?

P6: Maybe through PBL in fourth year.

I: Yep. In fourth year.

P5: OK. Yeah, just I don't think we've had..

P7: Was it kind of like a recurring theme though? I feel like going from 3rd to 4th.

P5: No It came up a few times.

P7: And then they were like, you know, you're going to do this again next year, so I feel like it was something that was touched on early on and then like.. kind of dished, like people talked about it even in deep.. more depth in 4th year and then you kind of got a bit of taste on it on the oral surgery assessments when people were talking about them.

P8: So there was also a question in the OSCE for antibiotic prophylaxis. So it kind of made us like know it better.

I: OK. Is this 4th year OSCE?

P8: No Third Year OSCE. It was in the medical OSCE.

P7: Yeah.

P8: Yes when they asked congenital heart conditions.

P7: Yes.

P5: And it said would this patient need it or not. Yeah.

P7: Yeah.

I: So you'd say having that assessment in third year would prompt you to think about it more?

P8: Yes.

I: OK, excellent. Do you remember having any lectures about antibiotic prophylaxis?

P6: It was only touched briefly when in the path sessions maybe in third year. But other than that, I don't remember any.

P7: Yeah. So like our path sessions were like summary kind of revision things that we had over each like maybe block, but I can't remember it being a singular topic.

P6: Yeah.

I: OK. And do you think how you've been taught about it saying in PBL, is that applicable for you in a clinical setting? Is the way you've been taught easily applied in clinical practice?

P5: I would say no. This is probably just PBL in general, but I think a lot of the guidelines like throughout all fields of dentistry, we touch on them in PBL. But you're not definitely like.. every like we're teaching ourselves. So I wouldn't be fully confident that I have found the right guidelines to use and then we're just kind of going on off that. So I would never be fully confident in, I suppose the guidelines.

I: OK. Would everyone agree with that or?

P7: Yeah, because the guidelines, it's like we sit down, talk about it and then like when it comes to like the guidelines, it's more like, oh yeah, just read the guidelines..make sure you know that so you don't actually kind of go through kind of situationally when they could come up or like, so you're just left to your own devices to kind of read through them. So if you.. I don't feel like it's you don't do it practically then like you remember more situations when someone tells you so I don't think it's like that. That you asked, is it practical? Is it? I don't think so. Probably I would agree with P5, yeah.

I: And have you experienced antibiotic prophylaxis in PBL.. is that in 3rd and 4th year or when are the PBL sessions or is it sort of just once, how often does it sort of come up?

P8: Two or three times, I think?

I OK, two or three times in PBL.. and this year has it come up at all and and now that you're in final year?

P5: No

P7: No

P6: No

I: OK, that's interesting. And now we've sort of touched on this before, but I'd like your own experiences of prescribing antibiotic prophylaxis .So this is outside of just PBL now, this is more your experience with patients, your own patients. So has anyone had any experience with prescribing antibiotic prophylaxis to prevent infective endocarditis here?

P5: No

P7: No.

I: OK. And have we seen someone else prescribe for their patients or have we observed it in say oral surgery or not really?

P6: Once in special care.

I: Oh yeah, you mentioned you saw it in special care. And do you remember what the patient had? Was it a cardiac condition or?

P6: I can't remember exactly what it was, but she did have to take Amoxicillin before they started doing her treatment.

I: OK. And has anyone else seen someone prescribed it for someone?

P7: Maybe once in oral surgery.

I: OK good. Alright. so we're moving on to your perceptions of the education you've received during dental training, so moving a little bit away from that now. So could you describe any gaps you feel you have in your knowledge with respect to antibiotic prophylaxis prior to dental procedures for patients with cardiac conditions?

P7: So gaps in knowledge, maybe the timing sometimes is it like is it you know, an hour and then just two hours after. It varies with some people so that would be one.

P5: Um, and I kind of touched off it, but if there is a Penicillin allergy, the alternatives and like when to use them, when not to use them, I think. I just know the names of them to throw out there, but if you actually said here is a patient with Penicillin allergy or pregnant whatever, I couldn't tell you for definite.

I: So it's the time that we mentioned and the choice of the antibiotic potentially as well. Would there be any other gaps you feel that might be present with your understanding of antibiotic prophylaxis or cardiac conditions?

P6: I think the opportunity to apply what we learned in PBL. So little of us has had a patient, who would fall under requiring antibiotic prophylaxis.

P7: The cardiac conditions as well, because they're a little confusing. And yeah, I would say them definitely, yeah. Because, you know, it's again like you read about them, but then you don't necessarily have experience that you don't, you do the physiology a little bit early on like so yeah, I would say definitely the various cardiac conditions.

I: That's a very good point. So would we be prescribing antibiotic prophylaxis for say someone with bypass surgery or a stent? Do we know whether we would?

P6, P7, P8: No.

I: Yeah, OK. And do we know why maybe not for a stent, but for someone with a prosthetic valve? Or someone with a congenital heart disease?

P5: Not fully. Yeah, I just, I remember kind of falling into that trick before, like not knowing much of the difference between a valve and a stent and then kind of learning that you don't give it for the stent. But I suppose it's the valves is like a kind of prime site of where...

P7: Harbours bacteria.

P5: Yeah, but then I wouldn't actually be able to give you an answer why you don't for a stent, because surely if that's a prosthesis as well.

I: That's interesting. So I'd say in addition to the gaps we've mentioned potentially just the cardiac conditions themselves and why we're prescribing. Yeah. And how it relates to infective endocarditis. OK, great. Now this is the, I guess the question about the teaching. So how would you rate the teaching you have received regarding antibiotic prophylaxis to prevent infective endocarditis? If you had to rate it.

P5: Well if I had to rate it...

P7: But it's it's we've kind of taught ourselves, yeah.

P5: That's what I'm saying, if I have to rate it bad I'd be rating myself. Yeah, like it's yourself taught really.

P7: I think just the way we do our things like through the PDL a lot of it is self driven umm yeah, it's kind of up to you. And, and then you mentioned lectures..

P6: Well actually it's not. So even then it was barely touched on.

P5: Yeah. So going off that I'd rate it poor.

I: Yes.

P5: Like even a lecture just on different guidelines like and kind of talking through them because they're guidelines for a reason, they're quite important like I think would be something.

P8: It would be good if the lecture is done by a dentist or oral surgeon because the last lecture we had was done when we were having the pathology lectures. So I don't think she was a dentist. So I think having a dentist or an oral surgeon would be more relatable for us.

I: OK so having a clinician would be preferred. So have you had experience in PBL where you haven't had a clinician teach it for you or?

P7: Oh yeah many times.

P8: Yeah they're usually not dentists.

I: Right and is that even in fourth year or is that just more the earlier years?

P7: Oh no because say out of say there are 10 sessions, say there's seven times it's a dentist, three, maybe that's fair right?

P5: Some I don't know, some I wouldn't be sure if they're.

I: OK, fair enough and you mentioned that PBL is self-taught. So in terms of antibiotic prophylaxis, do you feel that PBL in general, so other topics also, you would feel like it was more self-taught or do you feel particularly with antibiotic prophylaxis that's something that is a bit more grey or a bit more self-taught less, I suppose supportive teaching in that category or is it in general PBL?

P8: In general.

P7: In general. OK, well, maybe even a bit more so 'cause it's a guideline and it's like go, get do it you yourself.

P5: I feel like that antibiotic prophylaxis, it's one of the guidelines we've known better than yeah.

P7: MRONJ or...

P5: Yeah, or even SDCEP or the anticoagulants would be more iffy than...

P7: Fair point.

P5: I feel like maybe because it came up two or three times and like the OSCE as well, we were made to learn it a bit better.

I: OK.

P8: And I think the guidelines are quite easy to read and quite clear. So it does help us understand better just by looking at the guidelines.

I: OK, good. And in terms of your preparedness to enter the workforce, how would you say the teaching, how prepared has it made you for say next year when you're going in and working independently?

P5: Overall like or?

I: Well, I guess in terms of antibiotic prophylaxis, prescribing?

P7: You prefer to just keeping it to antibiotic prophylaxis?

I: Oh yeah so how prepared is your teaching for..

P5: Yeah, I would say not fully confident, I'd probably be giving someone like a ring or like asking for a second opinion before I did it but I think I'd be like 90% there, being like this is the case where it's needed but that last 10% would be like asking someone, am I in the right here?

I: OK, and who do you think you would ask?

P5: Probably someone if I was in a practice with another dentist, someone who's been working longer than like yeah.

P7: Principal dentist.

I: And let's say you were working in a clinic where you didn't have a senior dentist there, or you were by yourself potentially, do you think you'd feel prepared or is there someone else that you might ask to make yourself feel more certain?

P8: I think I would just search up the HSE guidelines and follow it.

P7: Yeah, I think I'll just look at them. Yeah, just follow the guidelines and then do that.

P6: Or consult the GP, the GP just to double check.

I: OK, Yeah, OK. And I guess similar to the last question now, how confident are you with prescribing antibiotic prophylaxis? So you mentioned maybe 90% confident. How about

everyone else in the room? How confident would you say you are in prescribing antibiotic prophylaxis, say if you had to do it tomorrow?

P7: I feel like I'd be there, thereabouts. I think just to be able to go and say this is, I think you should take these antibiotics for this.

I: And would you ask the patient, say you were in a private practice setting, would you have them take the antibiotics at home? Would you write a script? Would you hope that the practice has it there for them to take? Or how would you manage that?

P5: Yeah, that's something that I wouldn't know because like when they get it, you prescribe at their last visit, they go to the pharmacy and get it and then take it and but then it's like will the patient remember. And then is it also the case where you prefer to watch them take it and kind of leave them in the waiting room for like 30 minutes plus? And I wouldn't know, I'd probably be again asking around.

I: Yeah, fair enough. And do we know what's done here in DDUH? What would happen here if a patient needed antibiotic prophylaxis?

P6: They'd have to go down to the theatre. One of the nurses are watching and then they'd be timed, the one hour pre-op. Is that how it works? Because I think Doctor [name of lecturer] sent an e-mail about how to organise um getting antibiotic prophylaxis but I've never done it.

I: OK, Yeah, good. Yeah, that's what we would do here. It's administered in theatre, but worth, I suppose, considering what you would do say in private practice or if you were in a clinical setting, what you would do there. OK, now what do you think would help increase your confidence or if you feel already confident, what else could just make it easier for you to understand prescribing antibiotic prophylaxis to prevent infective endocarditis? Do you think anything else would be able to?

P7: Maybe in day theatre, actually have whoever is coming in on those days a list of those people and then it's up to the attending students to actually do it for them. And then it kind of plays a bit of an onus and I suppose gives them a bit of ownership that they have to know why. You know, I think that would be a good idea. And then the fact that you've just done it a couple of times, it's just very much gives you confidence.

P5: I agree because I feel like most things in dentistry once you do it a few times you feel like more confident in yourself, the exposure to it and even like I suppose from the four of us like we're seeing, it's not that common. So even going through like hypothetical cases and like just asking, you know, like not even maybe like an interactive lecture and they put up a case and you kind of have to be like, is this person umm for it or not? And which one you'd give, that kind of thing would get you more..

I: So what I'm hearing is application in day theatre, just being involved in that, more interactive lectures will be helpful.. is there anything else that we think maybe would help?

P5: I think with guidelines in general, I don't know when like you asked earlier even like when were they updated or whatever, just something, a notification even that like there's new updates or something because I have no idea where that is.

P8: Maybe send it through email to the whole hospital whenever there's an update?

I: OK. Yeah, some updates. Yeah. Good. And how about PBL? Do we think there could be anything, any room for improvement to PBL?

P8: Lots.

P5: Yeah.

P6: More guidance in PBL in general.

P7: A lot of the references in the back of the PBL where you're told to go look for things are really outdated. They're really old. Yeah, so and they're not actually that, yeah. So you're going looking at something that's actually really difficult that won't access. And then two, there's already a newer one and so it's changed. So that's the that's sort of the thing. If you're going to keep the PBL, you could improve it that way, yeah.

P5: Or else even if it was a block that involves guidelines like PBL might be OK for like teaching yourself the different heart conditions and kind of having a bit of a background but when it comes to the guidelines, I think like we have come across them ourselves, but then like a final

review lecture with someone who's really like on top of that, maybe like, you know, an oral surgeon or something in terms of in dentistry and to kind of kind of, I think back our knowledge as well, you know, like.

P7: Solidify.

P5: Yes, solidify a bit more.

I: OK great. And P7, I think I heard you mention if we were to keep PBL, what are our thoughts on having it at all? Is it something that you think would be beneficial to be removed from the curriculum or just kept, but I suppose improved with updated references and maybe more clinicians in those sessions?

P6: Aye, could keep it, but with more guidance because it is an interactive session. Yeah, So it's better than sitting in.

P8: Yeah, I think you can keep PBL and then try to find a balance between PBL and lectures. So have like less PBL time and then have more time, a bit more time for lectures at the end of each block just to make sure we are all learning the same things. And then have all the important resources put on blackboard so we all know and we assess all the same articles and guidelines.

I: OK, great.

P7: Yeah and it depends who takes your PBL session. So like most of the times, a lot of times it can be just rubbish because the person who's actually taking them doesn't really care. The students understand that, so there's no standards and then it becomes like, we're just all reading. We're just like all going in, relax and googling whatever. And then but then there's some tutors who will actually hold it to a really high standard and they'll actually ask you questions and they'll quiz you and then they'll actually force you, you'll actually be like, oh, I actually kind of have to make common sense of this and then rationalise it. Then you're like, oh, that was a really good session, so there's like different ways, it is really good sometimes, but it depends who's taking it.

P5: OK, yeah, I'd say what P8 was kind of saying, the hybrid kind of like well no not the hybrid one, but where a mix between hybrid and lectures because I think whenever we'd have pathology block in PBL, we have a lecture to go over the whole block and like everyone's like they're really good, like just going back over the gaps. I feel like all their topics that we haven't had, like all the gaps and knowledge, to be honest.

P7: Or doing it without screens because that lady, she genuinely made us do that. Yeah and it actually worked out way better.

P5: It's just a lot of work then when you're like kind of busy with everything else.

I: Do you mean no screens, no computers or what do you mean by?

P7: No computers, yeah, we all just read off them yeah.

I: OK, thanks guys. All right so on to our last two questions now, what changes or additions to the current school curriculum would improve your understanding and knowledge? I think we've covered that, so with lectures, maybe how we could improve PBL, so is there anything else particularly with the school curriculum that you think would benefit? I just wanted to also bring it back to PBL, I think it seems that there's a bit of variability, there's a bit of variation with your PBL sessions because P7 you mentioned that sometimes you'll have, it depends on who you have. And does that mean that if you're in different groups, would you have different tutors and would you have different experiences, do you think?

P5: Yeah, for sure because it just depends on the topic, one person might be like really knowledgeable in that I know for like we were doing pathology last year and we had a guy, he was doing like Max facts as our PBL tutor so we'd have like really good sessions where it's like other groups would be coming out with like they'd be out in like 10 or 15 minutes. Yeah, but the knowledge things are very different, you know?

I: And so the other groups would never get the crossover with the tutor you had P5?

P5: And not on that topic, they'd probably get him for a different. You switch off for every block OK, but it might be the next block might be a subject that he's not as knowledgeable on, so it's just kind of the luck at the draw really.

P8: OK. I mean, there's tutor guidelines that they're supposed to follow, but when they have different levels of knowledge, like you just learn more with some tutors.

I: Yeah. OK, great. All right. So getting to the end now, is there anything else anyone would like to add or we haven't talked about?

P5: No that's pretty good.

I: Great. Thanks everyone, just going to stop the audio recording now.

FOCUS GROUP TWO TRANSCRIPT 26/11/24

Interviewer:

I

Participants: P9, P10, P11, P12

I: So we'll just begin with the first question and it's what do you know about antibiotic prophylaxis for cardiac patients within dentistry in Ireland, Australia and other parts of the world such as the UK?

I: So what do we know about it? Just antibiotic prophylaxis for cardiac patients?

P9: Given before invasive dental procedures where there's a risk of bacteraemia.

P10: Typically given for patients that have a history of infected endocarditis or rheumatic fever or have had a history of like a valve placement or hepatic cardiac transplant or something.

I: Yeah, OK. We mentioned a few conditions, are there any others?

P10: Congenital heart defects if they're unrepaired, if it's within six months of them being repaired or if there's a defect around the repair with prosthetic material.

P11: And with cardiac transplant patients, it's only if they develop cardiac valvopathy within first six months after the transplant, I think. And we said previous infective endocarditis.

I: Yeah. OK, good. And is that for all parts of the world do you think is that in the UK as well? Would they be using antibiotic prophylaxis there?

P10: I think those are the Scottish guidelines, SDCEP ones. So I think they could use those as well but not too sure.

P9: Do Australia follow the NICE guidelines instead then? I'm not sure.

I: OK. And now we're talking about guidelines you mentioned SDCEP. So what you were saying initially about the cardiac conditions and when you would prescribe it, were you referring to the SDCEP guidelines or which guidelines were you guys referring to?

P12: I think the American society of cardiac patients or cardiology I think are the ones that we use in this hospital, but I could be wrong. I'm not 100% sure.

P11: I'm not familiar with who lays out the conditions, but I am familiar with the different organisations like the AHA and the British BSAC and the NICE guidelines for, on like the dosing of prophylaxis. OK, But I'm just familiar with the DDUH criteria, which doesn't follow the NICE guidelines. I think it might, but I'm not confident.

P12: I think so too.

P10: Yeah, but I think everything mentioned as well is also on SDCEP ones. So I don't know how much cross over there is.

I: OK, there's quite a few guidelines, it's great. So just as a consensus or what we all think, so which guidelines do DDUH follow? Is it the NICE or is it SDCEP? Oh, we're not quite sure?

P10: I thought it was SDCEP.

I: Well, you mentioned American Heart Association?

P11: Yeah, I think P10 is right in saying that in terms of the dosing of the drugs themselves that we use, I think it's the American Heart Association Guidelines for AHA guidelines, and I think that's the ones I'll be following here.

P10: But I was going to say that we follow the British ones, I think .But I'm not sure.

I: No, that's OK, guys. Yeah, that's totally fine. There are a lot of guidelines. And would you have any or all kind of agree that those are the guidelines, you mentioned SDECEP? (motions to P10)

P10: Those are the ones I've studied personally.

I: So, OK, great. And so in the UK, do we know what they would be using or we're not really so bothered what the UK use?

P11: I wouldn't know.

P9: I don't know.

I: Yeah, OK and has anyone heard of the NICE guidelines?

P9, P10, P11, P12: Yeah.

I: And do we know how they might be a bit different, so the UK do use the NICE guidelines, but do we know how it may be different to ours or is it fairly similar, do we think?

(Pause)

P11: OK, probably not very confident on that.

I: And that's totally OK. That's fine.

P9: If I had to guess, probably to do with the medication and dosages but don't actually know.

I: OK, fair enough, great. And which of these guidelines do you guys use at the moment? So I think you mentioned SDCEP, right? You mentioned American Heart Association, excellent. Any other guidelines we've used and it's OK if you haven't used them, that's acceptable as well obviously, but are there any other guidelines that we use?

P11: The BSAC, are they guidelines? Am I getting the letters right? Or are they the same as the NICE guidelines?

I: I'd say NICE would be the guidelines, but I'm, I'm assuming you're referring to British Society of Cardiology potentially. And there is a European Society as well that we haven't mentioned yet. But I suppose in guidelines it's an association or society and then there are guidelines that they follow or the official guidelines. So NICE would be their own subset of guidelines and we actually also have HSE guidelines in Ireland. Does anyone know about them or have we heard about them?

P9: Yeah, I have heard about HSE guidelines.

I: OK.

P9: I don't know exactly what the difference is. I know the drugs they follow like Amoxicillin, Cephalexin, Clarithromycin and um and yeah, that's all.

I: OK. Yeah, very good. And has anyone else? Have you guys come across the HSE guidelines or?

P12: I've heard them referenced but I haven't physically read them myself.

I: OK, yeah.

P9: I agree.

I: And do you feel from what you've seen that these guidelines are sufficient? Are they enough to kind of guide you when it comes to prescribing antibiotics? Do we think they're enough?

P9, P10, P11, P12: Yes.

P11: Yeah, they're all laid out quite clearly, OK. So there isn't really a doubt who should or shouldn't. OK. And then I think if there is a doubt, then you will have to contact their cardiologist.

I: OK, great.

P11: And the dosing is quite clear for the different ages as well.

I: OK and when we're saying that the guidelines are clear, which ones particularly do we think are quite clear or do we think they're clear in general?

P10: The SDCEP guidelines, those are the main ones I've looked up. I think they're quite clear.

I: OK and because we've brought up SDCEP a few times. Do we know how they might differ to the American Heart Association or the HSE guidelines, or do we think they're pretty similar? Are there any differences in dosage or in the type of antibiotic or would we say they're pretty much spot on and similar?

P10: Do they recommend 2 grams of amoxicillin pre op as opposed to three grams that the, the American Heart Association recommends 2 grams, whereas the Scottish and NICE guidelines recommend 3.

I: Very good.

P9: The HSE is 2 as well, I think the HSE guidelines are two grams.

I: OK great. All right, so we've kind of mentioned already, but can we talk more about the recommended antibiotics for prophylaxis and the dosage? So we've said Amoxicillin 2 grams and someone mentioned SDCEP which is 3 grams. OK, NICE, we're not sure about or? And what if we have a mild penicillin allergy? I think you may have mentioned 1 P9?

P9: Clarithromycin 500 milligrams.

I: Yep. So is that for mild or severe? Is there a difference or would we just give the same? Mild or severe Penicillin allergy? Could we give Clarithromycin for both or is there a difference?

P9: I think mild might be the Cephalexin and then more severe, Clarithromycin. Yeah I know you can use Doxycycline as well but I'm not sure what the difference is.

I: OK.

P12: I think I've also seen Clindamycin 600 milligrams, but I'm not exactly sure why we do Clindamycin over Clarithromycin.

I: OK, great. Any more to add or is that probably all the ones that we've all come across?

(Participants nodding)

I: OK, excellent. Now we briefly touched on this anyway, but it's in what particular conditions or circumstances that antibiotic prophylaxis is recommended? So you mentioned previous infective endocarditis, we mentioned cardiac transplant in the first six months.. which are the other ones?

P11: Valve, prosthetic valve, congenital heart disease which hasn't been repaired in the previous 6 months or if it hasn't been a completely successful repair if there are still remaining defect.

P10: Unrepaired cyanotic congenital heart disease.

I: And what about rheumatic fever? Do we know much about rheumatic fever or when to prescribe or we don't?

P10, P12: We don't.

P9: We don't provide antibiotic cover.

I: Great, now do we agree with the use of antibiotic prophylaxis for certain cardiac conditions?

Is that something that we're all in agreement with?

P9, P10, P11, P12: Yep.

I: So we all agree? What if I told you that the NICE guidance in the UK actually do not recommend antibiotic prophylaxis to prevent infective endocarditis? What are your thoughts on that, say if you were going to work in the UK and their guidance is to say not to prescribe antibiotics? What would you think about that?

P11: I've read that whether you give it or not, there's still a risk of getting infective endocarditis, so maybe it's to do with that even if you give it, you're not 100% covered.

P10: Also that prevention is better than cure in the case of infective endocarditis and it does carry a high mortality and morbidity.

I: So I would agree with you definitely.

P12: But I think also the increased risk of antimicrobial resistance poses a threat to like the future of medicine. I would also, I would also understand why as P11 said, maybe they found that it

wasn't as effective in preventing the onset of infective endocarditis as we may have proved to thought in the literature. So I would depending on where, if I'm working in the UK, I think I will follow the guidelines, the guidance of the country that I'm working in.

I: OK, yeah, that's interesting point. And would you all feel the same? So we all agree with the antibiotic here, but if you were to go to the UK, would you then not prescribe?

P9: Probably feel tempted to prescribe anyway, just kind of selfishly as a cover for myself if something was happened, but I'm not sure whether I would or not.

I: Yeah.

P10: Especially depending on the extent of the invasiveness of the procedure. I think there's obviously a difference between like dentoalveolar/ periodontal surgery versus placing a subgingival clamp and the amount of bacteraemia that you could be introducing.

I: And so you mentioned the subgingival procedures and bacteraemia. So which other procedures or what procedures would you be looking at prescribing antibiotic prophylaxis for to prevent infective endocarditis in dentistry.

P11: Extractions.

P9: Root debridement.

P10: Subgingival root debridement. Yes and placing a a clamp subgingivally and a matrix band as well.

P11: If you're lifting a flap for whatever reason.

P10: Any manipulation of soft tissues.

I: Excellent. And these procedures, how do you know of them? Is it because you've been taught, shown or you've just thought of them or where are you getting these procedures from?

P9: Probably from the hospital guidelines that we've been taught, it has them all listed.

P10: Yeah, I have a feeling that these come from the HSE guidelines.

I: OK. And so you mentioned the hospital guidelines you've been shown? Can you talk a bit more about these hospital guidelines that we have?

P9: Yeah. I'm actually confused now as to which they're based on. I know we have hospital guidelines that we can access from the computers in the hospital and that's kind of where we've based when we initially learned about this. That's what we learned from, are those guidelines.

I: And has everyone else gone through and seen the hospital guidelines?

P9, P10, P11, P12: Yep, Yep, Yep, Yep.

I: And have you guys seen them on antibiotic prophylaxis?

P11: Yeah, they give a list of procedures, more invasive procedures you should give antibiotic prophylaxis for then those that aren't invasive.

I: OK and our guidelines up to date from DDUH in terms of antibiotics, do we know if they're up to date? It's okay if you don't, but do you think they're up to date?

P12: I would assume they are because the software that you use that we use is the Hubsend I think software that's constantly being updated.

I: OK. In terms of your educational experiences, we're going to go to sort of, that area now. How have you been taught about antibiotics prophylaxis for cardiac patients in dentistry?

P9: Think through problem-based learning. And then apart from that, it's come up kind of sporadically in lectures um.

P10: Through problem-based learning.

P11: Yeah, yeah.

I: And which year levels would you be coming across?

P10: So third year maybe?

I: OK.

P11: I think they just would have maybe told us to work with the hospital guidelines.

I: OK.

P10: And it would have fallen under a problem on infective endocarditis specifically.

I: So you guys are in final year now. Did you come across it in fourth year as well or is it just third year?

P9: It was probably revised in fourth year again. Yeah, in probably based learning again.

I: OK and how about this year, have you guys come across it yet?

P12: Other than the clinical aspect down in clinics with a consultant or with one of the post grads, we revise that in a seminar style but we would not get it again through problem-based learning.

I: OK, And can you tell me a bit more about problem-based learning or how is it taught in problem-based learning?

P9: So we're given a problem the problem would probably have been somebody with a certain cardiac condition is going to get an extraction and you're the dentist and then you kind of discuss the background of how that cardiac issue would impact your dental treatment. And then if you should prescribe anything what the guidelines are and how you would follow that.

I: OK.

P10: It will probably like allude to that by asking um like as a dentist, you need to take any of their medical history into consideration before carrying out a procedure. And are there any precautions required? It would be up to us then and led by the tutor and their guidelines to suggest that we might need to look at prophylaxis for their condition.

P11: But it's all like a discussion among us. And then if the tutor needs to step in, they will. And so we go after our own research and then come back and discuss it.

I: OK.

P11: But some tutors, I can't remember, like a lot of them wouldn't step in and kind of you'd be reading one thing and someone would be reading a different thing and you don't really know who's saying the right thing so it wasn't always very clear.

P10: OK so that might be why we're coming up with so many different guidelines because we would have gone off and researched infective endocarditis guidelines and find different ones

and then because we're not 100% sure what guidelines the dental hospital are following, um we wouldn't have known exactly which ones to specifically go and look up the HSE ones.

P12: And then the reading list sometimes is very outdated. So we are provided the reading list but some of the guidelines are not updated guidelines. So for example, I know SDCEP guidelines are frequently updated, whereas the reading list could be one from 2016 for example, versus one that could be out from 2022. So yeah.

I: OK, very interesting. And so just on when you're mentioning just being updated, do we know when the HSE guidelines were last updated?

I: So have a guess as to when they may have been last updated?

P9: I don't know to be honest.

P10: I'm not sure.

P12: Not sure.

I: So just going back onto PBL, so just to do a segue there and you mentioned that may be outdated. Do you think the way you've been taught and PBL for prescribing antibiotics, is this really applicable in a clinical setting? Do you think the way it's taught, is it sort of practical? Do you feel like it is something that could help you apply, to say a clinical setting?

P11: It's practical, but it would have been nice if we got a lecture beforehand so that we are all 100% certain on the exact guidelines and then to come in and discuss maybe different cases of okay, what do you prescribe, what do you not, how much would you prescribe?

P10: I also think it provides you with, like it equips us with the skills to on the spot research, which guidelines are appropriate for our workplace and our patient rather than being handed, you know, handheld and one set of guidelines under one roof provided to us, we're familiar with all the other different guidelines and that we can research quickly, which ones we need to follow?

P9: I agree, but I think it will be better if they then kind of confirmed which ones we should be following because how are you supposed to know whether you're doing it right if someone doesn't tell you?

P11: You know, that's a very big thing to prescribe antibiotics, like we're constantly being told to not give them out loosely but yet I don't really know if it's 100% clear when we need to give them or not.

P10: I've also had an experience with older supervisors recommending contacting the GP to see if the patient needs antibiotic prophylaxis because of a history of rheumatic fever and so even though it's not in our guidelines, they were encouraging me to investigate further and possibly prescribe.

I: OK and do you think just from what you've said, has that been everyone else's experience or is there quite a big variation between who teaches you, whether it's like you mentioned, an older person or is it a non clinician? Is there a variation on who teaches you this?

P9: Yeah, even between the tutors in PBL, if you get one tutor, they might say one thing and another could say another.

P11: Like everyone has their own experiences and that's what they teach us but in here we should really just be taught the guidelines and be able to then make our own decisions based off those.

P12: And then a lot of the PBL tutors are non clinicians so they would be mainly allowing us to go through the PBL process, but we would have the clinicians in our clinics who may not agree with the guidelines and we're being taught in PBL and then they would tell us, no, you should not be using that guideline, this is the guideline you should use instead. So that I feel like that's where the downside of it is. And then I also agree with you guys about how PBL is a really good method of delivery but I think guidelines themselves, it's a skill in itself to be able to look through a guideline and pick up the important changes that are in a new updated guideline and I find that as a third year student, I don't have the clinical discernment or skill to be able to do that accurately myself and to be able to realise when, what the differences are between guidelines or when there have been changes. So it would have been nice if that was delivered to us before and then maybe in a fifth year level, be able to look through them ourselves.

I: OK. And you mentioned something that sometimes clinicians don't agree with the guidelines taught in PBL. Do you remember a specific situation or which guidelines this may have been, where there may have been confusion or differing opinions with guidelines?

P9: I think particularly one that comes to mind isn't infective endocarditis, but more so bisphosphonates but that's a big bowl of contentment, like nobody really knows what's going on there. But I think the infective endocarditis ones are a bit more standardised, people would agree on those more.

P12: I agree.

P11: I've had similar experiences with bisphosphonates. Everyone's telling me a different thing and it gets really confusing. But I've never had a patient who's at risk of infective endocarditis personally.

I: OK.

P10: And I don't think, I'm not sure if there's guidelines surrounding this and this might be of no use but the prescription of antibiotics in dry socket when bacteria isn't implicated in the cause of dry socket and I've seen people prescribe antibiotics for that when it mightn't be necessary.

I: OK. That's all interesting, in terms of sticking to I suppose prescribing for infective endocarditis and I suppose, would you say that, that is clearer than the other circumstances?

P11: Yes, 'cause there's just a nice list and if you stick to that list then it's very clear than something else.

I: OK, yeah, that's good. Now, what are your experiences of antibiotic prophylaxis to prevent infective endocarditis within a clinical setting? So do you have any patients that you've prescribed it for?

P9: No.

P10: No.

P11, P12: No.

I: And have you guys seen it being prescribed for any patients in another setting, say special care or oral surgery or in another clinic?

P10: No.

P9: No.

P12: I have in day theatre, we had a patient who had a history of infective endocarditis and they were given the medication Amoxicillin 3 milligrams or 3 grams, I'm not really sure? And one hour before the surgery and that was pretty much all of the experience I've had with it.

I: And that, that would have been this year and is it just the one time?

P12 nods.

P11: I've seen it, kind of in assessment in oral surgery. Patient came in and she had a pretty long history of cardiac issues. I think she had ASD or BSD or something that didn't require prophylaxis but she kept insisting on it and because of just how many surgeries she had and she was just really scared of something happening. So I think then we just had to really explain to her that she didn't really fit into the guidelines and so she, but she came with the proposition for them, rather than us saying it to her.

I: OK, yeah.

P9: I had a similar experience in oral surgery as well, actually, where someone had a heart condition that didn't fall into the guidelines and had been getting antibiotic prophylaxis for years and then was really confused as to why they wouldn't be getting it, for whatever procedure was going on.

I: OK, that's very interesting. And how did you find it best to convince the patient or did you guys end up convincing the patient?

P9: I didn't convince the patient, no. It was more that I brought it to the oral surgeon and the oral surgeon kind of laid out what the guidelines are now and explained that under our guidelines they're not at risk of infective endocarditis.

I: And did the patient respond well to that? Did they?

P9: Yeah, yeah he did actually. He was happy enough. He was very easy going anyway. It was more just confusion.

P11: Same for me, just she didn't speak any English, so it's a bit more difficult to communicate it through Google Translate. So I think we had to call her daughter who spoke English and then explain it to her and then she would explain it on the other side and eventually she understood it. And we advised her on the day of the extractions to come in with her daughter or someone who spoke English, just again, if she had the same questions to explain it again.

I: OK, So what I'm hearing is guidelines can actually help convince or can reassure patients they don't need antibiotic prophylaxis, in some circumstances?

P11: Yeah

P9: Yes.

P12 nodding.

I: OK, good. Now please describe any gaps you feel you have in your knowledge, with respect to antibiotic prophylaxis, prior to dental procedures for patients with cardiac conditions. So where you may have gaps in your understanding or knowledge?

P12: Definitely knowing where the information is coming from.

I: OK

P12: Because of course I think we all know information about the guidelines but we don't know which guideline it's from and I think it'd be good to know exactly oh, I'm getting this piece of information from this guideline or this other guideline. I think that's where my gap maybe is and yeah, second guessing which guideline if a patient did ask me or what guidelines are you using, I think that would look quite bad if I wasn't aware which guideline I was specifically referring to.

P11: Or even if you refer to a guideline and then if they went and looked it up and saw that Ireland doesn't actually follow those, that would also look bad perhaps if we were able to figure out which ones we're supposed to use.

P9: Yeah, I agree.

P10: Maybe management of patients who need multiple procedures and multiple, have to receive cover multiple times. I mean, is that appropriate or like the amount, the number of procedures you could perform in one visit and maybe how long that date they're covered for the antibiotics.

I: And do we feel there are any gaps in understanding why we prescribe antibiotics for certain conditions?

P12: I think, I personally don't know the literature that supports the use of antibiotic prophylaxis used for infective endocarditis or any of the other disorders that were listed or conditions that were listed. So I think it would be good if we were given maybe some of the literature that supports its use or the literature that supports against its use to know exactly why we, whether or not there is enough evidence to suggest its use.

I: OK so more literature, and say in PBL when you mentioned sort of outdated references. Is it because the literature given is outdated or you're not getting any literature at all on the reasoning for prescribing antibiotic prophylaxis?

P11: We get maybe a really long list of references so it's actually really hard to even look through them and see which one is most appropriate. And then even if you do finally find one, it's normally just really old, it's tough to find better one.

I: And so we mentioned, you know, cardiac transplant for the first six months, we mentioned not for rheumatic fever. Do we know or do we understand or do we feel there are gaps in why we prescribe not for more than six months for cardiac transplant, why we don't prescribe rheumatic fever? Are there gaps in that?

P9: Yeah, I'd say my cardiac knowledge overall is very poor and I wouldn't actually be able to tell you exactly why we do or don't. I'm only able to recite the guidelines to say that it should be this or that, but I couldn't tell you why.

P11: Honestly I don't fully understand why these specific patients are more at risk of infective endocarditis, what the physiology is going on.

P12: I have a very small amount of knowledge and that's from the cardiac physiology lecture in 3rd year that touched off of infective endocarditis and a little bit on rheumatic fever as well. But the guidelines were not associated with that lecture so that's not where we were taught about antibiotic prophylaxis but I think it would have been of use while we were studying pathophysiology to put in the guidelines there so that we know we can ask the questions then and also why we're doing that.

I: So the link between the guidelines and the understanding?

P12: Yeah.

P10: I feel like I've been able to apply a bit of that to the guidelines myself, to make sense of them.

I: OK. That's very helpful. Now how would you rate the teaching you have received regarding antibiotic prophylaxis to prevent infective endocarditis?

P11: On a scale of 1 to 10? Or?

I: Yeah, you can say 1 to 10, you can use words, however you want to rate it.

P11: I think it's been quite poor. OK, I think that's evident in this room. We're all looking at different guidelines, mixing and matching. And if we all have the same, we were all on the same guidelines, that would also reflect better teaching, I think.

I: We're all in agreement it's quite poor?

P9: Yep.

P10, P12 nodding.

I: And if we were to suppose knuckle down and look at to why it might be poor, is it PBL? Would PBL be a factor having to look at updated guidelines, not being told which guidelines? And how about the lectures? How could we improve that or what are the issues of lectures being given?

P10: Feel like it's the lack of lectures that we've been given on the topic that you know, we studied it in PBL but a follow up lecture confirming what guidelines we used would have been really beneficial.

P9: I think we're overwhelmed in PBL as well because the lectures that we did get, I don't think came until a while after PBL possibly and you're kind of overwhelmed in PBL learning all this new stuff about cardiac disease and different defects and you don't really understand it. So it's hard to know at that point what the most important things are to take away and then when

guidelines are being thrown at you as well, it's just overwhelming, so I think if they have lectures either before PBL or something or at the end of PBL.

P12: I think also the method of examination. I find that in second year and 3rd year when we were learning pathophysiology, the guidelines should have been the high yield information that should have been examined rather than necessarily the ins and outs of certain cardiac conditions because then they would be able to see the gaps in knowledge within a class group if people are unable to state the guidelines in a clear, concise manner and show their understanding. So I think maybe improvement on the examination.

P11: I do think also at the time, because we were in second or third year, I didn't fully understand why guidelines were important because I hadn't been treating patients or especially not treating anyone with severe cardiac disease to know like OK, no, this is actually irrelevant. I just thought it wasn't that relevant because again, it was kind of lac over in PBL. So again, if it was maybe just highlighted with a bit more importance.

P10: And an understanding that the guidelines that we follow in the hospital, the DDUH guidelines are based on some larger guidelines and so we might be familiar with hospital guidelines, but not actually sure where they're coming from, which is probably the more important guideline to be familiar with.

I: What I'm hearing is there's quite a bit of confusion on which guidelines and we need clarity whether that being in lectures or in PBL?

P9, P10, P11, P12 nodding.

I: And we mentioned having more lectures, when do you think they should be given or by who, would be helpful? Would it be a PBL, you know PBL tutors, who would it be or when would it be, do you think?

P11: We do get some lectures from some oral surgeons or even the oral medicine department? Someone in that field kind of who's constantly dealing with this sort of prophylaxis should be the ones teaching us because then they could also give us a lot of maybe backstories to help us understand and really solidify in our heads.

P12: I understand it may be difficult to allow for a large lecture series within the kind of program that we're in, that is very clinical based. But yeah, like the girls said, having clinicians that are on the floor in the clinic every day teaching us about the guidelines and maybe the pathophysiology can be taught by our PBL tutors or having a subsequent lecture explaining guidelines 'usage and applying that clinically would be helpful

I: So say you weren't going to have any more lectures on antibiotic prophylaxis to prevent infective endocarditis this year in your final year, would that be uncomfortable or do you think that would be reasonable if you were to have no more or you wouldn't have any lectures on it, would that be concerning for you guys or?

P11: Especially before going out into the real world, like here, we have a safety net. Once we start working, we don't have that anymore. So maybe at most just if someone tells us specifically in an e-mail, follow these guidelines, here's the link, keep up to date. Maybe that's all we need.

P10: I think there'd be a lot more anxiety and lack of confidence in my first experience with prescribing without the lecture than there would be if we did have a confirmation lecture or a follow up lecture.

I: And how about more experience with prescribing yourself? Would that be helpful?

P12: Yeah.

P11: Definitely.

I: Now how do you rate the teaching in terms of your preparedness to enter the workforce? So we briefly touched on that. I'd say that to actually go in, say if you had to go in tomorrow and you had to prescribe antibiotic prophylaxis in a private practice setting? How would that make you feel?

P11: Kind of nervous. I feel like I'd be telling that patient, give me one second, let me look this up, I'm kind of trying to find the guideline, find the dosage, which I think that would not fill the patients, the patient with any confidence.

P10: But I do think we're equipped in the skills to search up guidelines, that we would be able to retrieve them, given time.

I: And how do you think you would manage that? So you said you would look up the guidelines, but say in a private practice setting, would the patient take the antibiotics on site? Would they take it at home? How long before would they take it? What are your thoughts on that?

P9: You should probably give it to them on site so that you know when they've taken it and it's usually like 60 minutes, 30 to 60 minutes, not sure exactly.

P10: Also, if they don't have a history of taking that antibiotic before, you're monitoring to look out for signs of allergy as well because ultimately you're responsible.

P11: I was just going to say, if you don't have the antibiotics on site yourself, you could give them a prescription to get it and bring it in with them the next day.

I: So that's a valid point. So would you then consider because I think most practices probably wouldn't carry that medication like in the dental hospital, so let's say you have a patient, would you then bring them back another day and give them the script beforehand to purchase the antibiotics?

P11: I'd probably give it to them the day I'm telling them they're going to need this procedure, to go and buy them and have them ready for the day of the procedure.

P9: There could be patient-related factors as well. If you know someone is, you know, you've had some one as a patient for a long time, you know they're responsible, you know that they've taken this antibiotic before and they've had no reaction to it. Then maybe you would just prescribe it and let them take it before they come in. If they were completely informed and they fully understood the consequence, maybe not taking it at the right time, I think, then it would be OK to let them take it before they come in.

I: I suppose you've mentioned potential for a reaction so that might be a reason why like you mentioned, monitoring the patient and that's why, do we trust if the patient's going to take it at the same time? So you mentioned patient-related factors, being aware that they've never had a reaction in the past, but do you think that one of the reasons why maybe it gets taken on site is because we're not sure the patient will take it right?

P9: Yeah

P10: Yeah.

I: Now again, so similar, similar to the previous question, but how confident are you with prescribing antibiotics? If you had to summarise your confidence in it, do you feel really confident? Are you a little bit confident or you're not confident at all?

P12: I would say I'm a little bit confident.

I: OK.

P12: And also I say that with like the girls said, with a safety net. If I was to do it out in practice, I wonder if my confidence would drop a little, but I have say in here I am a little confident and hopefully that's the same in practice.

I: OK and so you mentioned having that safety net. Could you tell me a bit more about the safety net and the confidence that you have, say in the dental hospital compared to private practice?

P12: I think having clinicians that have a higher clinical standing, so having people that are very like much older, more educated in the field so that I can ask a question if I'm unsure and not making that decision entirely on my own, I think is what I would refer to as my safety blanket. And having, making an educated guess is always, you're more confident in that when other people agree with your decisions.

P11: Definitely.

P10: And legally we can't prescribe at the moment, so it would be the clinician's final, like they would have the final responsibility to make sure it's correct.

P11: But it usually prompts a discussion with your supervisor, which is nice, so you can understand their reasoning behind what they're saying or maybe they'll understand yours so it kind of helps you understand what's going on a bit better.

I: Say we were in a setting without a safety blanket, for example, in private practice or in a job where you don't have a senior, what would you do in that situation, do you think, if you had to prescribe antibiotic prophylaxis?

P12: I think I know of dentists in practice that have group chats with other dentists, so if you were unsure, I think posing that question to your colleagues and your peers and asking if you were all confused about the guidelines, what they would do in this case would be a good idea for other dentists in the practice as well.

P10: Or contact the patient's GP or cardiologist if you need clarity on the condition.

P9: I think if it was straightforward enough of just follow the HSE guidelines and just prescribe. But if it was somebody with a very complex medical history with other conditions also, then maybe yeah contact your GP.

P10: Especially if they come in with a history of always receiving antibiotics prophylaxis and you're the first operator to not prescribe them.

I: And what do you think would help increase your confidence in prescribing antibiotic prophylaxis?

P12: I know clinicians have a need, have to do continued professional development that is done by the government. I'm pretty sure with the HSE it's mandatory. So perhaps having courses that

we have to do as graduate dentists yearly to update our knowledge on the guidelines that are present etc, to urge that and up to date continued professional development.

P11: At the moment, we don't have a lot of experience where we're fully independent and so once we're working for a few years or have managed a couple of cases like this, I think we'll get a bit more comfortable learning what conditions need it and what don't.

P10: Yeah, if every student could be exposed to one case before graduating, I think we definitely would have more confidence in practice.

P9: Yeah, I think the same.

P10: Because we do have a log book, do you know where we have to sign off certain cases, so that could be one area.

P12: And I know it may be difficult to adapt having, making sure that each student sees a patient. So maybe having a case vignette of infective endocarditis patients or patients who need antibiotic prophylaxis and doing a lecture on that and explaining the patient's history and what steps were taken to prescribe. So maybe 10 cases and showing us how you'd apply in each different case, I think could be a really good way of having that kind of, cool like aspect of it, without being actually done in the clinics.

I: Very good, and do you think that's more useful in the final year or is it something that should be done earlier?

P9: I think the guidelines should be outlined and taught earlier and then how you apply them should kind of come into more 4th and 5th year because otherwise you're out of touch with it anyway until you actually start dealing with patients in oral surgery and day theatre.

I: OK and more I guess clinical exposure and experience in your final year then to put it all together?

P9, P10, P11, P12 nodding.

I: Now, what changes or additions to the current school curriculum, if any, would improve your understanding and knowledge? So were you suggesting potentially logbook, adding something like that to logbook?

P9: Yeah

I: We talked about lectures and the vignette and that was really good, interesting idea there. PBL being a bit more updated? Would there be any particular changes? I think you may have mentioned examinations?

P12: I know exams are meant to sometimes see who studied the most in depth detail of a specific topic, but in those cases I think it's important to just examine the high yield information, even though it may seem predictable, just to make sure that the student body understands exactly the importance of antibiotic prophylaxis, for example.

P9: I think the 3rd year OSCE that we had was very good at kind of making you prioritise information and realise, OK, the guidelines are important and I need to know how to apply them and then we got a question on like a particular patient came in, do you prescribe and I think that was a great kind of stimulus for learning the guidelines.

I: OK. Thanks everyone. Actually up to the end, now I just want to finish with is there anything else that anyone would like to add or we haven't talked about on this topic?

P9, P10, P11, P12: No.

I: Thank you.

FOCUS GROUP THREE TRANSCRIPT 28/11/24

Interviewer: I

Participants: P13, P14, P15, P16, P17

I: I'm going to start with the first question, what do you know about antibiotic prophylaxis for cardiac patients within dentistry in Ireland, Australia and other parts of the world such as the UK?

I: Just what we know, thoughts, throw them out there.

P13: I know in the UK, they're NICE guidelines, they recommend complete cessation of antibiotics so they actually don't recommend antibiotics.

P14: In Ireland it's the HSE, they recommend it under certain conditions. So for example, if the patient has an unrepaired cyanotic congenital heart defect, but just also as an example and the dental procedure is considered invasive then it is recommended.

P15: And then America is kind of we're kind of like in between the both of them because America, I think they would be a bit more lenient to who they would give antibiotic prophylaxis to.

I: OK, so what do you mean by they would be bit more lenient? Do you think it's different to the HSE guidelines or?

P15: Yeah, so I know the HSE guidelines split them up into recommended and then considered, whereas for the American Association, it's, I think it's all recommended, but I'm not too sure I would have to check, well, but I think they would do it for more, have like a broader criteria that they would.

I: OK. and why do you think they use a broader criteria, if anyone wants to weigh in on that?

(silence)

P14: There are not as many regulations around kind of antimicrobial stewardship as there is here. I feel like it's quite tightly regulated here so maybe it's not as regulated.

I: That's interesting. Yeah. And where do you think we're basing the HSE guidelines on?

P14: On the European Society, ESC 2023, I think is what the HSE is based on.

I: OK, very good. And are there any other guidelines have we come across SDCEP guidelines?

P17: So they're the Scottish guidelines, I'm not too sure what exactly they follow, but I know just going back to the HSE guidelines that there are other instances where prophylaxis is recommended, would be in patients who have previously developed infective endocarditis or patients who've received cardiac valve replacement where they developed cardiac valvulopathy in, after the transplant.

I: OK, very good.

P13: We did have a mnemonic that we learned for the ones that.. it does, you do give cover for which I actually have looked back on what they were for, what you should give the antibiotic prophylaxis and when you don't, when you think you should.

I: Where did you hear of this mnemonic?

P13: My notes I remember.

I: Oh OK.

P13: Yeah, from a lecture it was definitely given to us. That's all right.

I: Yeah. OK. That's very interesting. We'll touch on the lectures you've had. That's the first I've heard of the mnemonic, that's good. OK, great.

P14: I was just going to say going back to your question with the American, why they might give it more, I know they have more say medical legal, you know, cases over there so it might be more trying to cover yourself with a legal standpoint in case the patient was to develop infective endocarditis. So that could be, that could be one reason why they might give it a longer, broader criteria.

I: Yep, that's an interesting point. They do, they tend to have a bit more of a medio- legal emphasis there, right. So we sort of mentioned already, but which of these guidelines have you used? And which guidelines do we use in the dental hospital?

P16: Currently the HSE guidelines, I believe, that we use here.

P17: I think there could be largely based on the SDCEP guidelines, the HSE ones. I know there are differences, in some guidelines recommend one gram of Amoxicillin whereas other guidelines recommend two grams pre-operatively, um depending on the guidelines that you follow.

P16: The HSE, they recommend 2 grams, 30 to 60 minutes pre-op in those cases that are indicated.

P17: And if it's a case where maybe it wasn't planned or something to do with procedure or you didn't remember the antibiotic prophylaxis, in those instances, you can still give it within two hours once you've started the procedure, to be effective.

I: OK, excellent. And does the DDUH have its own guidelines on antibiotic prophylaxis?

P14: I think we do and this is where it gets a bit confusing as well. But I'm not sure exactly what the difference in our ones are compared to, compared to the guidelines. But I don't think it's verbatim the HSE ones, I think there is a modified one in here.

I: OK. Yeah, that's fine. OK. And do you guys feel that the existing guidelines are adequate? Are the guidelines we have sufficient? In terms of antibiotic prophylaxis, cardiac conditions...

P17: I think the guidelines that are out there themselves are very clear in explaining what needs to be done. I think where it breaks down well for me anyway and I think maybe for lots of other students, is that, say, the hospital's own guidelines, they could be quite difficult to access and say remotely, like you have to be in the hospital on certain computers to access them, whereas if they were more freely available or more easily accessed, I think students would be more inclined to access them more often and know them better.

P15: I was going to say just because we are in the nature of a teaching hospital as well, even trying to get within our clinic times the patient coming out to then sometimes when you have to go down to day theatre to get them signed out and stuff, it can be a bit of a hassle and then asking the patient also to come in an hour before as well and we're waiting during the lunchtime period. So it's a bit awkward before 9 am, I know day theatre's open so that's quite handy, but I just know there was a lot of issues where one of the students in our bay needed antibiotics and the supervisor had to come down from clinic two down to day theatre. He wasn't too happy to do that so I get that's probably just an institution based thing, but just in the actual delivery of them, I think there's a lot of like work, we kind of dread we have to do it because we know there's a lot of pre planning that has to go into it where I don't think that's the case in private practice perhaps because you would be able to do it a bit more easy but.

I: OK, now that's a really interesting point. So let's talk about private practice then. So what would you do in private practice? Would you not bring the patient in an hour earlier? How would you organise it? So here you're saying that the patient has to, we have to plan it, the patient needs to have it an hour beforehand, your supervisor has to approve it. So walk me through what you think you would do in private practice potentially?

P15: Prescribe it at the last visit and then tell them to take it at home one hour before, if they're capable of doing that.

P13: Or even if they take it in, 'cause you're going to be qualified if you're working in a private practice, you don't have to go down two flights of stairs to administer it to come back to be

dealing with various things. That's probably easier to have it in the waiting room beforehand that way.

I: So would you still have the patient in the practice waiting room taking it? Or would you have the patient take it at home? What would the difference here be?

P17: I think it might depend on if you have concerns regarding the patient's allergies or if they haven't had the antibiotic before. If they hadn't had it before, you might want to keep an eye on them in your surgery would probably be a more prudent option, whereas if it was something the patient was more used to or more routine, probably letting them administer themselves at home and then come in might be a better option.

P15: Also with regards to whether you believe the patient if they said, 'Oh yeah, I took it an hour ago.' But quite often they wouldn't understand the significance of the time frame and whether they took it 2 minutes before they came in or whether they took it 3 or 4 minutes before they came in and just said, yeah, yeah, I took it whatever. But it's very, very difficult and all of that obviously, if they say they took it at home and they said they took it at the right time. And then for example, if they want on to develop infective endocarditis, you would kind of question yourself then wonder if it was, you know, it was your own kind of responsibility there.

P16: So in those cases, if the patient was in the waiting room, at least you could have been the staff to monitor the patient taking it or something.

I: OK, so what I'm hearing is it can be a bit of a household and dental hospital because there's supervisors involved, but at the same time, we may want to monitor them for allergies and also to make sure that they've complied. Is that what I'm hearing there?

P17: Mmhmm.

P13, P14, P15, P16 nodding.

I: OK and in instances where we've said the patient's taken it before, they haven't had an allergy, would we still trust or would we still be happy for the patient to take it off site?

P13: Probably depends on the patient, but I think for some, yes, if it's a routine thing, they, say, have to get a good bit of work done.

P15: I think in like in just in the medical field, there's a lot of things where patients have to like say fasting for surgery and stuff. You kind of trust the patient to be able to do that by giving written and verbal instructions. So I think that's not uncommon where things are done off site and patients manage their own.

P13: Yeah and when patients know the importance of it and have sicknesses in the past, they're not, not going to take it.

P16: They're going to take it.

P17: I think basically there is kind of professional judgement, you know, the practitioner would know the patient best and what they may or may not be capable of.

I: OK, very good. I might just bring it back to your point there with the supervisor as well. Do you think there could be a better way of implementing it or what are the issues around the supervisor having to come down to theatre for the antibiotic to be administered?

P15: I just think because maybe some of them are external and part time, they don't realise that's the way it's done here and they might just think, oh, it should be in the nurse's office on the floor or something and not realise that obviously you guys are doing meds' checks and checking how much there is downstairs and obviously then, they're supervising 8 students as well, so that is a bit of time that's taken away from them to come downstairs and watch the patient do that. So, um yeah and again, some of the part times don't come until half one, they're actually not there at the time when the antibiotics need to get administered, so it's kind of hard organising that.

I: OK. So how have you managed that yourselves? Have any of you had experience with prescribing antibiotic prophylaxis?

P16: I haven't.

P15: Not personally, but someone in the bay well I just know, so, they had to start at 2. So then that meant that they were doing it at 3, so I think maybe from a clinical standpoint, you might be saying you could have had another patient in and you have to do the extraction a bit later in

the session, and obviously it's nice to have ample time. So in case, you know, you break a root or something, you have enough time to do whatever it is you're doing, but just having to start off at 2 o'clock and you might not be starting actual procedures until 3 or a bit later. So that's the only thing in terms of clinic times.

I: That's interesting. I think with that as well, it really comes down to who's going to be ultimately responsible for that prescription. So as a student, you wouldn't necessarily be able to prescribe yet, you'd be able to manage and treat your patient. So there needs to be someone who's supervising you and I suppose that supervisor needs to be ultimately responsible for that prescription.

P17: I think that probably comes down to the fact that if a student just went downstairs and it was authorised by an old surgeon, when the patient goes back upstairs, that person isn't watching the patient for the next hour or two, whereas the supervisor in the bay is ultimately the person responsible for the management and they're the person that's going to be there when the procedure is taking place. So from that point of view, it probably doesn't make sense that they're the person responsible, but then just logistically it can be a bit tricky as we alluded to.

I: OK, great, very good points there. Alright, so we haven't spoken quite about this yet, but can someone tell me about the actual antibiotics that are recommended on the guidelines for prophylaxis? So what type of antibiotics, the guidelines are saying to use?

P16: Amoxicillin?

P15: So that would kind of be like a broad spectrum antibiotic, it's a beta- lactam antibiotic. But in case of allergies then I think, I think we actually saw them yesterday in the lecture, but it's like cephalexin.

P16: It's a cephalosporin, I think and that's, that's usually that's the kind of first line after um, like any cases of penicillin allergy...

P15: but didn't they say If there's like severe cross reactivity, you go to clindamycin instead, which is another class of antibiotics. I'm not sure what but I think it's mostly broad spectrum that are recommended to use.

P16: And also doxycycline is on the list of in cases of penicillin allergy also, and I think also in cases where oral administration isn't possible, 2 grams of amoxicillin, either IV or IM can be recommended also.

I: OK, very good. Can you talk to me more about this? Were you all present at this lecture...

P13, P14, P15, P16, P17 nodding

I: And which what lecture was this that you were?

P16: Kind of a paed's and special care kind of lecture.

I: OK, it was a joint lecture, right?

P16: On congenital heart defects actually.

P17: On managing paediatric patients with special health care needs.

I: OK and prior to this lecture, when was the last time you heard about the HSE guidelines on antibiotic prophylaxis?

P13: Quite some time ago.

P17: During our second, third and 4th year, we do PBL which is problem-based learning and it comes up, it might even come up twice in two different years, but it might be 2nd year and 3rd year that it comes up in and I think maybe one of the things could be that, it probably comes up in the learning side of the curriculum, a good amount of time before you come across it clinically. So then there's a kind of a mismatch, whereas perhaps if it came up at a time when you're more likely to see it clinically, then it would be more relevant and you'd have a probably better understanding of it.

P16: And I'm aware that, I believe that these guidelines were updated in February of this year. So that was obviously since we were initially, we initially learned the guidelines when we talked about them, so, there is some minor tweaks there that you know, when we went and learned it. It's not the up to date guidelines that we actually learned.

I: So, and did you learn it was updated in this lecture yesterday?

P16: I had actually seen it before. I think I was just looking for them a couple months before.

P13: I didn't know they had changed.

P16: Yeah, but it was, it's happened then in the lecture.

P15: I hadn't actually heard of the HSE guidelines before yesterday. I was always under the assumption that we have like just the dental hospital ones that were modified from, not sure what they were modified from but.

I: Had everyone else heard of the HSC guidelines?

P17: I know when I, when we originally came across it that I found it difficult to access the hospital guidelines, but doing a Google search, the HSE guidelines, they have a nice PDF and flow chart, which is easy to understand and readily available. So I found that the handiest thing to access on my mobile phone or whatever.

I: And so which flow chart are you referring to? I just missed that.

P17: It's the HSE guidelines, all the indications for um, antibiotic prophylaxis for infective endocarditis, so it goes through the criteria for qualifying and then the recommended dosage and the drug.

I: OK, great. Does anyone know what changed between the guidance prior to February 2024, the HSE?

P15: I don't.

P17: No.

P14: I don't think so.

I: Clindamycin potentially ring a bell?

P16: Yes. So yeah, it's not longer used.

P13: I was thinking Clindamycin as well.

I: Does anyone know possibly maybe why Clindamycin?

P14: Were there adverse reactions or something reported, because I was doing my research on NICE guidelines with my dissertation. So like but none of HSE was covered, but I feel I think I should probably look into it anyway for my dissertation. OK, but yeah, that's something I did

come across that it's no longer used, even in the ESC 2023, it's no longer used, same for HSE and yeah.

I: So you mentioned NICE guidelines, are you doing this for your 5th year dissertation?

P14 nodding.

I; OK, great. Can you tell me a bit about the NICE guidelines?

P14: Yeah, so essentially I'm saying that NICE guidelines should be reviewed because since 2008, it pretty much hasn't changed its guidelines and um I think it was in 2015 where all they did was they added the word routine, routinely into the actual guideline. So now even dentists, like practitioners are really confused as to what that means because they actually provide no like recommended dosages, no recommended drugs, absolutely no details to what should be done in the non routine or routine cases and so it's extremely confusing and there's so many like articles and studies out there um looking at, for example, the AHA, the American and their guidelines and how there are studies supporting that. So the main reasons as to why NICE decided to stop, you know, antibiotics is to deal with the fatal adverse drug reactions and development of like antimicrobial resistance. Um but there is actually not like, they have overstated all that. That's what the studies proved. I think Thornhill, Mark Thornhill, so many articles published by him and it goes in detail, it goes through in detail like all the articles proving this. So yeah, it's 16 years after their initial publication, they do need to change the guidelines.

I: Has anyone else heard of Thornhill's research into antibiotic prophylaxis and infective endocarditis?

P13, P15, P16, P17 shaking heads.

I: OK And the NICE guidelines has anyone else heard about them?

P17: Yeah

P16: Yep.

I: So if you guys decide to work in the UK, can I ask if you would feel comfortable or would you be prescribing antibiotic prophylaxis knowing the NICE guidance?

P17: I suppose coming from an Irish background, you'd probably be more familiar with what you've known and what you've been told in university. So perhaps then we would probably be more likely to administer antibiotic prophylaxis. But yeah, I suppose it might depend on, it is something you probably speak with your practice manager about as well before doing it.

P15: And also the patients themselves might be aware that they've never gotten it before if they've visited other dentists at that point. Might be a bit different because I think patients, especially with cardiac conditions or even like bleeding disorders where you're doing stuff beforehand, they're very aware of what they've had to get done and even they might be spoken

about with their cardiologist so they would know, um Intimately so they might question why, why you're doing that.

P14: I think being a general like feeling as a general dental practitioner, so I'm not a specialist, so I would probably consult with the cardiologist or someone first before making any decision. But yeah, ultimately I think I would as well.

P16: It's important to note that the NICE guidelines are guidelines. They're not absolute best practice. So not an absolute best practice document. So as with all guidelines, I feel like there's always kind of a bit of, leeway in a bit of situations. So as they were saying consulting with a cardiologist or general practitioner.

I: OK, great. Now we've already mentioned this briefly, but I'll just go over it again. In what particular conditions or circumstances are antibiotics recommended? So can we just maybe quickly summarise that, we've mentioned previous infective endocarditis, prosthetic valves, any other conditions you remember?

P16: Cardiac transplant recipients, I think we mentioned that.

P15: I also think there's. there's a time frame as well,

P13: Yeah. So six months like six months, yeah, or every six months with valvulopathy.

P16: I think it's in the new guidelines. It said it should be considered or may be considered for cardiac transplant patients, but it's not definite. It's not a definite recommendation there and also unrepaired cyanotic congenital heart disease as well.

P17: And with the congenital heart defects, I think if they have been recently repaired as well, certain ones are included but I know that list has 3 or 4 on it that are kind of hard to remember. I kind of in my head...

P16: Transcatheter or something like that.

P17: I remember there were, yeah, I find it easiest to remember that there are four kind of subcategories. So one being the previous infective endocarditis, one being the cardiac valves, one being the congenital heart defects, with the specifics of that, the cardio transplants...

I: OK, very good. Now I, I would assume with this question, 'do you agree with the use of antibiotics?' and from what I'm hearing you say, that everyone here agrees.

P13, P14, P15, P16, P17 nodding.

I: OK, so we're moving on to educational experiences now in antibiotic prophylaxis. So I hear that you had a lecture yesterday with paediatrics and special care, and who was that held by?

P15: [Name of postgrad], third year postgrad.

I: OK, great, apart from that, how have you been taught about antibiotic prophylaxis for patients with cardiac conditions? I remember you mentioned PBL, so can we talk a bit more about how we've been taught prior to the lecture yesterday?

P13: Definitely have them, have had a lecture, I just can't really remember who it was by.

P15: I don't really remember that. I just really remember problem-based learning and just it's more self-directed, so obviously you go find those yourself and again, usually the problem is quite broad. So I think it would have been based on that, but I think like we're saying, a lot of the conditions are hard to remember on their own, so it might have been better suited as almost like, if it was done maybe in day theatre while we're there and you know, they'd ask, would you do it in this situation rather than trying to memorise a list because memorisation is maybe not the best way to learn if you're actually faced with the case, if they've done specific cases, I think that was just probably 1 had a prosthetic heart valve maybe, I think that's the one that sticks out to everyone that they remember, but we actually can't remember the rest of them because it wasn't spoken that much. And then, so yeah.

P17: I think the problem with problem-based early as well, it's maybe not the most effective way of teaching it because it's as P15 was saying, it's self-directed. So one person could go and when they come back to report, you know the whole guidelines of by heart and another person may not have even opened the documents and that's not necessarily picked up or reflected by, you know, the tutor because they could just have it open on the day and so I think maybe if we

were delivered a clear lecture by maybe some of the oral surgery staff before our introduction to theatre, it might, erm, make a more uniform understanding across the class group.

P16: And as well it does quite often, it does be heavily dependent on who your tutor was at the time, we're obviously split up into I think eight groups and it depends on whether the tutor, for example, has an interest in kind of infective endocarditis or it could be for example, a public dental health specialist that doesn't, doesn't encounter this, you know, on a daily basis and it isn't of that much interest to them, so they might just kind of skim over that and say, yeah, the guidelines are there. But there might be another tutor that would sit down and say this is important because and really emphasise that. So it really is kind of, It's luck, basically.

P14: Sometimes the topic itself is not on that, it's another topic or something else, it's just a part of it. So then it's very likely for a tutor to actually not really go into detail with that.

P15: OK then also the reading list as well, so sometimes the reading lists are either really long, really extensive, you don't really have enough time to go reading all this or it's like a chapter in a book or a whole book itself and you would miss out like a landmark study like Thornhill. Like I wouldn't if I'm doing self directed learning, I'm not going to go into the research of how the guidelines have changed and everything, so I think sometimes with, they could probably learn from, I think perio. I think the lectures we got in 4th year, I think they're probably the best because they went through the landmark studies, actually told us the reasons why, we, you know, instrument at certain times is so if we actually had the landmark studies for oral surgery developments, I think that would be really great because unless again you've done it through

your dissertation, you've actually gone through the history, you might not realise when the changes were made and why they were made. So that would be.

P16: I feel like that's a flaw just inherent in the teaching here, because obviously as P17 was saying, for the first, the first 3 years, the first 2 years, 3 times a week and in the next 2 years, it's once a week and that is really what we do I'd say, 80% of what we're expected to know. And I feel like it's not the most efficient way of delivering the teaching here because there's so many kind of different guidelines as we've been speaking about and so much variability in what you can pick up on and I think it's not until later whenever you're actually looking at some of these things clinically. Then that's those kind of when those flaws and those gaps in knowledge kind of start to show through.

P13: 5th year is the 1st year we've had like a lecture on Friday that sums up our PBL that's on Monday and I don't know but definitely for me, I thought it's, it's so beneficial because at least it's the professor of whichever, they've kind of just been revision topics over the last 11 or 12 weeks, nothing new, but they're highlighting what's the important thing but we haven't had that for the 4 years prior. So it would be great if we had that all the way up because it really like, they sum up exactly what's needed to know the guidelines mentioned and stuff, so I don't think we've gone through antibiotic prophylaxis in the last 12 weeks, but it could it should, it should be mentioned say, say 4th year or something.

P15: There's no oral surgery topics on that actually.

P17: There is exposed bone.

P13: Oh yeah.

P15: That was the only one though.

I: So you're still doing PBL in 5th year?

P13: We only for this semester, yeah it's called CBL but yeah, it finishes, actually finishes this week, so we don't have any more after Christmas.

I: So just in terms of PBL or PBL experiences, do you think it's been taught in a way that's applicable in the clinical setting, because you mentioned readings and how difficult they were to navigate. Is it something that's actually helpful from a clinical standpoint?

P17: I think it's the stuff that is, you know, comes up frequently that you see with your day-to-day patients. You're seeing that more often and I suppose a combination of your PBL, repetition and clinical exposure makes it stick in your head, whereas things that you might have been exposed to like such as endocarditis prophylaxis, they might not necessarily have a patient or have come across an experience in theatre with the patient, then you're not going to have had the experience to go back on that or to have seen it first hand. So I think it really kind of just depends on what comes up with your patients and your clinical experience that kind of forces you to go back over your PBL material relevant to that case.

I: So it's more about the experiences that you guys are having first hand rather than necessarily just what's coming up in PBL. And I'm correct saying no one has actually had a patient that requires antibiotic prophylaxis?

P16: No.

P13, P14, P15 shaking heads.

P17 No, I think personally, like just from my point of view anyway, any of the things that I've done on clinics and the things that I would feel much more confident that I know the ins and outs and the details of them.

P15: I think PBL does have a place in terms of obviously you're going to be lifelong learning, so you know, finding things and reading. But again, like you're saying, I think if there was some sort of practical aspect, a lot of the job is when you're down in day theatre, you're on the spot thinking oh, does that patient need that? Whereas I think PBL it's all fair and well saying well I know where to find the guidelines but actually trying to apply them in the second or you know, when a supervisor asks you a question. You're like I actually never thought thinking about it that quickly in my head before, so you're kind of stunned a bit. so yeah. I think there definitely needs to be more, maybe more questions asked more, I don't want to say like exams or quizzes, but more so just forcing to actually recall the information from your head rather than just because in PBL we have our laptops open, so you can just read it all off and then say that you've learned it and that's it.

I: Sure. Okay, thank you for that. Alright, so in terms of gaps, where do you feel or can you describe any gaps you have in your knowledge with respect to antibiotic prophylaxis prior to dental procedures for patients with cardiac conditions? Do we have any gaps in our knowledge at the moment?

P13: I didn't know that the guidelines had changed in February so that.

I: So the update?

P13: Yeah Clindamycin no longer being administered.

P14: The actual difference between DDUH and HSE.

P17: It's as well in terms of when to give, I think it's easy to remember like previous infective endocarditis or something like that. But when it comes to congenital heart defect, it's very hard to remember off the top of your head without looking at the guidelines. You know what, when it is and isn't required. Not that you'll ever need to necessarily know without looking at the guidelines, but it would help to be more familiar.

I: Sure and where is the understanding as to why we prescribe for these conditions versus other conditions such as stents or for only a period of time for cardiac transplants? Do we understand the underlying reasons behind that?

P17: Personally, I wouldn't feel too confident. I know that it is usually due to a bacteraemia of Streptococcus, Staphylococcus erm species. But beyond that I wouldn't be too confident on the pathogenesis.

P15: I think it's the heart physiology say around say prosthetic valves or if there's something preventing endothelialisation, that's an area of like, the blood is stagnant essentially, so that's where obviously the bacteraemia can start and vegetations grow. So I think depending, with a shunt, say if someone's had like say a heart attack, angina and they have a stent that's obviously opening up the blood vessels, that kind of blood is I don't know, is stenosis the right word to use or stagnant, wouldn't really happen where there's turbulent flow, it wouldn't happen if it was all lamellar. So bacteria wouldn't be able to adhere and begin to do that. So I think that's the yeah.

P13: We do learn it in 2nd year, but we don't really.

P14: The critical factor is the bacteraemia following the procedure.

I: OK, great. Now how would you rate the teaching you have received regarding antibiotic prophylaxis for infective endocarditis?

P14: After everything we've said.

P13: 5.

P14: 6.

P15: Is it out of 10?

P13: Yeah, I think fair.

P15: 5 out of 10.

P16: If it hadn't been for actually for yesterday, just been shown the actual, the paediatric lecture that we did have because obviously before that no one has explicitly presented these are guidelines that we use and had a screenshot of the table, it has never actually been explicitly presented to us. You know, it's been against self-directed through PBL that we've had to go look for it. So I think yesterday, knowing that this is definitely it, that's probably what's brought it up from maybe a 3 to 5 for me. But yeah, I would say.

P13: But the emphasis yesterday wasn't even on. It was paededs.

P16: But it was nice having a slide to look back on, that you know, this is what we've been taught, this is what we should know instead of oh these guidelines were referenced and oh, they might have been updated since then and that sort of thing. So it's nice to have something more recent and up to date that we're able to refer back to.

P17: I think in an ideal, like in an ideal world, maybe on paper, what's in the curriculum here, would be sufficient, but at the end of the day, like the amount of material you're exposed to in

dental school and no one is going to be the perfect student in every area. So I think like really, I think repetition is kind of a lot of times is the things that you remember the most, are the things you're exposed to the most. So even if it was kept in the problem-based learning, but there was like a summary lecture in 3rd year and then a summary lecture again in 4th year and once in 5th year or something.

P15: Yeah, because I think we did have the same lecture series in 4th year and 5th year for oral surgery, so that covered things like mandibular fractures, maxilla, all the fractures, trauma and what else, could be like MRONJ or and all of that. So that could easily be added. I think even with prescribing antibiotics and I think even other things like pain relief and such, um that's something that's more learned like on the floor say in locals and stuff. So that would be handy, just prescription writing. I think that could definitely be added to the oral surgery curriculum and be just brought up again.

I: As a lecture?

P15: Yeah.

P17: Yeah, even actually I know most supervisors here for our locals and A&E clinics, they tend to ask a student to prepare a seminar each week. And there are a lot of, I would say very common topics like we've all done 3 or 4 or 5 seminars on ORN and MRONJ at this stage and things like that. And it would be probably, it would probably be easy enough to add, I would say infective endocarditis prophylaxis in one of those kind of common themes instead of repeating a topic that we probably feel very confident in already.

P16: Yeah, personally, that's never been mentioned in a group I've been in.

P14: Yeah.

P17: And I personally find those seminars very kind of informative, good way of learning.

P16: Especially if it's you preparing it yourself.

P17: Yeah, it's kind of in a smaller group, but it's more kind of an intimate setting, so you're more inclined to kind of engage in it.

I: OK.

P13: But also having a lecture's handy because you have it then in your computer or no. I don't know, sometimes seminar is good but you might bin the notes or it won't stick or something, but when it's actually in a lecture you tend to keep it when it's filed and you'll go back to it.

I: OK, great. So just moving on now, just with your confidence in prescribing antibiotics. So say you were to go out and work in private practice and start prescribing yourself. How confident do you feel and how prepared do you think the current curriculum has sort of made you?

P17: I think I would feel confident as long as I still had the guidelines kind of readily at hand.

P13: Yes.

P17: I think it would be a case where I would kind of know in my head, but I would still want to read over them and check over them. And as long as I had kind of guidelines available in the practice or on my computer or whatever, I think, I would be confident to deliver the prophylaxis myself.

I: OK, yep.

P16: Yeah, I'd be the same. And if I wasn't sure, again, I could always contact the patient's cardiologist or GP. That would obviously not seem confident however.

P13: Yeah, I'd fear if, if it didn't work or something like that, what, what would you do. Do you send the patient straight to hospital or? But actually administering it, I'd be confident.

P17: I think one of the things maybe I wouldn't be so confident in, we touched on there is maybe like signs and symptoms that maybe after the procedure, like in the days and weeks that something is not quite right, like maybe.

P13: Oh sorry, I wouldn't even know how common that is for it not to work.

P17: Maybe confident in administering it but maybe not telling the patient of what to look out for afterwards or post op instructions that would, for me, would be a bit more of a grey area.

I: Mm-hmm.

P16: I think it's kind of just a general feeling of unwellness with no other explanation that can kind of be it, often.

I: Now, what do you think would help increase your confidence? So at the moment we're saying we're fairly confident if we've got the guidelines. Is there anything else that would make you more confident, say if you were to enter the workforce potentially?

P17: I know it probably depends on jurisdiction, but in Ireland, it's not really enforced in the dental field, like CPD kind of hours per year. They're not really accredited, whereas maybe if it was a case that, you know, all dental practitioners have to do, like a refresher online course even in a certain amount of topics per year, I think that would be an effective way, if that was enforced.

P15: Yeah. And like, so outside of school, I work in healthcare and safety administration of medication, you have to know like the seven Rs, like the right dose, the right patient. I don't think we're really taught as students in terms of administering medication. So nurses, healthcare systems, they can all do that. To me, that's something they could add just to make sure because it's all fair to be able to write prescription but to actually make sure that it's being done properly.

P14: Even the HSE line, I don't know if there's one on, maybe there is, I'm not sure. But even if like students and dentists are, they have to do it, you know? That would be a good idea.

P17: Even like the Dental Council seminars or webinars and guidelines and things if they had a document, that are accessible on it.

OK. So I'm hearing potentially more documentation, more of a multidisciplinary approach, nurses being informed and being in that type of setting.

P16 nodding.

I: And what changes or additions to the current school curriculum, if any, would improve your understanding and knowledge? I think we have touched on a couple of areas, which were actually quite good. So we talked about lectures from oral surgery, we talked about seminars and locals clinics, I think you mentioned something that involved CBL as well. But a lot of that seems to come down to more lectures?

P17: Mmhmm.

P16: Yep.

P14: Yep.

P16: More concise lectures.

I: Excellent. OK, so we're finishing up now. Is there anything that you'd like to add or anything else we've missed that you want to talk about for this topic, or all good?

P13, P14, P15, P16, P17 shaking heads.

FOCUS GROUP FOUR TRANSCRIPT 28/11/24

Interviewer: I

Participants: P18, P19, P20, P21, P22

I: So I'm just going to start with the first question now. What do we know about antibiotic prophylaxis for cardiac patients within dentistry in Ireland, Australia, other parts of the world such as the UK?

I: So just shout out some things that we know, if we know anything about it.

P18: They are recommended for people who might have had previous infective endocarditis or if they've had an unrepaired cyanotic congenital heart defect. Does anyone else want to...

P19: So they're recommended for high-risk procedures, so things that would involve manipulation of the gum, so perio surgeries, biopsies umm and then they're not required for lower risk procedures like local anaesthetic or like supragingival cleaning I believe.

I: These procedures you mention, where have you gotten them from or do you just know of these?

P19: They're listed in the NICE guidelines or the HSE guidelines anyway, but I think they follow NICE guidelines.

P18: We also follow AHA guidelines, the American Heart Association in the DDUH.

P20: Yeah, I think it's the dental hospital, like Dublin Dental Hospital's policy that we follow in here that they get it from the American Heart Association, I think and NICE guidelines. I think it's a combination of both.

P21: And also for patients who has prosthetic devices in their hearts for any different reasons, they are required to get antibiotic prophylaxis before dental treatments that are extensive like extraction, biopsy, root debridement, especially the perio treatments that one would like going and bleeding a lot.

I: Yeah, OK, great. To mention a few, but could we list all the guidelines that we're aware of regarding antibiotics? So we talked about HSE, NICE, AHA, any other guidelines that we know of?

P20: SDCEP, I don't know if they have infective endocarditis guidelines, do they?

P19: Don't know.

P22: They have guidelines in Australia as well. I don't know what they're called.

I: No, that's good. They do, yeah.

P20: The hospital itself has its own policy as well.

I: And what's our policy? Does anyone know? Has anyone seen them?

P20: Basically the same as what P19 and P19 said.

P21: They are like making it into sections of low risk patients, and I think treatments with low risk of bleeding, medium risk and high risk and I think the low risk treatments like taking impressions, x-rays, placing ortho bands, these things, they, don't need any antibiotics, but the medium ones and high ones, I think they need, as much as I can remember.

I: And the ones that you're listing, these low, medium and high, which guidelines are these from, do you think?

21: Was it from the NICE ones? Um, I can't remember. They are the ones that we follow.

I: OK, that's fine. No worries. All right. So which guidelines do we use? So we've talked about that and some of us aren't quite sure, but which guidelines do you think we use? Because I've

heard HSE, I've heard NICE. Do we think we use both so they're the same? Which ones do we think we use?

P20: I think it's the AHA one but I don't know.

P18: I think so too, yeah.

P22: I think it's NICE, But I'm not sure.

P20: I don't know.

P19: I thought it was HSE, but I think it's a version of one of them but I'm not sure which one.

I: OK that's fine, and do you feel that these existing guidelines are adequate? Are they sufficient in protecting patients and for practitioners at the moment?

P18: There is evidence that antibiotic prophylaxis can help prevent infective endocarditis, so it's a good idea to have them in practice and making sure that we follow them.

P20: I think they're pretty clear. They're kind of, they state obviously, which is what treatments need it, what treatments don't need it and then they say the doses and what dose is necessary, if they're not, if they have an allergy to penicillin. So I think it's quite clear for operators.

I: P18, you mentioned some evidence with regards to prescribing antibiotic prophylaxis. What do we know about the evidence that's out there at the moment? Is it strong, are there particular references or?

P19: I don't know.

P20: I have no idea.

P18: I don't know.

I: That's absolutely fine, alright. So how about we move on to antibiotics? So recommended antibiotics for prophylaxis? What do the guidelines recommend in terms of the type of antibiotics that you'd give?

P22: So I think it's Amoxicillin 3 grams for adults and then Clindamycin for 600 milligrams for adults if they have penicillin allergy.

I: OK, and which guidelines do they come from?

P22: That's DDUH again.

I: And are we all in agreement it's 3 grams Amoxicillin?

P19: HSE says its 2 grams of Amoxicillin or 50mg per kg if they weigh a bit less, if they're a child or weigh less and then 600mg of Clindamycin and there's another one, but I think it's, it's not if they have a severe penicillin allergy.

I: For mild allergy?

P19: Yeah.

I: Do we know which one that might be?

P21: Is it metronidazole? No? I am not sure.

P19: It's Cephalexin or something like that.

I: Yep so it is Cephalexin for a mild penicillin allergy and we're referring to the HSE guidelines now. And just the dosages that we talked about, we talked about 2g Amoxicillin, OK, and we talked about Cephalexin as well, OK and someone mentioned Clindamycin. So what what do we know about Clindamycin and say antibiotics for allergies to penicillin, are there any other ones apart from Clindamycin?

P21: Is it Azithromycin?

I: OK great.

P18: Yeah, I think it's now changed to 500, isn't it? It used to be 600 in the 2018 guidelines. I think now it's changed to 500. And then it's like 15 milligrams for children per kg up to 500.

I: OK and we talked about a few of these, you guys covered this quite well. But what particular conditions or circumstances are antibiotic prophylaxis recommended? So the actual conditions themselves, someone mentioned previous infective endocarditis?

I: Any other conditions we can think?

P21: Cyanotic condition to the heart so like if they have like the transposition of the Great...

P20: Transposition of the great arteries.

P22: Yes, yes, this one or like there's many conditions that can be, lead to cyanotic heart conditions that like it's like problems from heart in birth and if we had it and it's treated, but if it's failed or if it's like partially treated, all these things there are many forms, but if the patient has a history of heart problem especially in birth, it's like more recommended to get antibiotic prophylaxis, yeah.

I: Yeah, OK.

P19: I think unrepaired congenital heart diseases or repaired within the first six months of surgery.

P20: Or repaired and not fully repaired yet.

I: And what do we know about maybe for stents or cardiac transplant?

P19: I don't think they're necessary.

P18, I think for stents, unless it's like a prosthetic valve or if there's material related to the valve.

P19: I think then you can consider it, case by case maybe, for them ones.

I: For cardiac transplants?

P19: Yes.

P20: They should probably consult a cardiologist.

I: That's always a good thing to do. OK. now do we agree with the use of antibiotic prophylaxis for cardiac conditions? So we're in agreement to use them?

P21: Yes, yes we are.

P19, P18: Mmmhmm.

I: And why, why do you think we're supportive of these guidelines?

P19: Because of whatever evidence this is, I don't know which one, but that it might reduce the incidence of infective endocarditis which, is life threatening I assume.

P21: Risk of infection with dental treatment and dental treatments can introduce an infection, bacteria to these patients especially they are compromised already, yeah, I think so.

I: And do we know of anywhere or any guidelines where antibiotic prophylaxis is not used?

I: Have you heard of any places where antibiotic prophylaxis for cardiac conditions is not required?

P20: In the UK, they're usually less pro antibiotic.

P19: I think so.

P20: They're more conservative in their antibiotic use, I think in the UK. So I think they don't recommend it.

I: And why do you think the UK might be a bit more conservative? What are the reasons they may not be prescribing antibiotics, do we think?

P20: Antibiotic resistance and they've stronger stance on antibiotic resistance than we do in Ireland or mainland Europe or in the US.

P19: Also the cost as well.

I: Mm-hmm. Funding?

P21: And also maybe they don't believe it's doing something really like we are all giving it just in case there are as well the adverse reactions with the dental treatments, but maybe it's not really helping that it's just building up resistance to the antibiotic, so yeah.

I: Oh, great. So imagine we or any of you are now working in the UK. What would you do if you had a patient with one of these cardiac conditions? Would you prescribe antibiotic prophylaxis if you were in the UK, working there?

P22: Probably if I was allowed to, I would. 'Cause I think that's something we're taught here. So I think it's something, yeah, I probably would just to protect myself as well, as I wouldn't want to, suppose if you did an extraction or something, for them to come back and say something went wrong.

P21: I think we will, like message or send a letter to the cardiologist and ask for what he thinks about it, mentioning the treatment plan that we want to do and if he's happy for giving the antibiotic, we will go for it, but if he's not, then yeah.

I: You mentioned if you were allowed to. Can you elaborate on that?

P22: Yeah, I don't know. I suppose like I suppose, yeah, it depends I suppose if you're working in the practice of someone I suppose like alongside, you have to consult someone, I suppose it's not a position you probably completely make by yourself and I suppose it's getting the patient on board as well.

I: Yep, so with the patient and say in the UK, if they weren't prescribing it frequently or at all and your patient's not used to potentially taking antibiotics, is that something that might influence your decision?

P18: Mm-hmm. Getting consent for the antibiotics.

I: So we're obviously very supportive of guidelines and we think they're great, but say in the UK they actually use NICE guidance which does not recommend antibiotic prophylaxis routinely for dental procedures for cardiac conditions, So, then let's say we're in the UK now and that's the guidance, those are the guidelines. How do we feel then about guidelines and I suppose how we operate as practitioners with prescribing?

P20: I think coming from here where it is standard to give it that, you would, well, I'd probably be more inclined to consult the cardiologist beforehand and see that they're OK with doing it without the prophylaxis.

I: OK. So that second opinion might be a bit more reassuring?

P20: Mmhmm.

I: OK, sure. So we're going to move to the next part where we talk about your educational experiences of antibiotic prophylaxis to prevent infective endocarditis. So how have you been taught about antibiotic prophylaxis for patients with cardiac conditions? So think about any lectures you've received recently or in the past.

P21: Uh we had a patient in the A&E that had the Transposition of the Great Vessels, hope I'm saying it right and he used to get antibiotic prophylaxis before any dental extraction and for this patient we were very careful not to even probe in, just did an examination, we did OPG and we planned that teeth that will need extraction and we told the patient we will be giving you antibiotic before the extractions because of the condition he has. And he also told us from the history that he always used to take antibiotics before any dental treatments because we were not allowed to probe because of his heart condition that is treated, but still there, that history of that.

I: Yeah, OK, great. So you were taught in a clinical situation mainly? That was this year, was it?

P21: No, in last year.

I: OK and any other experiences of being taught antibiotic prophylaxis?

P18: PBL back in second year, there was just a problem specific on infective endocarditis, came up in third year as well. It's kind of what it is, what problems caused, how we treated, etc.

P19: Came up again in 4th year. It's been in most years, we've covered at least one problem, that it's involved in.

P20: I don't know that if we've had any specific lectures on it.

P22: I think it's more we're just talking about guidelines as well. And then it would, it usually comes up in past paper questions often enough anyway, so we would kind of learn it from that.

I: OK.

P19: It does come up kind of randomly in some lectures as well.

P20: I don't think there's been any specific lecture on infective endocarditis and its prophylaxis but there has been, it's been touched on in other stuff but no specific thing that I can think of anyway.

I: OK so you've had PBL on 2nd, 3rd and 4th year from what I'm hearing, some experiences and exposure in A&E in fifth year. Have there been any sort of CBL/PBL cases or lectures at all referring to antibiotic prophylaxis?

P21: There was a presentation given by one of the paediatric specialist postgrad about infective endocarditis and antibiotic prophylaxis, he was using it as reference for the paedics clinic and the children. But it was the guidelines for everyone, it was very useful and a good lecture presentation.

I: Excellent, and the guidelines came up in that lecture, but prior to that this year had guidelines been taught or shown to any of you?

P20: No.

P19: No.

I: And in terms of PBL, what are your thoughts on how antibiotic prophylaxis to prevent infective endocarditis is taught in PBL? Is it applicable in the clinical setting? What are your thoughts about PBL?

P18: I remember back in second year it would be more, more textbook based than clinical based and I suppose over the years go by it's more clinical, we're given the scenarios in particular patients and then we get a clinical picture and then you know, we can draw a treatment plan for this patient with infective endocarditis.

P18: I think it gets a little bit lost in PBL, especially in second year because of each problem it has a lot of content and then, if you've not found the exact, correct information, you can kind

of be on the wrong track, so you might have found like, I don't know, didn't get all of the details of the guidelines down and then you're not actually sure.

P18: Sometimes the supervisor might not even be a dentist, again, you know, in first year we had an oral microbiologist, so it might not be a specialist, so he might not be 100% able to help us.

P21: I think it's just about the guidelines, following it. It's not hard, it's not complicated, it's not really a PBL topic. It's more, it's more in clinical work. It's more just a guideline to follow, not to do something against the guidelines of the country, it's all about the place that we are working in. If we are in Ireland, we follow the Irish guidelines for like what the place that we are working and follow whatever it's the HSE or the NICE. And if we are working abroad in the UK or any place, it's, it's more like beneficial or more better to follow the guidelines, that the place follow. There's no right or wrong I think in this part. Yeah, it's, it's all for patient benefit at the end of the day.

I: OK, a few of us mentioned earlier that we would prefer to prescribe say in the UK. Why do you think it's better to follow the guidelines of the country that you're working in?

P22: Probably like legal implications, of course.

I: What legal implications would you be concerned about? Do you think guidance or guidelines has legal implications?

P22: I think guidelines are there to be followed, but I don't think you necessarily have to follow them. I suppose your documentation is really important, but you would be a bit concerned if you didn't give antibiotics, I suppose after an extraction and then they did get infective endocarditis.

P21: Also we need to have like a reason why we are giving it, as patients are humans who know what, what is happening to me to give that reason why we are giving it and our reason will always be that there's a guideline we follow and it's, it's a need, not something that we just want to give and that's it.

I: See what I'm hearing that is a bit conflicting, it's between the guidelines of the country, it's providing also legal implications potentially and what's in the best interest of the patient potentially is slightly confusing, but is that, is the consensus that we stick to the guidelines within the country that we're prescribing? That we're working in?

P20: Mm-hmm.

P19: Yes.

P21: Yes.

I: P22?

P22: I think you do, yeah you do.

I: Alright, so now just on PBL and I think you mentioned it. Do we think it is effective or do you think it's a good way of delivering training or education on antibiotic prophylaxis?

P20: I think it's a good way to introduce it initially, but I think to clarify things, a little more helpful to have a lecture on it that like clears up exactly what is expected of us and especially because it's not something that we see very often.

I: Mm-hmm.

P20: Umm, it'd be nice to have like a lecture on it or kind of someone that knows exactly, is like used to dealing with it that can tell us exactly what actually happens clinically instead of what the ideal would be or what a textbook is saying, why it's done certain ways in certain countries.

I: And who would it be most useful delivered from, do you think, in terms of giving lectures on?

P22: Probably an oral surgeon or maybe a general dentist as well as someone in practice, I suppose.

P21: Oral surgeon would be very, very useful in that part, especially the person who work in other like places, countries and had an interact with different guidelines and have to use different guidelines not because he wants it, because different places use different guidelines.

I: And can I ask what your experiences have been with antibiotic prophylaxis? Have any of you had any patients that you needed to prescribe antibiotics for due to a cardiac condition?

P22: I had a patient who had a prosthetic valve and we provided, we gave them antibiotic prophylaxis. And then he came back in an hour later we did the treatment and he was very healthy but he had a lot of uncontrolled medical conditions and stuff. So it was quite complicated, but it's fine. We try to do as much treatment as we did as possible. So we did all the treatment we could. It was root debridement and two composite restorations. We placed matrix bands as well, that was him and we reviewed him and that was fine.

I: OK, and how was, how did you find the process of prescribing or having a supervisor assist you bringing him in, going to day theatre?

P22: Yeah, I think it was fine. I think it was, well enough organised. I think I was just a bit nervous because he has so many uncontrolled medical conditions. I think there's other things as well, kind of like medical emergency or something. But it was, no, it was fine. I think it was well enough organised. Yeah. And he like he was used to having antibiotics for dental treatment, so it wasn't something that he wasn't used to himself either.

I: OK, good. Has anyone else had any patients that they've had to prescribe antibiotic prophylaxis for?

P21: I had one, he's a perio patient, it's basically he has a missing valve and his condition is well controlled with that cardiologist, with the GP and the good thing about that patient that shows

how the teamwork or the MDT is going in a very great way is that like he already has a Amoxicillin prescription with him by the cardiologist and he was given that like advice to take 1g of Amoxicillin 1 hour before every single dental treatment, so he always comes 1 hour before dental treatment, that is root debridement already having taken antibiotic prophylaxis.

I: Moving along, so you had your patient, he was well equipped. So did you feel that he was taking the right dose and the right time?

P21: Yes yes, because he has an unstable perio disease and, and the perio problem is linked to his heart condition and it's kind of like the PDL or like it's unstable and he keeps extracting teeth or like the teeth is like just there's no hope from a few and it's linked to the heart problem. So he is kind of aware, has the knowledge because of the GP giving all the information, because of the cardiologist always in contact with him and because of also attending DDUH .We advised about Amoxicillin taking 1 hour before any dental treatment and he was like keeping well and before every single treatment, dental treatment, we asked did you take the Amoxicillin and he always say yes, I took it 1 hour before because he know that it's, it's very like with, with his condition, it's very serious because he has actually a heart problem that he is missing 1 valve and to keep everything under control, he's taking huge amounts of medications. So he knows that the situation will be serious if you miss 1 dose or if he just forgets about it.

I: Yeah. And do you feel though, because he's so concerned about it and you've said he takes it for every dental treatment. Yes. What about the dental treatments where it may not be high risk? Would he take it then? Or what are the issues when he's coming for, say an examination or for something that doesn't require or generally isn't high risk?

P21: Yes he is my patient for a periodontal treatment erm so every time he comes in even for like perio assessment which is just probing and he always still have it. I'm not sure about if, if he needs it in the time of the assessment or full perio chart check up, but he still take it. It's like as a prophylaxis I think and from my like level of experience, I wasn't able to say you don't need it this clinic or there's no need for it this time. We stick to the cardiologist um like guidelines that he he give the patient and we stick to the GP instructions regarding taking antibiotic prophylaxis before every single dental appointment, to avoid any adverse complications. That's it. Yeah.

I: OK. And so from what you've mentioned, do we consider GP or cardiologist opinion greater? Or more significant than guidelines? So if the GP or cardiologist suggested something, would you always choose that over guidelines?

P22: Yep.

P21: Yes.

P20: Yep.

P19: Yes.

I: And why is that?

P19: Well the cardiologist will definitely know all of the details of the condition so they're in a position to make an educated decision, and the GP, I would trust their medical knowledge really.

P21: I think it's always like better to follow because they are the general doctors. They are, and our problem is more about medical condition, that they are more experts in the general body problem. And we are dentists, we are more about the teeth, but teeth are just, we need to keep everything under control in our clinics. So for like listening to the other like team members is always better, yeah.

I: Yeah, OK. Right. And has anyone else had patients that need antibiotic prophylaxis? Or is it just the two patients?

P20, P19, P18 shaking heads.

I: OK alright, could you describe any gaps you feel you have in your knowledge with respect to antibiotic prophylaxis prior to dental procedures for patients with cardiac conditions? Do we have any gaps anywhere?

P20: I don't think there's any, I don't think we're ever really told about the evidence really. I don't think there's much, like we're told the guidelines, but we don't know what evidence that's based on really. But maybe that's just me, I don't know

P18: I agree.

P22: Yeah that's fair.

P21: We also don't know if giving the medication is helping and if we don't give it, will there be an infection happening really or we are just giving it just in case. What if we didn't give the antibiotic prophylaxis to a patient with a heart problem, will there be a serious problem happening or no? This is actually not.

I: Do we have any gaps in terms of the types of antibiotics, the dosage, the timing?

P18: The guidelines say from 30 to 60 minutes, but that can, that's a big gap. Someone could take it like 60 minutes before that, someone could take it 30 minutes. Like I'm just curious to know if it has the same effectiveness or maybe if it's less effective after like let's say 60 minutes. We better just take it before now, like take it for 30 minutes instead of 60 or you know, or take less at 30 minutes if it's the same effectiveness.

I: So the period of time and maybe the absorption and how that works might be bit confusing or the gap.

P19: Okay. I'm not sure if they're supposed to get any antibiotics like for the rest of the day or like for a week or anything like the full course of antibiotics, I'm not sure.

I: OK.

P22: And then as well, like they say to take the pre-operative mouth rinse, but like how effective is that as well. And the dental hospital guidelines, is kind of small print at the bottom, suppose focuses more on the antibiotics.

I: OK. So what I'm hearing is there's a confusion with how the guidelines are stated, the duration afterwards as well and evidence overall?

P22 nodding.

I: OK right, so how would you rate the teaching you have received regarding antibiotic prophylaxis to prevent infective endocarditis?

P19: Like out of 10?

I: You can use words, you can use numbers, whatever you feel.

P19: I feel like an 8 out of 10 like it's good. It could be improved slightly by like concise lecture on it specifically.

P22: I think we need a lecture specifically on infective endocarditis. I think a lot of it's just been kind of PBL with the guidelines from the dental hospital on Blackboard and that's kind of it.

P20: I was gonna say a solid 6 because we haven't actually been taught that, we've been given guidelines, but I don't think it's actually been taught to us as such.

I: When were you given guidelines, sorry?

P20: They were in the reference list for PBL.

I: OK.

P20: The, but that I think the only guidelines that we were ever given was the DDUH. So I don't know that we've ever been given, maybe they were touched on.

P18: We weren't no.

P20: I think it's just the DDUH ones. We're told which ones they get, they stem from, but I actually can't remember. Um but we never really have been taught it as such.

I: And just on the HSE guidelines, does anyone know when they were last updated?

P22: No.

P19: Maybe 2023? I have no idea.

P18: 2019? Could be I'm not sure.

P21: 2019? No?

P18: There were ones from 2018 and I think at some point they were updated, but I think it's 2018, but they've definitely changed since 2018.

I: Mm-hmm, OK and does anyone else have any thoughts on how they would rate the teaching or what they think of the teaching on antibiotic prophylaxis to prevent infective endocarditis?

P18: Again, like a 5 or 6 out of 10, like there's still room for improvement.

I: Sure, OK.

I: And how confident are you with prescribing antibiotics for patients with cardiac conditions once you graduate? Given your experience in your teaching, how confident would you be?

P21: Confidently, I think we will be able to like give it once we are like allowed in the place to give or like the place that we are practising and after consulting the GP, the physician, the cardiologist and if they are happy, it's always working as like a team because it's like, like multidisciplinary treatment approach is much better than just going straight and giving it to the patient because it's medication, it has like negative sides as like positive sides, so it's always better to consult the team and then of course if they are happy, I will be confident in giving that, yeah.

I: So just to confirm, you wouldn't necessarily be confident making that decision on your own. You would need to consult the GP, the cardiologist?

P21: Yes.

I: So would anyone else here be confident prescribing independently with just the guidelines?

P20: I think it's a case by case kind of situation. Like most of the people that have, that I've heard of that have one of these conditions, they've often been told by their cardiologist or by their GP that they will need prophylaxis. So then in that case I think I'd be happy enough to go with it, without consulting. But if the patient wasn't really sure or if I wasn't really sure, I think I'd be happier to consult.

I: So again, we're relying on the patient's previous experiences and the GP's knowledge with guidelines?

P18: I suppose it depends on where we work. If I was in a very remote area in Ireland, like a small village where for example, a GP was miles away and wouldn't answer the phone, I would probably make the decision myself.

I: So that's also depending on access to the GP?

P18 nodding.

I: Sure.

P22: I think as well, like I've only given it once before. So I suppose I wouldn't say that's great experience. So I suppose maybe in the dental hospital if we have a little bit more patients or seeing it maybe more mm-hmm 'cause I don't know if I'm confident after giving it once.

I: Sure or not at all potentially. OK and what would help increase your confidence? So you mentioned maybe, would you say more experience and more exposure more than once?

P22: Yeah, I would say so, yeah.

I: OK. Anything else that could increase our confidence?

P19: I think probably a clear lecture on it as well so that we'll be sure of what guidelines we are actually following.

I: Thanks and do you have any ideas on what changes or addition to the current school curriculum would improve your understanding and knowledge? You mentioned lectures already.

P19: Lectures, yet.

I: OK, great lectures. Maybe more exposure, having our own patients to prescribe? Any other changes that we would consider?

P18: Maybe a talk from a cardiologist to hear their point of view, maybe joint consult, maybe we could have like cardiologist and a dentist together, they would give the talk like because the cardiologist might know, know much about dentistry so that we, you know.

I: So, OK, great. And in terms of what you think would benefit from having a cardiologist as well? To explain it to dental students?

P18: Mm I suppose just for example, I might not know exactly what unrepaired cyanotic congenital heart disease might be or recognise it, so they would just explain it in more simple language in medicine.

I: Sure, develop a greater understanding. OK, any other thoughts there? Anything else we've missed or anyone would like to add?

P21: No.

I: OK, great. All right. I'm just going to stop the recording there now.