Authors:
Ros Aziah Mohd Rashid
Ku Nurhasni Ku Abdul Rahim
Dr. Izzuna Mudla Mohamed Ghazali

External Reviewer:
Associate Professor Dr. Firdaus Hariri
Consultant Oral & Maxillofacial Surgeon

Associate Professor Dr. Mohd Nazimi bin Abd Jabar
Consultant Oral &Maxillofacial Surgeon

Associate Professor Dr. Azimatun Noor Aizuddin

Dr. Stephen Joseph Royan
Consultant Oral & Maxillofacial Surgeon

Background

Oral and Maxillofacial Surgery (OMFS) is a surgical specialty which deals with diseases, conditions and injuries of the mouth, jaws, face, head, neck and associated structures. This branch of surgical expertise is an evolving field and the newly introduced techniques have widened the scope of OMFS.

In Malaysia, there was a gradual increase of total attendance for OMFS patients in the 2016 to 2019 with average number of 3,715 patients. In 2019, 90.0% of the surgery were minor surgical cases consist of pre-prosthetic and pre-orthodontic procedures, removal of impacted teeth, biopsies, excision or ablative surgeries and removal of retained or displaced roots. Meanwhile, major surgery of 10.0% for surgical removal of malignant lesions, primary or secondary facial reconstruction, cleft lip and palate repair, orthognathic surgery and distraction osteogenesis.

Computer-assisted surgery (CAS) represents a surgical concept and set of methods, that use computer technology for surgical planning, and for guiding or performing surgical interventions. Computer assisted surgery is also known as computer-aided surgery, computer-assisted intervention, image-guided surgery, digital surgery and surgical navigation. Nowadays, different variations of computer-assisted surgery are used. Over the past decade, with the great development of computer technologies, the computer-aided surgery has been widely used for minimizing the risk and improving the precision of the surgery. Compared with the traditional OMFS, the computer aided OMFS overcomes the disadvantage that the treatments on the anatomically complex maxillofacial region depend almost exclusively on the experience of the surgeon.

Hence, this Technology Review (TR) was requested by Oral & Maxillofacial Surgeon and Head of Oral & Maxillofacial Surgery Department, Hospital Kuala Lumpur to assess the feasibility of technology to be adopted in Ministry of Health facilities.

Objective

The objective of this technology review was to assess the effectiveness, cost-implication, safety and organisational issues related to the application of digital assisted technology for oral and cranio-maxillofacial surgery.

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 April 2021. 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 12th June 2021. A cost comparison analysis was conducted using the Microsoft Excel 2013. The total costs of each surgeries were calculated using the time-driven procedure-based costing.

Results and conclusion:

A total of 822 records were identified through the Ovid interface and PubMed, and six were identified from other sources (references of retrieved articles). After removal of 326 duplicates, 502 records were screened and 418 were excluded. Of these, 84 relevant abstracts were retrieved in full text. After reading, appraising, and applying the inclusion and exclusion criteria to the 84 full text articles, 12 full text articles were included and 72 full text articles were excluded.

There was fair to good level of evidence retrieved to suggest that digital/ computer assisted oral & cranio-maxillofacial surgery has better soft tissue prediction and CMF skeletal harmony for both maxillary and mandibular site. As for the navigation, the accuracy and zygomatic-maxillary (ZMC) eminence were better compared to surgery without navigation. However, the asymmetry index and orbital volume ZMC width was comparable between both groups. For safety, there was similar adverse event rate in both groups. In terms of organisational issues, digital/ computer assisted oral & cranio-maxillofacial surgery has shorter operative/surgery time, reconstructive, ischaemic time and length of stay. Digital/ computer assisted oral & cranio-maxillofacial surgery was also found to have lower cost compared to conventional method with a cost saving of approximately RM 1,632.00/surgery. However, a minimum number of 15 surgeries per month in a hospital is suggested to achieve a minimum savings.