U.K. hemophilia treaters’ knowledge of risk assessment for prolonged bleeding associated with dental procedures

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Abstract

Introduction: Optimal delivery of dental care for adults with congenital bleeding disorders (CBD) requires close collaboration between hemophilia treaters and dentists.

Aim: To explore U.K. hemophilia treaters’ knowledge of dental procedures and associated hemostatic management in adults with CBD.

Method: Staff (N = 180) from N = 60 hemophilia facilities in the United Kingdom were invited to participate in a questionnaire-based study using a web-based tool. The questionnaire assessed participants’ knowledge, adherence and appropriateness of application of U.K. guidance on hemostatic management of common dental procedures.

Results: The response rate was 23% of treaters (n = 41) from 62% (n = 32) hemophilia facilities. Individual participants (87%; n = 34) reported they adhered to guidelines, though knowledge of guidance was poor with only 36% (n = 15) applying guidance appropriately in 3 common dental scenarios. There was a tendency for participants to assign the use of systemic hemostatic measures independent of the agreed bleeding risk associated with the proposed dental procedure.

Conclusion and recommendations: While hemophilia treaters were aware of current guidelines, their knowledge of the guidelines and ability to risk assess dental procedures was poor. There was a tendency to overprescribe systemic hemostatic measures for dental procedures. Education initiatives to aid decision making are needed.

KEYWORDS
congenital bleeding disorders, dental procedures, haemostatic management plan
In parallel with the evolution of hemostatic management, dentistry has also developed less invasive approaches compared to procedures used in the past, such that not all dental treatment requires factor coverage or other systemic hemostatic management. Indeed, for example there is growing evidence that the amount of factor replacement recommended to minimize bleeding risks associated with dental treatment may now be reduced, and in many cases is no longer required.5–9 Aiming to confine the use of factor replacements to those high risk patients undergoing high risk procedures is likely to be more beneficial for patients in general as it should decrease the possibility of developing inhibitors throughout the life course, eliminate the potential transmission of infectious agents, and minimize overtreatment. However, adherence with published guidelines seems variable between different hemophilia centres.6,10,11

An audit of dental procedures management in patients with inherited bleeding disorders found that 59% of procedures were over treated in cases where patients had a mild bleeding disorder.6 Similarly, a literature review from 21 European studies (published between 1995 and 2006) showed that for dental extraction, the factor level was increased to 60–80% preoperatively, with one-third of hemophilia centers using a repeat dose postoperatively.11

In 2013, The United Kingdom Haemophilia Centre Doctors’ Organisation (UKHCDO) produced guidelines on the dental management of people with CBDs. These were based on an up-to-date literature review, a review of national and international guidelines, and consensus opinion.7 The guidelines advised that factor replacement coverage was not required for certain dental procedures namely: dental examinations, simple fissure sealants, restorative dentistry without the need for inferior dental block of lingual infiltration anesthesia, supragingival scaling, and endodontics.7 Specific dental procedures were identified as needing an increase in the missing factor level or other hemostatic management (such as Desmopressin, tranexamic acid or both) included: dental extractions, implant placement, and treatment of advanced periodontal disease.7,9

To formulate a personalized dental care plan for people with CBDs, it is essential that the dental team develop an understanding of the nature of the CBD, the severity of the disorder and the patient’s previous responses to dental procedures. Of equal importance, is that the treating hemophilia Multidisciplinary team (MDT) should understand the prolonged bleeding risk associated with certain dental procedures to ensure hemostatic management is planned accordingly. Close cooperation between the dentist and the patient’s MDT is crucial for risk assessment and identification of the appropriate management plan10 and the WHF suggests that a dentist should be part of the MDT. There is some evidence that factor replacement may be overprescribed for certain dental procedures.6 This is because there is a tendency to catastrophize dental procedures with a resultant reluctance to deviate from historic custom and practice.

In this study, the aims were to investigate U.K. hemophilia treaters (comprising doctors and clinical nurses) knowledge of appropriate hemostatic management planning for dental procedures in adult patients, and to assess how closely their practice adhered to the recommended U.K. guidelines at the time of the study.7 The focus of this survey was confined to the management of adults with CBD, as the specialty of Special Care Dentistry (SCD) is an adult-based specialty in the United Kingdom.

2 | MATERIAL AND METHODS

The study was designed as a cross-sectional observational study. Participants were recruited from hemophilia facilities across the United Kingdom (N = 60 centers).

Individual potential participants’ (hematologists and nurses) names were identified from the publicly accessible UKHCDO website. Potential participants’ e-mails (N = 180) were confirmed by the principal researcher by contacting the clinical center. The researcher checked that the potential participant was involved in treatment and management of CBD at the center. Participants were excluded if they were not working in the area of adult CBD or were retirees.

Participants were approached via e-mail and invited to participate in the study. To avoid pressure to participate, a link within the email directed the participants to a landing page, which provided them with the participant information sheet (PIS) and a link to the on-line questionnaire.

The survey was live for 6 weeks from 21st of March to 30th of April 2016, and 2 reminders were sent to maximize the response rate.12 All data from the questionnaire were anonymized. For the purpose of this study, participants were asked to limit their answers to the management of Von Willebrand disorders (VWD), hemophilia A and hemophilia B.

2.1 | Questionnaire

The questionnaire was designed with a web-based tool (Survey Monkey TM, Palo Alto, CA, USA) and was divided into 3 sections using a mixture of closed and open ended questions.

The first section assessed participants’ knowledge of dental procedures that would pose a risk of prolonged bleeding (knowledge). To determine the levels of knowledge, a list of 17 typical dental procedures was presented to participants using descriptors from the UKHCDO 2013 guidelines. Participants were asked if any of the procedures caused a risk of prolonged bleeding under 3 levels of CBD severity: mild, moderate, and severe CBD. Three options were offered “Yes,” “No,” and “Uncertain.” A knowledge score was developed for each participant in which one was scored for a correct
answer and zero for incorrect and /uncertain answers. A total of 51 questions were initially produced, but subsequently one question was removed as allowed some discretion in the answer. Therefore, a participant scoring correctly on all indicator questions would score a maximum of 50.

The second section sought to capture the hemostatic management plans used for common dental procedures, and to assess the MDTs’ rationale for these prescriptions. Three scenarios were specifically designed with unambiguous clinical conditions to enable the participants to make rapid decisions.

For scenario I, the plan for a patient with moderate hemophilia was to receive fillings and supragingival scaling under local anesthesia infiltration. For scenario II, a patient with moderate VWD was care planned to have teeth extracted. In scenario III, a patient with severe hemophilia with a history of inhibitor development was care planned to receive a root canal treatment. For each scenario, participants were asked about the need for and type of hemostatic management including the timing of regimes and timing of dental treatments. Participants were also asked about circumstances in which they would consider a repeat dose of factor coverage following a dental procedure and whether there were situations when they may deviate from the U.K. guidelines.

An assessment of the participants’ appropriate application of the guidelines in these 3 scenarios was then made by combining the 8 questions asked in the 3 scenarios into an application score.

The third section recorded the participants’ demographic details.

Prior to the dissemination of the online survey, the questionnaire was piloted for timing and understanding, and some minor revisions were made to the questions. The study received favorable ethical approval (Ref: LRU-15/16-2256).

2.2 Data analysis

Data from Survey Monkey were downloaded as a CSV file and imported into Statistical Package for Social Science software version 22 on a password protected computer. Data were analyzed descriptively and presented here as summary statistics, including percentages and respondent numbers.

3 RESULTS

3.1 Demographics and sphere of practice

Sixty-seven participants went to the online platform and answered an opening question regarding the hemostatic management guidelines being used (67/180; 37%). Twenty-four participants dropped out after this opening question. The first section on knowledge was therefore completed by 43 participants (24%). Two further participants dropped out after completing the knowledge section, which gave a final achieved sample for all sections of n = 41 (23%). There were individual responses from 37 out of 60 (62%) hemophiliac facilities treating adults with CBD in the United Kingdom. The following results refer to the 41 participants who completed all 3 sections.

Most respondents had at least 3 years of experience in treating people with CBDs (Figure 1). Participants came from 3 clinical settings: comprehensive care centers (53%), hemophilia centers (35%), and community hospitals (12%).

Most respondents (97%; n = 40) reported experience in the coordination of care with dental teams, and 95% (n = 39) said they received between 1 to 10 referral letters per month for advice on hemostatic management for dental procedures, mostly from general dental practitioners.

3.2 Knowledge of prolonged dental bleeding risk and guidelines

Most participants (85%; n = 34) reported that they followed the UKHCDO guidelines with a few (4%; n = 2) following the WFH 2006 guidelines. Some respondents (11%; n = 5) reported following ‘local’ guidelines, which they reported were based on either UKHCDO 2013 or WFH 2006 guidelines.

Knowledge was tested using a knowledge scale. The internal reliability of the knowledge scale was good (Cronbach alpha 0.9). Table 1 presents the proportion of participants who correctly answered the questions by severity of CBD (maximum correct knowledge score = 50). The mean knowledge score of the sample was 25 (SD = 10.11). The median was 24, with a minimum score of 6 and a maximum score of 50. Only 2 participants achieved the maximum score. Knowledge levels were poor, with 50% of participants answering fewer than half of the questions correctly.

3.3 Assessment of practice in dental scenarios

Three brief typical clinical scenarios explored MDTs’ practice in relation to dental procedures.
### Table 1 (Continued)

<table>
<thead>
<tr>
<th>Which of the following carries a risk of prolonged bleeding?</th>
<th>Correct answer</th>
<th>Participants who answered correctly (%/n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical extraction needing tissue flap to be raised and suturing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild CBDs</td>
<td>Yes</td>
<td>86%(37)</td>
</tr>
<tr>
<td>Moderate CBDs</td>
<td>Yes</td>
<td>98%(42)</td>
</tr>
<tr>
<td>Severe CBDs</td>
<td>Yes</td>
<td>98%(42)</td>
</tr>
<tr>
<td>Tooth filling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild CBDs</td>
<td>No</td>
<td>70%(30)</td>
</tr>
<tr>
<td>Moderate CBDs</td>
<td>No</td>
<td>60%(26)</td>
</tr>
<tr>
<td>Severe CBDs</td>
<td>No</td>
<td>47%(20)</td>
</tr>
<tr>
<td>Subgingival tooth filling that requires placement of matrix band and wedges</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild CBDs</td>
<td>No</td>
<td>19%(8)</td>
</tr>
<tr>
<td>Moderate CBDs</td>
<td>No</td>
<td>12%(5)</td>
</tr>
<tr>
<td>Severe CBDs</td>
<td>No</td>
<td>2%(1)</td>
</tr>
<tr>
<td>Provision of crown and bridge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild CBDs</td>
<td>No</td>
<td>53%(23)</td>
</tr>
<tr>
<td>Moderate CBDs</td>
<td>No</td>
<td>42%(18)</td>
</tr>
<tr>
<td>Severe CBDs</td>
<td>No</td>
<td>33%(14)</td>
</tr>
<tr>
<td>Provision of removable partial denture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild CBDs</td>
<td>No</td>
<td>67%(29)</td>
</tr>
<tr>
<td>Moderate CBDs</td>
<td>No</td>
<td>67%(29)</td>
</tr>
<tr>
<td>Severe CBDs</td>
<td>No</td>
<td>65%(28)</td>
</tr>
<tr>
<td>Provision of removal full denture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild CBDs</td>
<td>No</td>
<td>65%(28)</td>
</tr>
<tr>
<td>Moderate CBDs</td>
<td>No</td>
<td>65%(28)</td>
</tr>
<tr>
<td>Severe CBDs</td>
<td>No</td>
<td>60%(26)</td>
</tr>
</tbody>
</table>

*Correct answer determined by UKHCDO 2013 guidelines.

### 3.3.1 | Scenario 1

A patient with moderate haemophilia requires fillings and supragingival scaling under local anesthesia infiltration. The UKHCDO 2013 guidelines advise that in this scenario there is no need for a preoperative factor coverage or the use of antifibrinolytic agents. The majority of participants 70% (n = 30) incorrectly recommended the preoperative prescription of factor replacement (ie, DDAVP or VIII) and 31% (n = 13) incorrectly recommended antifibrinolytic agent coverage for the planned dental treatment.

### 3.3.2 | Scenario 2

The second clinical scenario concerned a patient with moderate VWD who was in need of tooth extraction. The majority (98%; n = 40) of participants correctly recommended factor replacement coverage and 92% (n = 38) suggested several antifibrinolytic regimes. The most commonly recommended Tranexamic acid regime was a 1 g tablet, 3 times per day, for 5-7 days postoperatively. The UKHCDO 2013 guidelines...
suggest a regime for the majority of adults of oral Tranexamic acid (1 g tab and/ or 5% mouthwash) 2 hours before a planned treatment and continued every 6-8 hours for 7 days. The regimes recommended by participants in this study varied greatly from the U.K. guidelines. In addition most of the respondents (80%; n = 32) who suggested factor replacement cover recommended starting a planned dental treatment within 2 hours and 1 participant advised that the planned treatment could be started within 6 hours. Only 18% (n = 7) of participants recommendations adhered to the advice in the U.K. guidelines (ie, dental treatment should be performed immediately after factor administration). Furthermore, the U.K. guidelines recommend that in the case of an invasive dental treatment, factor replacement may be repeated on the next day of the planned procedure. How ‘invasiveness’ is defined however is not stipulated in the guidance. Only 48% (n = 19) of participants reported they would repeat the factor dose and 28% (n = 11) were uncertain.

### 3.3.3 Scenario 3

The last clinical scenario involved a patient with severe Haemophilia with a history of inhibitor development who needed root canal treatment. According to the U.K. guidelines, neither factor replacement nor antifibrinolytic agents are required for root canal treatment. Only 20% (n = 8) of participants answered this scenario correctly, whereas, 63% (n = 25) reported that this procedure needed factor replacement coverage (ie, by passing agent or FVIII), and 17% (n = 7) were uncertain. As in scenario 2, there was considerable variation in the antifibrinolytic regimes prescribed.

### 3.4 Participants’ practice in relation to the prevention of prolonged dental bleeds

Overall 68% (n = 37) of participants identified situations in which they would consider repeat factor replacement therapy on the second day after the dental treatment. The most common indication was a dental extraction. Moreover, 51% (n = 21) of participants indicated that they would deviate from the U.K. guidelines. A past history of prolonged bleeding (any cause) was cited as the most common reason for deviation.

### 3.5 Participants’ appropriate application of the guidelines

Based on 8 questions asked in the 3 scenarios above, an 8 item application score was derived, where the participant scored 1 for a correct answer up to a possible total of 8 (Table 2). The mean application score for the sample was 3 (SD = 0.98). Over half of responders were applying the guidelines inappropriately and were failing to answer at least 50% of the questions correctly (Table 2). The internal reliability for this scale was, however, poor (Cronbach alpha 0.038).

### 4 DISCUSSION

This study demonstrated that there was a gap in participants’ knowledge in relation to dental procedures that carry a risk of prolonged bleeding. Participants had insufficient knowledge on how to assess the risk of prolonged bleeding for individual dental procedures. The U.K. guidance bases advice on the individual dental procedure proposed and severity of bleeding disorder. To replicate this advice, we did not indicate to participants any information about past dental history. It was clear however that the same bleeding risk afforded to a dental extraction was being used to determine hemostatic cover for scaling, fillings or endodontic treatments (Table 1). This lack of optimal knowledge could lead to unnecessary use of systemic hemostatic management.

Although most participants said they followed the UKHCDO 2013 or WHF 2006 guidelines, the case scenarios showed that the application was often inappropriate and constituted overtreatment. Interestingly, more than half of...
the participants deviated from the guidelines in 2 of the 3 presented scenarios without any explanation for the deviation. Some participants said they would use a previous history of prolonged bleeding to determine whether someone needed hemostatic management rather than the risk associated with the proposed dental procedure. This suggests that the participants were unaware that they were deviating from the U.K. guidelines and confirms their lack of knowledge in relation to individual dental procedures.

The over prescription of systemic hemostatic management has wider ramifications. Factor replacements at surgical doses have been associated with the development of inhibitors in susceptible individuals, leading to unpredictable responses to treatment and difficulty in controlling bleeding which have a severe impact on future management of their condition in the presence of an inhibitors. In addition, the risk of transmission of blood borne viruses still exists in parts of the world where patients are receiving plasma derived products. The number of patients requiring factor coverage prior to dental procedures significantly impacts on access to dental care, prolongs waiting times, and reduce factor availability for patients who truly need it.

The overprescription of hemostatic coverage by hemophilia teams and the low adherence to guidelines has been reported previously, including those associated with dental procedures. To our knowledge, this is the first study to specifically evaluate the dental knowledge of hemophilia teams.

The response rate was low at 37%, despite the researchers’ efforts to maximize responses with 3 mailings. It is, however, consistent with other published literature using online surveys to collect data from hemophilia teams and health care workers in the United Kingdom. In the present study, it was difficult to produce an accurate sample for all individual hematologists and nurses operating in the United Kingdom. This may indicate that not all UKHCDO members were contacted or received the questionnaire and may have introduced additional source of bias in the final sample.

The low response rate indicates that the study cannot claim to be a comprehensive overview of all U.K. hemophilia treaters’ knowledge and practice regarding dental procedures, rather it is possible trend. Nevertheless, it does provide some insight and shows that there is a gap in the dental knowledge of many of these participants.

The knowledge scale performed well; however the internal reliability for the application scale for the 3 scenarios was poor (Cronbach alpha 0.038). This is unsurprising given the variability in the phenomena being studied, particularly the inclusion of a VWD scenario and the small number of questions used.

One of the major problems identified in this survey was the participants’ lack of knowledge of dental procedures that produce a risk of prolonged bleeding. In particular MDTs did not possess sufficient knowledge to estimate the invasiveness of a dental procedure. This is surprising given that the WHF guidelines recommend a dentist should be part of a hemophilia team, and this expertise would contribute to accurate risk assessment. There is a clear need for further training and education, in addition to clinical tools, such as algorithms to aid decision making. Recent work at the Royal Free in London has provided some evidence of how a risk-based approach using a Dental Bleeding Risk Assessment and Treatment Tool (DeBRATT) enables a comprehensive evaluation of bleeding risk. The tool assesses the invasiveness of the dental procedure against the severity of the CBD.

Participants’ adherence with the clinical guidelines is a critical issue. Although the development of clinical guidelines is an effective tool for improving the quality of care, their clinical application and influence on clinician decision making is often variable. The literature has highlighted several barriers which include lack of awareness, time, familiarity, self-efficacy, length and complexity of guidelines, patient preference, and environmental effects such as resources or facilities.

Therefore, it will be valuable in future research to investigate the barriers that prevent hemophilia teams from following the evidence informed guidelines. Then, founded on these identified barriers, an effective intervention can be devised to improve the implementation and adherence to guidelines which should include use of risk-based management tools.

5 | CONCLUSIONS

Although a sample of U.K. hemophilia treaters were aware of the UKHCDO 2013 guidelines, their knowledge of the guidelines and ability to appropriately assess the risk of dental procedures was poor. There was a tendency to overprescribe hemostatic management. Education initiatives and algorithms aimed at implementing updates on recommendations about the risk of bleeding are indicated to reverse this trend together with a need to increase the evidence base informing the recommended guidance and the involvement of all stakeholders.

ACKNOWLEDGMENTS

AR, NN, and BD designed the study. AR and BD gathered the data. AR, NN, and BD prepared and reviewed the results. AR, NN, AD, and BD prepared the manuscript and commented on each stage of drafting.

CONFLICTS OF INTEREST

The authors declare that they have no conflict of interest.
ETHICS STATEMENT
The Institutional Review Boards College London Research Ethics Subcommittee (RESC) reviewed and approved this study (Ref: LRU-15/16-2256)

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