THE AWARENESS AND USAGE OF ORTHODONTIC APPS AND SOCIAL MEDIA BY ORTHODONTISTS IN THE U.K.: A QUESTIONNAIRE BASED STUDY

ABSTRACT

OBJECTIVE:

To assess the awareness and usage of mobile apps and social media amongst orthodontic clinicians to:

• Support patients with orthodontic treatment

• Support the professional development of orthodontists

• Identify any relevant apps and social media platforms currently recommended to patients

DESIGN:

Cross-sectional questionnaire-based study.

SETTING:

United Kingdom.

METHODS:

A questionnaire was developed and distributed to members of the British Orthodontic Society (BOS). To increase the response rate the questionnaire was circulated at three time points between January and March 2020.

RESULTS:

A total of 149 orthodontists responded to the questionnaire (15% response rate) with 113 orthodontists completing all questions (11.4%). Of those who answered, 81% of (n = 111) had been qualified for over 10 years, 35% worked in practice (n = 48), 34% worked in a hospital (n = 47) and 26% worked in both hospital and practice (n = 36).

The results indicated that 20% of clinicians (n = 22) used apps to support patients and 33% (n = 37) reported using apps for professional purposes. Brush DJ appeared to be the most popular patient focused app (39%, n = 18) whereas the IOTN (17%, n = 8), Invisalign (17%, n = 8) and Dental Monitoring apps (9%, n = 4) were the most popular clinician focused apps. With regards to social media, 53% (n = 60) of respondents reported that they used social media to communicate generic orthodontic information and promote their practice to patients. The most commonly used social media platforms were Facebook and Instagram.

Ninety-six per cent of respondents expressed a willingness to recommend an evidence based mobile app to patients if available, and 88% were willing to recommend an evidence based social media platform.

CONCLUSIONS:

Orthodontic clinicians are utilising mobile apps and social media both to support patients and their own professional development. There is a willingness to increase the use of evidence based platforms and apps to support patients.

Keywords: Orthodontic apps, Mobile apps, social media pages, questionnaire for orthodontists

BACKGROUND

Mobile Apps

The increased availability of mobile apps and social media make them advantageous in the delivery of information and in supporting both patients and clinicians. A recent study by Siddiqui et al. (2019) identified 305 orthodontic apps, of which 241 apps were aimed at patients and 18 of these aimed to elicit behaviour change in patients.

A number of randomised controlled trials and systematic reviews have been carried out in orthodontics which have shown apps to be an effective way of improving compliance (Al-Silwadi et al.,2015, Li et al., 2016, Mohammed et al., 2019, Sharif et al., 2019a, Zotti et al., 2019, Scheerman et al., 2020, Al-Moghrabi et al., 2021). The apps included features such as reminders, chats with their clinician, sharing pictures and testimonials which are evidence based techniques to improve compliance described by the widely used and validated framework, known as the Behaviour Change Wheel (Michie, 2011). These studies showed apps to be an effective way of improving compliance in orthodontic patients, which led to improvements in plaque levels, gingival bleeding scores, reduction in white spot lesions, reduction in caries, reducing breakages and reduction of treatment time. In addition, 99% of patients had access to a smartphone, of which 73% belonged to them (rather than a parent/relative) and 87% of patients stated that they would be willing to use an app to support treatment (Sharif et al., 2019b).

In addition to supporting patients, mobile apps can be used by healthcare professionals for a variety of reasons including professional development such as practice promotion, access to journals and publications and continuing dental/medical education. A regional survey conducted in the UK among 388 medical staff showed that mobile phones are regularly used to support education and clinical practice (Payne et al., 2012). The evidence supporting apps use for education and practice in dentistry, however, is limited.

Social media

Social media allows patients to share experiences which may be helpful for others to understand illness, understand treatment options and explore various healthcare options (Bekker et al., 2013). From an orthodontic perspective, social media sites including YouTube and Facebook contain content relating to patients 'brace journeys'. There is also a wealth of literature published on social media sites by patients who have undergone orthognathic treatment. Al-Silwadi et al., (2015) and O'Brien & Duane, (2017) conducted randomised controlled trials which showed YouTube to be an effective resource for clinicians to improve orthodontic patients' knowledge compared to traditional methods of information provision. Clinicians mainly use social media for marketing and advertising as it can improve the financial performance of dental practices (Parmar et al., 2018). In addition, social media can keep current patients engaged with informative posts and updates (Jorgensen, 2012).

Potential benefits

The use of apps and social media may enhance patient care in orthodontics. These sources also enable rapid dissemination of information to patients during emergency situations which may be especially useful in the current COVID-19 pandemic. The accessibility, versatility and fluidity of apps and social media sites make them ideal sources of information and platforms for communication. To date there is lack of evidence in regards to the awareness and usage of mobile phone apps and social media by orthodontists, both to support patients and for their own professional purposes.

AIMS

Primary Aims: To assess the awareness and usage of mobile apps and social media amongst orthodontic clinicians to:

- Support patients with orthodontic treatment

- Support the professional development of orthodontists

- Identify any relevant apps and social media platforms currently recommended to patients.

Secondary Aims:

- To ascertain features of mobile phone apps that orthodontists found useful and features they would like to see in future apps.
- To assess participant willingness to use evidence based mobile phone apps and social media to support patients.

METHODS

Ethical considerations

Ethical approval was granted by the University College London (UCL) Research Ethics Committee on 7th November 2019. Clinical governance approval from the British Orthodontic Society (BOS) was also requested to allow questionnaire distribution; this was granted on 16th January 2020.

Questionnaire development

A questionnaire was developed and piloted at the Eastman Dental Hospital, London, U.K. amongst orthodontic consultants, specialty doctors and specialty trainees in October 2019. Participants were asked for comments and feedback in relation to the questionnaire and three comments were received; to increase the word limit for free text comments, an option to go back to a question in the questionnaire and a suggestion for rephrasing and enhancement of certain questions. The recommended

changes were implemented and the questionnaire was re-piloted by members of the research team.

The final questionnaire consisted of 22 questions (17 multiple choice questions (MCQs) and five open ended questions). It was estimated to take 10-15 minutes to complete. The three main components included were demographic details[A], awareness and usage of mobile apps for patients and professional purposes[B] followed by the awareness and usage of social media for patients and professional purposes[C]. A summary of the questions were:

1. How many years since qualification?[A]

2. What setting do you work in?[A]

3. Do you use apps to support your patients? Which apps? If not, are you aware of apps to support patients? Which apps?[B]

4. Would you consider using an evidence based app to support patients?[B]

5. Which features do you find most useful in apps to support patients?[B]

6. What features would be useful in future apps?[B]

7. Do you use apps in other aspects of your professional practice? How?[B]

8. Do you use social media to communicate generic orthodontic information to patients?[C]

9. Would you consider using an evidence based social media platform to support patients? Which one(s)? [C]

10. Which features do you find most useful on social media to support patients?[C]

11. We would be grateful if you would provide details of your patient specific social media page to provide generic orthodontic information to patients.[C]

12. Do you use social media to promote your practice? Which platforms do you use to do this?[C]

Distribution of questionnaire

The questionnaire was distributed by the BOS to all members of both the Consultant Orthodontist Group and Orthodontic Specialist Group (n = 987) at three different time points; 30th January, 19th February and 10th March 2020.

Storage and data protection

Completed questionnaires were received and responses were retained on the UCL OPINIO (a questionnaire platform). The Data Protection Act (2018) was adhered to including the following measures: data was stored on a secure platform, data was password protected on computers and encrypted storage devices and the information was only available to members of the research team. All data reviewed was anonymised and will be discarded after 10 years as per the UCL retention schedule.

Statistical analysis

Data was collated in Microsoft Excel and statistical analysis was carried out using SPSS Version 24 (IBM).

RESULTS

A total of 149 orthodontists responded to the questionnaire (15% response rate); however, not all questions were answered by all respondents. The full completion rate was therefore 11.4% (n = 113). Data was analysed for partially completed forms and thus the following results were calculated as a percentage of respondents who

answered each individual question. Of those who answered, 81% of respondents (n = 111) had been qualified for over 10 years, 9% (n = 12) had been qualified 5-10 years and 10% (n = 14) had been qualified less than 5 years. Thirty-five per cent worked in practice (n = 40), 34% worked in a hospital (n = 38) and 27% worked in both hospital and practice (n = 31). The remaining respondents mentioned working in other settings (4%, n = 4) but did not specify the type of practice setting (Figure 1).

Use of mobile apps

When asked if they currently use mobile apps to support their patients care, only 20% (n = 22) of respondents said that they do. Use of mobile apps to support patients did not descriptively appear to be related to time since qualification, however there were smaller numbers of respondents in the 1-5 years and 5-10 years categories than the greater than 10 years since qualification category (Figure 2). Meaningful statistical analyses were unable to be conducted due to the small sample sizes. Forty-six respondents listed 15 apps that they used, or were aware of, to support orthodontic patients (Table 1). Of those who responded, Brush DJ appeared to be the most popular patient focused app (39%, n = 18) whereas the IOTN (17%, n = 8), Invisalign (17%, n = 8) and Dental Monitoring apps (9%, n = 4) were the most popular clinician focused apps. It should be noted that 7 of the 15 apps were not exclusively orthodontic apps but may still be used to support orthodontic patients using features listed in Table 1.

Features deemed useful in patient focused apps

Thirty-seven respondents listed features which they had found useful in the apps which they had recommended to patients (Table 2). Provision of oral hygiene instructions was the most common reason for recommending apps to patients. All respondents were invited to answer this question whether they currently use apps to support patients or not.

Recommendation for future patient focused apps

Thirty-four of the respondents made suggestions for useful features to incorporate in future apps to support orthodontic patients. These are detailed in Table 3. The most common features included instructions on oral hygiene, retainer wear and reminders for elastics and removable appliances. Again, all respondents were invited to answer this question regardless of whether they currently use apps to support patients or not.

Willingness of participants to use an evidence based app

Ninety six percent (n = 109) of respondents reported that they would consider recommending an evidence based app to their patients to support treatment (Figure 3). Willingness of participants to use an evidence based app did not appear descriptively to be related to time since qualification. However, meaningful statistical analyses were unable to be conducted due to the small numbers who were unwilling to use apps in each group (1-5 years = 0, 5-10 years = 1, >10 years = 3).

Use of apps for professional practice

Thirty-three per cent (n = 37) of respondents reported using apps for professional practice. Seventy-six percent (n = 28) of respondents used apps for conferences and continuing education programmes and 54% (n = 20) used them for publications and journals. Other reasons included accessing online dental communities (43%, n = 16), practice promotion (35%, n = 13), practice management (27%, n = 10), ordering dental materials (24%, n = 9) and department administration (22%, n = 8).

Social media use

Twenty-two percent (n = 25) of the respondents reported recommending social media sites to their patients to provide them with generic information such as oral hygiene instruction, advice on appliance care advice and management of dental emergencies. Thirty-one percent (n = 35) of the respondents reported using social media to promote

their practice. The most commonly used platforms were Facebook and Instagram, with 88% (n = 53) and 65% (n = 39) of the respondents to this question using them for both delivery of generic information and practice promotion, respectively. Other social media platforms used included Twitter (18%), YouTube (15%) and LinkedIn (8%). None of the respondents provided information to identify their practice websites or social media pages.

Willingness of participants to use an evidence based social media platform

Eight-eight percent (n = 99) of respondents reported that they would use an evidence based social media platform to support patients during treatment if one were available. Willingness of participants to use an evidence based social media platform did not appear descriptively to be related to time since qualification, although this was difficult to assess as there were very small numbers who were unwilling to use social media in each group (1-5 years = 2, 5-10 years = 1, >10 years = 11).

DISCUSSION

Mobile Apps

Professional usage of apps has transformed many aspects of clinical practice. In healthcare they are widely used to perform tasks such as health record maintenance and access, communication, information gathering, patient management and monitoring, clinical decision-making and medical education and training (Ventola, 2014). Despite their benefits, better standards and validation need to be established to allow further integration of these increasingly sophisticated tools into medical practice. In this study of orthodontists, 33% of respondents reported using apps for professional development, most commonly for educational activities such as conferences and journal access. Apps were also reported to be in use for marketing and management, although to a lesser extent, which may be due to a lack of

availability of specific apps or clinician priorities to focus on clinical activity rather than marketing or management. Unfortunately, the names of specific apps in use for marketing and mangaement were not given by respondents in this study. The use of apps by orthodontists was lower than the use of medical apps by doctors, with one study reporting 89.6% of doctors used apps as part of their clinical practice (Mobasheri et al., 2015). The introduction of apps in medicine before its availability in dentistry could contribute to the difference in usage.

Only 20% of respondents currently use mobile apps for support of patient care and information provision; however, 96% of respondents said they were likely to use an evidence based app if one were available. One of the reasons for the discrepancy between current use and potential future use may be due to the lack of quality, ease of use and awareness by professionals of available apps. Siddiqui et al. (2021a) carried out a robust assessment of the quality of all orthodontic apps, on the UK Google Play Store and Apple App Store, which were specifically aiming to modify patients' behaviour to improve compliance with treatment. They were unable to identify any high quality orthodontic apps using the Mobile App Rating Scale (MARS). There are currently very few apps which are approved and recommended either via way of accreditation by experts in the field or by robust scientific testing (Scheerman et al., 2020). The National Health Service (NHS) library of apps lists those apps which meet NHS quality standards for safety and user-friendliness; however, no orthodontic apps are available in this library (NHS Apps Library, 2021). It is therefore sensible for clinicians to proceed with caution when recommending apps to patients which may be a barrier. The researchers considered assessing if there was a correlation between years since qualification (as an indication of age) and use/willingness to use orthodontic apps, however, the sample size was too small to detect any difference. Other barriers could include not knowing which apps to recommend and investigating

barriers to app recommendation would certainly be an interesting area for future research given the robust evidence showing their effectiveness.

Oral hygiene was the most common feature for which clinicians currently recommend apps to orthodontic patients (n = 30). This is likely because of the need for excellent oral hygiene during orthodontic treatment and the detrimental effects associated with poor compliance such as demineralisation, caries and periodontal disease (Travess et al., 2004). It is therefore understandable that Brush DJ, an app which reminds patients to brush their teeth and keeps them engaged during the process using music, was reported to be the most popular app recommended to patients. Thirty-nine per cent of respondents reported using Brush DJ; this is the only accredited dental app within the NHS library of apps, which may also have contributed to the awareness and popularity of this app.

Interestingly, when looking at suggestions made for features to include in future apps (Table 3), most of these could already be found in apps. We know this as they are features which other respondents reported that they currently use apps for (Table 2). It may be that clinicians are suggesting improved quality of these features or the clinicians may not be aware that these already exist. Two novel suggestions, however, were interaction with the clinician via an app and treatment simulations. Siddiqui et al. (2021a) assessed all techniques used in patient focused orthodontic apps to improve patient compliance. Clinician interaction and treatment simulations were not identified in any apps and may certainly be beneficial to incorporate in future apps.

Thirty-three per cent of respondents reported using apps for professional development, most commonly for educational activities such as conferences and journal access. The names of any specific apps were not given. Apps were also reported to be in use for marketing and management, although to a lesser extent, which may be due to a lack of availability or clinician priorities. There were

approximately equal respondents working in hospitals and practice settings (or both) making the results more generalisable.

Social media

Sixty respondents (53%) reported that they used social media to communicate generic information (31%) and promote their practice (22%) to patients. Facebook was the most popular platform (35%, n = 53) followed by Instagram (26%, n = 39). These two platforms were used more widely for practice promotion and this could be due to their ability to allow patients to view pictures, patient testimonials, services provided and also features where they are able to communicate with clinicians. These social media sites also allow advertising which may aid promotion of private practices. It was reported that the useful features that social media sites were used for were similar to those that apps were used for, although as listed above, social media has more interactive features readily available

Interestingly, Siddiqui et al., (2021b) found that in a survey of 125 orthodontic patients, 99% had access to social media. Of these patients, 30% had utilised social media related to orthodontics, the most popular platforms were: Instagram (n = 17) and Snapchat (n = 12). The proportion of patients engaging with orthodontic related social media pages is greater than those who engage with orthodontic apps; a recent survey by Sharif et al., (2019b) showed that none of the 100 patients who took part in the study had accessed an orthodontic app.

Strengths and Limitations

The questionnaire was piloted and amended based on the feedback before its final distribution in an effort to make it as robust as possible. There were no publications relating to the utilisation of apps and social media by orthodontists at the time of conducting this study. The results of this study have allowed for a better understanding orthodontic app and social media usage by orthodontists. However, it

must be appreciated that the sample size was small and limited to the membership of the BOS.

The response rate was low, one reason for this may be that the questionnaire was distributed via email which is known to have a lower response rate than in-person (30% vs 57%) or postal questionnaires (50%) (Lindemann, 2019). The effect of the COVID-19 pandemic may also have lowered the response rate. The questionnaire included questions that were not mandatory which contributed to a reduced data set as responses were not inclusive of personal practice websites and social media pages and therefore did not allow analysis of content accuracy.

Implications for clinical practice

Owing to the Covid-19 pandemic, patient care has been largely impacted, making telephone triaging and video consultations more popular. Good quality apps that contain accurate information especially on managing emergency situations may therefore be beneficial for patients who do not have immediate access to clinics and hospitals. Both apps and social media pages are increasingly available and accessible at any time. Particularly with social media they can be updated quickly as rules or guidance changes, which can make them cost effective and as contemporary as possible.

Implications for future research

The incorporation of features such as oral hygiene instructions, reminders, games, instant chats etc. into future apps may help patients stay engaged with treatment. It is important to ensure that these apps are being developed with the guidance of oral health experts to ensure their content is evidence based and they should ideally be trialled for their effectiveness prior to recommending them to patients.

CONCLUSION

The results of this study showed that 20% of professionals currently use apps and 22% use social media platforms for the provision of patient information. The most commonly used social media platforms were Facebook and Instagram. If a dedicated, evidence based app or social media platform existed, the majority of respondents reported they would want to use this to support patient care. There is therefore the potential for development high quality apps containing evidence based information to greatly improve patient care and to aid professional development.

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TABLES

	PATIENT FOCUSSED APPS	CLINICIAN FOCUSSED APPS
1	*Brush DJ (n = 18)	IOTN (n = 8)

	Oral hygiene instructions	Clinical index app
2	**Your jaw surgery** (n = 2) Information for patients requiring orthognathic surgery	**Invisalign** (n = 8) Track progress with Invisalign
3	***Oral B** (n = 1) Oral hygiene instructions	***Dental Monitoring** (n = 4) Remote monitoring of patient's treatment
4	**I braces** (n = 1) Information on fixed appliances, oral hygiene, dietary advice and emergencies	***BNF** (n = 2) Information on pharmaceutical drugs
5	**Trayminder** (n = 1) Reminder for use of aligners	***NHS safeguarding** (n = 1) Provides safeguarding guidance for orthodontic patients
6	**Brace mate** (n = 1) Allows choosing colour of the modules prior to appointments, oral hygiene instructions and emergencies	**Orthodontic monitoring** (n = 1) Remote monitoring of patient's treatment
7		***Shape communicate lab** (n = 1) Access to scans, appliances and design files
8		**Incognito** (n = 1) For patient's using Invisalign- track progress
9		***EPIC Haiku** (n = 1) Access to patient information, records, appointments on NHS trust computers.

Table 1. Apps respondents currently use or are aware of to support orthodontic patients.

(*) Apps that have been starred are not orthodontic specific apps but may still be used to support orthodontic patients using features listed in the table.

	USEFUL FEATURES	RESPONSE
1	Oral hygiene instructions	30
2	Instructions on retainer wear	11

3	Reminders for elastics, appliances and retainers	11
4	Appliance maintenance instructions	9
5	Food and diet advice	7
6	Toothbrush timer	1
7	Aligner sequences/simulations	1
8	Patient experiences	1
9	Selfies with Invisalign	1
10	Games to choose modules in advance	1

Table 2. Features which respondents had found useful in the apps which they had recommended to patients.

SUGGESTIONS FOR FEATURES TO INCLUDE IN FUTURE APPS	
1	Consequences of poor oral hygiene and compliance (n = 9).
2	Coping with twin blocks and other appliances (n = 7).

3	Reminders to change elastics, brushing teeth and maintaining regular appointments (n = 7).
4	Showing a patient how to clean around fixed appliance components using a typodont (n = 4), explanation of bond up process (n = 1), need for extractions (n = 1), knowledge on handling dental emergencies (n = 3), avoidance of any disinformation for safe clinical practice (n = 1) and apps that consist of games and graphics to help keep children engaged (n = 3).
5	Interaction with the clinician regarding progress with an appliance using interactive elements (n = 2).
6	Treatment simulations to help patients visualize and understand the process better (n = 1).
7	Elastic band orientation and regime with the help of compliance charts (n = 1).
8	Apps for parents on post-op care for patients who have had jaw surgery (n = 1).

Table 3. Suggestions for features to include in future apps and the corresponding Behaviour Change Techniques (BCTs).