SEDENTEX CT

EURATOM

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SEDENTEX CT

Safety and Efficacy of a New and Emerging Dental X-ray Modality

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Abstract:

Aim: to perform a needs analysis amongst the professional community and public so as to provide an opportunity for public and expert participation in design of content.

Methods: a combination of web surveys and focus group work amongst various stakeholders. Areas covered were threefold: website content, method of delivery and aspects of assessment of training. Web-based surveys used a standard list of statements, based upon a preliminary list of website content devised by a SEDENTEXCT project sub-group. Responders to the surveys were asked to express an opinion on these using a five point Likert scale.

Results: The provisional website content devised by the project members was shown to be acceptable to stakeholders, although the results establish a priority of adding content, with an emphasis on radiation safety, justification and optimisation aspects. Interactive elements were highly valued.

While the website content should be open to all (incl. the public), restricted roles (e.g. for contributing content and access to interactive elements) should be established by registration and "gatekeeping" mechanisms. External validation of training will be requ.ired for acceptability to users.

Conclusion: The Needs Analysis provided important information on the priorities for training of stakeholders. This information will now be applied in developing the SEDENTEXCT training website.

Table of Contents

1. The Context

1.1: SEDENTEXCT Aims and objectives

The aim of this project is the acquisition of the key information necessary for sound and scientifically based clinical use of dental Cone Beam Computed Tomography (CBCT). In order that safety and efficacy are assured and enhanced in the 'real world', the parallel aim is to use the information to develop evidence-based guidelines dealing with justification, optimisation and referral criteria and to provide a means of dissemination and training for users of CBCT. The objectives and methodology of the collaborative project are:

1. To develop evidence-based guidelines on use of CBCT in dentistry, including referral criteria, quality assurance guidelines and optimisation strategies. Guideline development will use systematic review and established methodology, involving stakeholder input.

2. To determine the level of patient dose in dental CBCT, paying special attention to paediatric dosimetry, and personnel dose.

3. To perform diagnostic accuracy studies for CBCT for key clinical applications in dentistry by use of in vitro and clinical studies.

4. To develop a quality assurance programme, including a tool/tools for quality assurance work (including a marketable quality assurance phantom) and to define exposure protocols for specific clinical applications.

5. To measure cost-effectiveness of important clinical uses of CBCT compared with traditional methods.

6. To conduct valorisation, including dissemination and training, activities via an 'open access' website.

At all points, stakeholder involvement will be intrinsic to study design.

1.2: Work package 6 (WP6) objectives

- to perform a needs analysis amongst the professional community and public so as to provide an opportunity for public and expert participation in design of content
- to provide a robust and cost-effective means of delivery of on-line training and information dissemination
- to provide an open repository of knowledge and experience on CBCT, including the Guidelines developed by Work package 1
- to facilitate growth and sharing of knowledge and experience
- to ensure continued support and maintenance of the resources developed in the Work package beyond the lifetime of the project

1.3: Deliverable 6.1
"Needs requirements analysis". This Deliverable forms the basis of WP6, being the user derived information on training needs.

2. The Methodology

This section describes the work performed.

2.1: The establishment of the WP6 implementation group

The Work Package 6 implementation group, involving scientists from UNIMAN, NKUA, UMFCLUJ, KULeuven, MAHOD and VU, met in Month 1 (Milestone 6.1) as planned in the DoW and devised preliminary website contents (Table 1). EADMFR members, manufacturers and physicist groups were then surveyed about these preliminary contents.

Table 1: *preliminary website contents*

Pictures of available CBCT equipment on the market
Links to manufacturers' websites
A detailed technological description of how CBCT works
A history of the development of CBCT technology
An objective technical comparison of different CBCT machines
Information about Radiation doses and risks of CBCT
Dose Maps for CBCT
A strategy for Radiation Protection of staff
A strategy for Radiation Protection of patients
A Quality Assurance Programme for users of CBCT

Results analysis: website content

Survey results were then examined critically to establish a clear picture of perceived needs. It was clear that nothing included on our provisional content list had been rejected by respondents. For the EADMFR and Medical Physicist surveys, the website content preferences were possible to rank according to perceived needs (Table 2).

Table 2: Ranking of needs (website content) taken from responses to the web surveys conducted through EADMFR and EFOMP (and other means of contacting Medical physicists)

Rank	EADMFR survey (principally dental radiologists)	Rank	EFOMP/ Medical Physicist survey
1	Information about Radiation doses and risks of CBCT	1	An objective technical comparison of different CBCT machines
2	A Quality Assurance Programme for users of CBCT	2 =	Information about Radiation doses and risks of CBCT
3	A strategy for Radiation Protection of patients	2 =	A Quality Assurance Programme for users of CBCT
4	A strategy for Radiation Protection of staff	4	Information about Quality Control Test Tools for CBCT
5 =	Anatomical CBCT reference image library	5	A detailed technological description of how CBCT works
5 =	Pathological CBCT reference image library	6	A strategy for Radiation Protection of patients
7	Evidence-based Referral/ Selection Criteria for CBCT	7	A strategy for Radiation Protection of staff
8	Dose Maps for CBCT	8	Dose Maps for CBCT
9	Descriptions of the Dental clinical uses of CBCT	9	An image library of faults on CBCT images
10 =	Information about Quality Control Test Tools for CBCT	10	A regularly updated database of links to scientific publications on CBCT
10 =	An image library of faults on CBCT images	11	Evidence-based Referral/ Selection Criteria for CBCT
12	Descriptions of the Oral and Maxillofacial Surgery clinical uses of CBCT	12	Descriptions of the Dental clinical uses of CBCT
13	A detailed technological description of how CBCT works	13	Descriptions of the Oral and Maxillofacial Surgery clinical uses of CBCT
14	An objective technical comparison of different CBCT machines	14	Links to manufacturers' websites
15	A regularly updated database of links to scientific publications on CBCT	15	A list of available CBCT equipment on the market
16	Descriptions of the "non-dental" clinical uses of CBCT	16	Descriptions of the "non-dental" clinical uses of CBCT
17	A list of available CBCT equipment on the market	17	Anatomical CBCT reference image library
18	Links to manufacturers' websites	18	A Pathological CBCT reference image librar
19	Pictures of available CBCT equipment on the market	19	A history of the development of CBCT technology
20	A history of the development of CBCT technology	20	Pictures of available CBCT equipment on the market

For manufacturers, in view of the small sample surveyed, it was only reasonable to group the needs into bands of needs (Table 12).

Table 3: Needs analysis of manufacturers for website content

Manufacturers' survey	
Greatest need ↕ **Least need**	• Descriptions of the Dental clinical uses of CBCT • Descriptions of the Oral and Maxillofacial Surgery clinical uses of CBCT • Evidence-based Referral/ Selection Criteria for CBCT • An image library of faults on CBCT images • Descriptions of the "non-dental" (e.g. imaging of sinuses, middle ear) clinical uses of CBCT • A Pathological CBCT reference image library • A regularly updated database of links to scientific publications on CBCT
	• An objective technical comparison of different CBCT machines • Information about Radiation doses and risks of CBCT • An Anatomical CBCT reference image library
	• A list of available CBCT equipment on the market • A detailed technological description of how CBCT works • A strategy for Radiation Protection of staff • A strategy for Radiation Protection of patients • Information about Quality Control Test Tools for CBCT
	• Pictures of available CBCT equipment on the market • Links to manufacturers' websites • A Quality Assurance Programme for users of CBCT
	• Dose Maps for CBCT • A history of the development of CBCT technology

Results analysis: method of delivery

Once again, results were ranked for the two larger surveys and banded for the manufacturers' survey (Tables 4 and 5).

Results analysis: Assessment of users

Finally, results for this element were ranked for the two larger surveys and banded for the manufacturers' survey (Tables 4 and 5).

Table 4: Ranking of needs (method of online delivery of training) taken from responses to the web surveys conducted through EADMFR and EFOMP (and other means of contacting Medical physicists). Shading in red indicates statements that were rejected by respondents.

Rank	EADMFR survey (principally dental radiologists)	Rank	EFOMP/ Medical Physicist survey
1	A diagnostic forum where I can upload images for discussion would be valuable	1	A Discussion Board for interaction with other registered users would be valuable
2 =	Text-based information for training is essential	2 =	Text-based information for training is essential
2 =	A Discussion Board for interaction with other registered users would be valuable	2 =	Powerpoint lectures are essential
2 =	There should be restrictions on access to parts of the website according to the user's status (professional, public etc	4	The website should only be a source of information, from which I can passively choose relevant things to view
5 =	Powerpoint lectures are essential	5	A diagnostic forum where I can upload images for discussion would be valuable
5 =	Video presentations are essential	6 =	Powerpoint lectures with audio (voiceover) are essential
5 =	A "wiki" approach (like www.wikipedia.org), to maximise user involvement, would be valuable	6 =	A "wiki" approach (like www.wikipedia.org), to maximise user involvement, would be valuable
8	The website should only be a source of information, from which I can passively choose relevant things to view	8	There should be restrictions on access to parts of the website according to the user's status (professional, public etc
9	Powerpoint lectures with audio (voiceover) are essential	8	All parts of the training elements of the website should be open to everyone, including the public
10	The public (patients) should be given priority over the professions in determining the content of their part of the website	8	The public (patients) should be given priority over the professions in determining the content of their part of the website
11	All parts of the training elements of the website should be open to everyone, including the public	11	Video presentations are essential

Table 5: Needs analysis of manufacturers for delivery of content

	Manufacturers' survey
Greatest agreement ↑ ↓ Least agreement	• A diagnostic forum where I can upload images for discussion would be valuable • A "wiki" approach (like www.wikipedia.org), to maximise user involvement, would be valuable • Text-based information for training is essential • Powerpoint lectures are essential • A Discussion Board for interaction with other registered users would be valuable
	• The public (patients) should be given priority over the professions in determining the content of their part of the website • The website should only be a source of information, from which I can passively choose relevant things to view • Powerpoint lectures with audio (voiceover) are essential • There should be restrictions on access to parts of the website according to the user's status (professional, public etc)
	• All parts of the training elements of the website should be open to everyone, including the public • Video presentations are essential

Table 6: Ranking of needs (methods of assessment of training) taken from responses to the web surveys conducted through EADMFR and EFOMP (and other means of contacting Medical physicists). Shading in red indicates statements that were rejected by respondents.

Rank	EADMFR survey (principally dental radiologists)	Rank	EFOMP/ Medical Physicist survey
1 =	Accreditation/ validation of the training from an external body would be important	1	Accreditation/ validation of the training from an external body would be important
1 =	Assessment using visual interactive elements (e.g. labelling images) would be essential	2 =	Assessment using visual interactive elements (e.g. labelling images) would be essential
1 =	Multiple Choice Questions (MCQs) would be essential	2 =	Multiple Choice Questions (MCQs) would be essential
1 =	Short answer questions (one word answers) would be essential	2 =	Extended matching Questions (EMQs) would be essential
1 =	"True or False" questions would	2 =	Short answer questions (one

	be essential		word answers) would be essential
6	Extended matching Questions (EMQs) would be essential	2 =	"True or False" questions would be essential
7	I will only consider using the training elements in the website if they are accredited for CPD ("Continuing Professional Development") purposes	7	I will only consider using the training elements in the website if they are accredited for CPD ("Continuing Professional Development") purposes
8	No assessment is needed because I am happy to judge the success of training myself	8	No assessment is needed because I am happy to judge the success of training myself

Table 7: Needs analysis of manufacturers for assessments

Manufacturers' survey	
Greatest agreement ↕ Least agreement	• Multiple Choice Questions (MCQs) would be essential • Assessment using visual interactive elements (e.g. labelling images) would be essential • Extended matching Questions (EMQs) would be essential
	• Accreditation/ validation of the training from an external body would be important • Short answer questions (one word answers) would be essential • "True or False" questions would be essential • No assessment is needed because I am happy to judge the success of training myself

2.2: Focus group work: methodology

We conducted a focus group meeting with opinion-leaders in a local dental community drawn from administrators in the primary care trust, community dental services and local general dental practitioners.

2.3: Focus group work: results
Discussion points
Information and knowledge
 The dentists were concerned with practical issues associated with the features to look for when purchasing a machine; the high cost of three-dimensional imaging equipment; what would be the uses and application of three dimensional imaging?; how they would interpret images, and the radiation dosage and protection of patients. As this is a new technology,

dentists asked for referral guidelines for patients and other practical issues such as what the imaging area would include.

Website content
Dentists requested text and visually based information, including information by topic with web based hyperlinks. Interactive areas, with an upload faculty and discussion area were also requested, but dentists argued against a wiki area open to every user as information available should be evidence-based. These areas would need to have registration and password protection for reasons of confidentiality. Images could be discussed as long as patient identifiers were stripped from any images. It was pointed out that Dicom format uses patient identifiers embedded in the file headers. There was a strong request that any medico legal implications are carefully considered. There should also be a patient area on the website.

Continuing Professional Development (CPD)
The general feeling was that the training should be assessed for CPD, but questions were raised over the verification of online training. A system which required participants to log in and complete online assessments would allow the training to be verified for CPD. Online lectures and interactive tutorials were also requested.

2.4 Discussion

The results of the two larger surveys (EADMFR and Medical Physicists) will be considered first. There was conformity between the two surveys in the ranking of website content needs, with an emphasis on radiation risks and on quality assurance. Not surprisingly, the EADMFR responders (predominantly clinicians) prioritised anatomical and pathological image libraries and selection criteria, whereas the medical physicists ranked these lower. The dentist focus group emphasised the need for referral criteria, as they felt that they were more likely to seek referral rather than buying CBCT equipment themselves. Reassuringly, the dentists also were concerned about radiation risks. Overall, the provisional website content devised at the start of the project appeared to be a reasonable one, with no other items appearing in the free text boxes with any frequency.

In terms of methods of training delivery, it was very clear that interactive elements of the website would be highly valued (discussion board, diagnostic forum). The dentists were alone in bringing up possible medico-legal issues around uploading clinical images and taking opinions from other website users. Similarly, the dentists were concerned about the "wiki" approach, while the EADMFR members and medical physicists were comfortable with them. A variety of methods of delivering training were supported by all.

In terms of assessment, accreditation of training by an external body was the most highly rated statement in the professional groups surveyed.

2.5: Conclusions
- The Needs Analysis provided important information on the priorities for training of stakeholders.
- The provisional website content devised by the project members was shown to be acceptable to stakeholders, although the results establish a priority of adding content, with an emphasis on radiation safety, justification and optimisation aspects.
- Interactive elements were highly valued.
- While the website content should be open to all (incl. the public), restricted roles (e.g. for contributing content and access to interactive elements) should be established by registration and "gatekeeping" mechanisms.
- External validation of training will be required for acceptability to users.

2.6: Forthcoming work and input to the project

The results of the Needs Analysis are now being fed into the design of the Provisional website. In particular, the following are being addressed as priorities:
- Establishing hierarchy of website users, including registration processes
- Diagnostic forum/ discussion board
- Rich media content

A storyboarding process is currently underway with a short timeline
The revised timetable presented in the SEDENTEXCT first annual report is