Authors:
Ros Aziah Mohd Rashid

Reviewed by:
Dr. Junainah Sabirin

External Reviewer:
Dr Natasya Ahmad Tarib

For further information please contact:

Malaysian Health Technology Assessment Section (MaHTAS)
Medical Development Division
Ministry of Health Malaysia
Level 4, Block E1, Precinct 1
Government Office Complex
62590 Putrajaya.

Tel: 603 8883 1229

Available at the following website:
http://www.moh.gov.my

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Background

Dentistry, also known as dental medicine and oral medicine, is a branch of medicine that consists of the study, diagnosis, prevention, and treatment of diseases, disorders, and conditions of the oral cavity, commonly in the dentition but also the oral mucosa, and of adjacent and related structures and tissues, particularly in the maxillofacial (jaw and facial) area. Various types of dental treatments are carried out to prevent or treat the two most common oral diseases which are dental caries (tooth decay) and periodontal disease (gum disease or pyorrhea). Common treatments involve the restoration of teeth, extraction or surgical removal of teeth, scaling and root planing, endodontic root canal treatment and cosmetic dentistry.

Making an accurate impression is a crucial step for the fabrication of any prosthesis. Inaccuracies in this step could lead to compounding errors in the subsequent steps of dental (orthodontic/prosthodontic/restorative etc.) procedure. Conventional dental impressions have been a standard procedure for (orthodontic/prosthodontic/restorative etc.) for a long time. However, the workflow associated with conventional dental impression has limitations that affect the efficiency. Selection of tray and impression material, impression technique, time consumption, impression disinfection, transportation, and storage issues are the main reasons for considering alternative impression techniques in (orthodontic/ prosthodontic/ restorative). Hence, digital dental impression was proposed as a possible alternative to the conventional workflow.

In Malaysia, the digital dental impression is only available in the private dental clinics. Therefore, this technology review was requested to review the evidence related to digital dental impression in view of the intension to adopt it in Ministry of Health (MOH) facilities.

Objective

The objective of this technology review was to assess the effectiveness, cost-implication, safety, organisational and social issues related to digital dental impression.

Methods

Electronic databases were searched through the Ovid interface: Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) 1946 to Feb 2020, EBM Reviews - Cochrane Central Register of Controlled Trials – Jan 2020, EBM Reviews - Cochrane Database of Systematic Reviews - 2005 to Feb 2020, EBM Reviews - Health Technology Assessment – 4th Quarter 2016, EBM Reviews – NHS Economic Evaluation Database 1st Quarter 2016. Searches were also run in INAHTA database, PubMed database and U.S. Food and Drug Administration (USFDA) website. Google and Google Scholar were also used to search for additional web-based materials and information. Additional articles were identified from reviewing the references of retrieved articles. Last search was conducted on 14th February 2020.

Results and conclusion

A total of 157 records were identified through the Ovid interface and PubMed, and two were identified from other sources (references of retrieved articles). After removal of 56 duplicates, 103 records were screened and 69 were excluded. Of these, 34 relevant abstracts were retrieved in full text. After reading, appraising and applying the inclusion and exclusion criteria to the 34 full text articles, ten full text articles were included and 24 full text articles were excluded.

There was limited in-vivo retrievable evidence to suggest digital dental impression was found to be comparable to conventional impression for lower and upper arch anteroposterior length, lower and upper intercanine distance, lower and upper intermolar distance, complete-arch implant-supported restoration and marginal/ internal fit.

There were also limited evidence retrieved to suggest that digital dental impression was more comfortable, preferred by patients and also operators and had shorter procedure/chairside time compared to conventional impression. Patients perceived that digital dental impression was faster compared to conventional impression. Meanwhile, operators perceived that digital dental impression was less difficult.

However, there was no evidence retrieved on the safety and cost-effectiveness of digital dental impression.