

TELEDENTISTRY: A SYSTEMATIC LITERATURE REVIEW

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• Introduction

Teledentistry

Cook (1997) defined it as “the practice of using video-conferencing technologies to diagnose and to provide advice about the treatment over a distance

Telemedicine

The combined use of telecommunications and computer technologies to improve the efficiency and effectiveness of healthcare services by liberating caregivers from the additional constraints of space and time and empowering consumers make informed choices in a competitive marketplace



Rationale



Lockdown has made it impossible for patients to visit a doctor for a physical one-on-one interaction but has in a way paved path to several telehealth facilities



Most of the dental cases are non-emergency cases and not paying visit to the doctor has impacted both the patient and the dentist in tremendous ways.



The main purpose of this research was to review the feasibility of online dentistry



Aims & Objective

The main aim of this review of literature was to:

1. To study types of patient interaction in teledentistry and its benefits
2. To review the advantage of teledentistry

The main objective of this study was to explore its application in the field of dentistry



Methodology

A total of 57 comprehensive full-text articles and publications were hand searched in English language from electronic databases like PubMed and MedLine to study the evolution and benefits of Teledentistry

A total of 9 countries were reviewed

- UNITED STATES
- GERMANY
- SWITZERLAND
- UNITED KINGDOM
- CANADA
- AUSTRIA
- ITALY
- SPAIN
- JAPAN
- BRAZIL
- SWEDEN
- ITALY
- AUSTRALIA
- PORTUGAL
- SERBIA
- FINLAND

KEYWORDS

- “Dentistry AND videoconferencing”
- “Dentistry AND health promotion”
- “Teledentistry AND NOT Telemedicine”
- “Telehealth AND Teledentistry”
- “Teledentistry”
- “Oral health”
- “Teledentistry AND dental education”
- “Teledentistry AND remote health”
- “Teledentistry OR Telehealth”

Inclusion criteria

- It includes all the studies from 1994 to February 2013.
- All the text which is published in English and full text accessible.
- All the contents and publications which are directly relatable to Teledentistry and related disciplines.

Exclusion criteria

- It excludes all the publications before 1994. All the publications after 2013.
- All the articles and publications which were not in English and were full text unavailable.
- All the publications which have no concerns with the field of Teledentistry

Forms of Teledentistry

Real time consultation (Synchronous)

Transfers information immediately
Dentist and patient at different locations can see hear and communicate with each other using advanced telecommunication technology

Store and Forward (Asynchronous)

Allows data to be stored in local database to be forwarded as needed
Collecting all the patient info and images, storing that data for review by a dentist specialist at a later time. Later, the dentist reviews the information to make a diagnosis and treatment plan

Scope of Teledentistry



Patient monitoring at remote
site by video conferencing



Images can be
stored & forwarded
for peer consultation



Teleconsultation via mobile
health applications

Teledentistry Services

Patient
Consultation

Professional
Education

Specialist Referral
Services

Consumer medical
and health
information

Remote patient
monitoring

Teledentistry Delivery Mechanisms



POTS (plain old
telephone system)



Networked programs



Point-to-point
connections



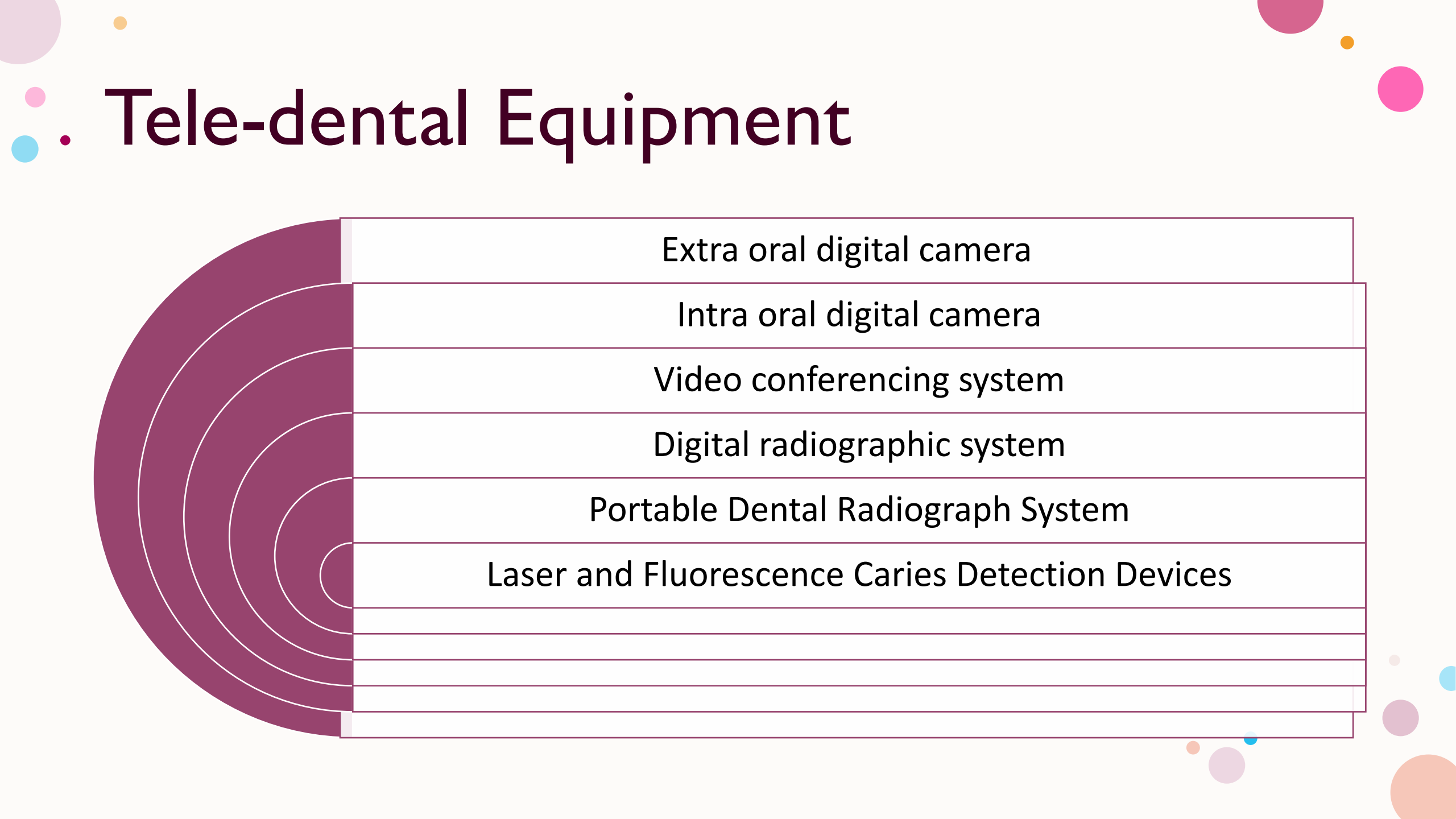
Primary or specialty
care to the home
connections



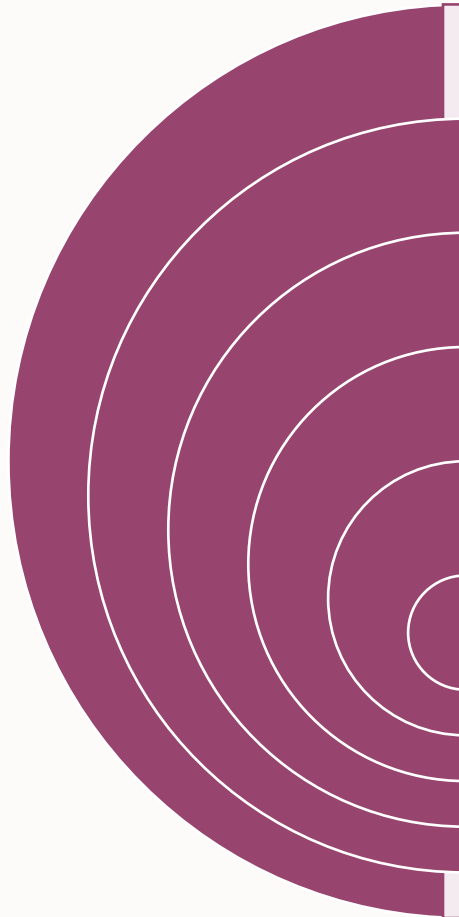
Home to monitoring
center links



Web-based e-health
patient service sites



• Tele-dental Equipment



Extra oral digital camera
Intra oral digital camera
Video conferencing system
Digital radiographic system
Portable Dental Radiograph System
Laser and Fluorescence Caries Detection Devices

Applications of Teledentistry

Oral Medicine

Orthodontics

Endodontics

Paediatric and preventive dentistry

Oral and Maxillofacial Surgery

Community Dentistry

Tele-Oral Medicine

- Photographic documentation of oral lesions was considered acceptable by 75% of patients seen for diagnosis of the lesions.

Leao & Porter (1999)

- The results of radiological interpretation of periapical lesions when analyzed by conventional methods or tele dentistry are comparable.

Mistak et al & Baker et al. (1999)

- A 95% correct diagnosis rate found when digital radiographs were transmitted through email.

Corr et al (2000)

- Comparison of tele dermatology diagnosis with histopathological examinations revealed a 79% correct distant diagnosis.

Lozzi et al

- The majority of papers favor transmission of clinical and radiographic images by email. Direct emails can be used for transmission of electronic patient history forms, appointment schedules, referrals, health reports & patient's concerns and questions

• Tele-Orthodontics

- Email image transfer is a reliable form of orthodontic planning & advice for general dentists in UK.

Stephans et al. (2002)

- Interceptive orthodontics care provided at a rural & inter-city clinic in Washington state. Ortho faculty member - real time teledentistry to assist general dentist on site.

Berndt J et al (2008)

- 71% general dental practitioners (200) agreed that teledentistry is a good way of positively identifying patients who should be referred to consultant orthodontist.

Mandall NA et al (2005)

Tele-Endodontics

- Remote dentists can identify root canal orifices based on images of endodontically accessed teeth.

Brullmann D et al. (2011)

- No statistical difference existed between the ability of evaluators to identify periapical bone lesions using conventional radiographs on a view box and their ability to interpret the same images transmitted on a monitor screen by a video teleconferencing system

Baker WP 3rd et al. (2000)

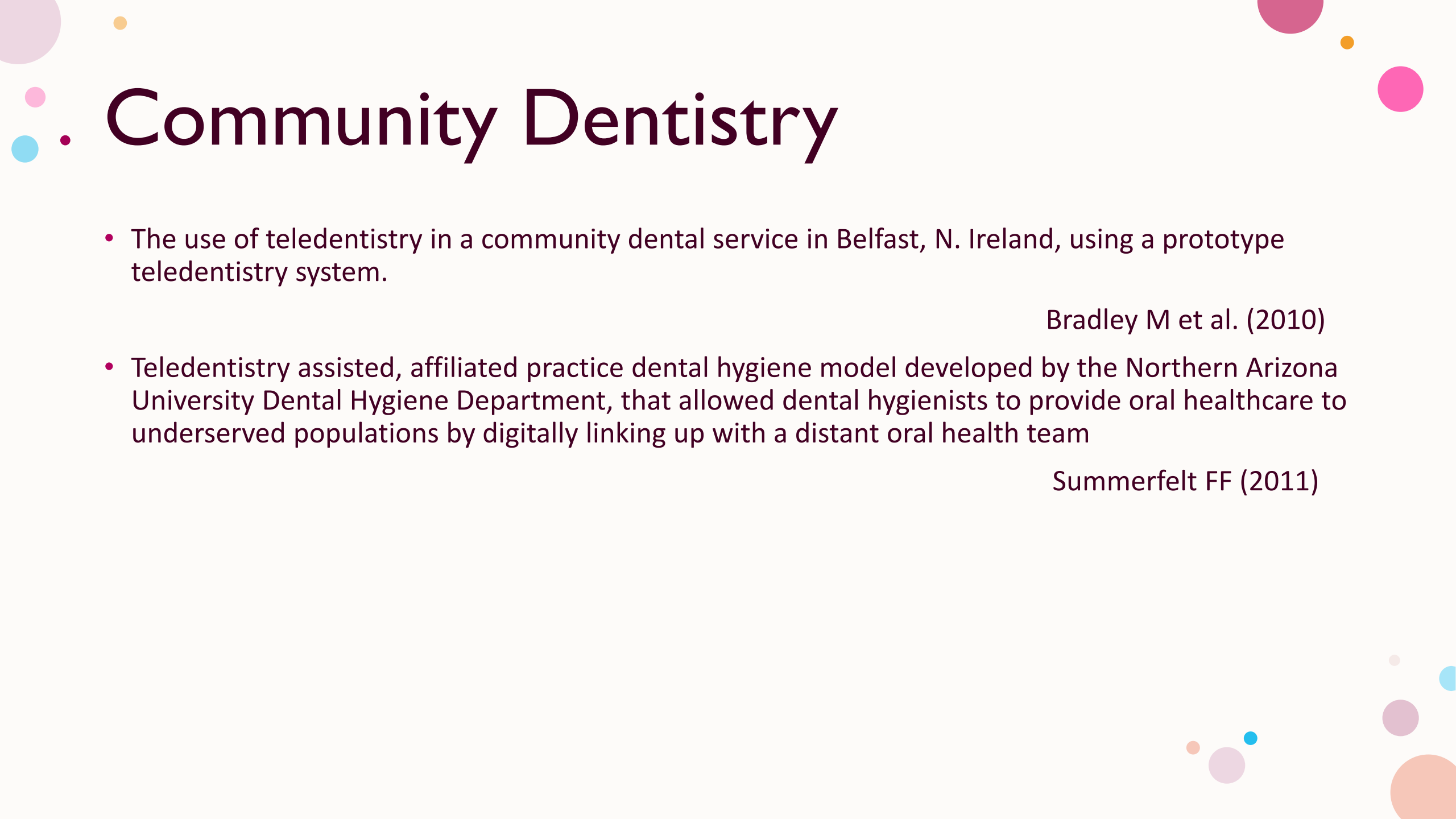
Oral & Maxillofacial Surgery

- Diagnostic assessment of the clinical diagnosis of impacted third molars assisted by the telemedicine approach was equal to the realtime assessment of clinical diagnosis.

Duka M et al. (2009)

- Smartphones provide fast and clear access to electronically mailed digital images and allows the oral/maxillofacial surgeon free mobility. - allows for improved efficiency of the specialty consultation and improved triaging, ultimately providing improved care to the maxillofacial patient

Aziz SR and Ziccardi VB (2009)



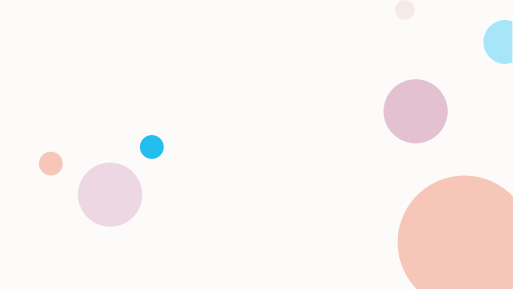
Community Dentistry

- The use of teledentistry in a community dental service in Belfast, N. Ireland, using a prototype teledentistry system.

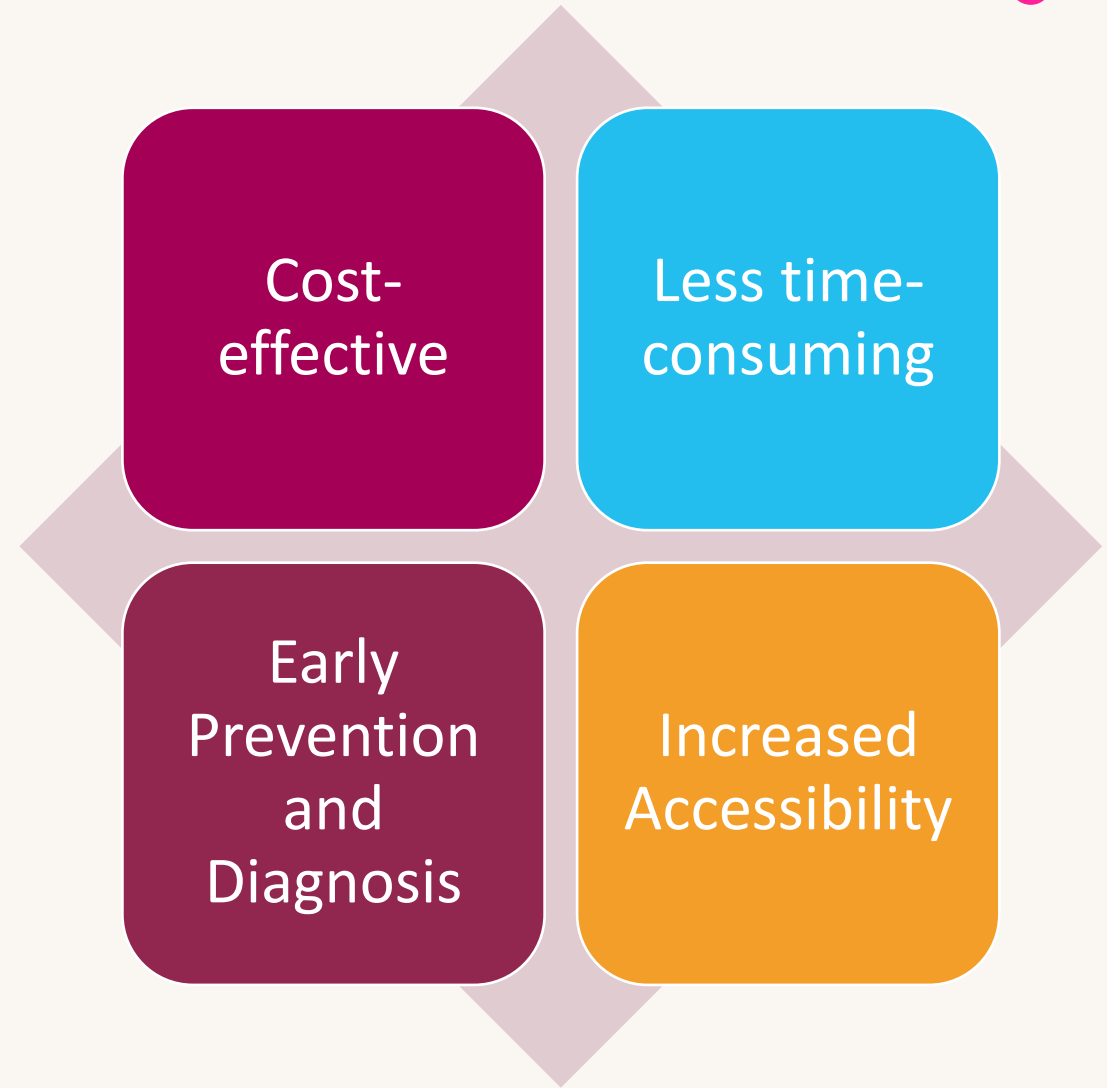
Bradley M et al. (2010)

- Teledentistry assisted, affiliated practice dental hygiene model developed by the Northern Arizona University Dental Hygiene Department, that allowed dental hygienists to provide oral healthcare to underserved populations by digitally linking up with a distant oral health team

Summerfelt FF (2011)



Advantages of Teledentistry



Scope of Teledentistry

Teledentistry can improve access to oral health care improve the delivery of oral healthcare & lower its costs. potential to eliminate disparities in oral healthcare between rural & urban communities.

Inter-professional communications will improve dentistry's integration into the larger healthcare delivery system.

Provide aspects of decision support & facilitate a sharing of contextual knowledge of the patient among dentists

Limitations

Legal issues - licensure, malpractice, privacy, security & ethics.

Technical problems during data transmission - misdiagnosis or medical error.

Undetectable alteration of patient's records has been a longstanding problem.

Currently no insurance company has a reimbursement system for tele dentistry.

Most teledentistry programs are in English.

Future goals should include considerations for multilingual programs

Future of Teledentistry

Potential to replace costly, traditional, dental consultations in remote areas.

Invention of devices capable of capturing & transmitting images & other data in digital form.

Digital x-rays sensors, laser scanners, intraoral cameras.

Primary Health Care centers : a desktop computer, teleconsulting software, Internet connection, digital camera, radiograph/text scanner

Conclusion



The teledentistry approach proved to be a feasible and viable solution, in terms of time, stress, and money saved for patients.



When taking a societal perspective, the implementation of teledentistry is likely to be a cost-effective alternative compared with the standard practice of face-to-face consultation.



Moreover, it is helpful for students to get better patient exposure thereby improving their clinical expertise and ultimately the number of beneficiaries.

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Thank you

