

**TELEDENTISTRY: A SYSTEMATIC REVIEW OF THE LITERATURE**

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**ABSTRACT**

**Introduction:** Teledentistry is a new technology providing a remote consultation and dental health care for patients. The aim of this study was to conduct a systematic review of the literature about teledentistry in order to detail international experiences of this innovation, its benefits and feasibility. **Methods:** An online database search was performed on Medline via PubMed from 1994 to 2017 using the following Mesh terms and their combinations: "Telemedicine" and "Dentistry", "Remote consultation" and "Dentistry", "Telecommunications" and "Oral medicine", "Telemedicine" and "Dentistry" and "Quality of health care", "Diagnosis" and "Remote consultation" and "Dentistry", "Remote consultation" and "Surgery, oral". After selection of articles, data were extracted and analyzed. **Results:** 62 articles were selected from 332 papers, most of them were Cohort study. Many applications of teledentistry were described in this review in different international experiences, from their advantages and feasibility of this technology were concluded. **Discussion:** Teledentistry is a new alternative to traditional methods of providing dental health care. According to this study, it's a feasible method presenting various earnings improving the quality of medical care and dental health care level.

**KEYWORDS:** Telemedicine, teledentistry, electronic transmission, remote consultation, diagnosis, quality of health care.

**INTRODUCTION**

Tele dentistry is an innovative technology first described in 1994, consisting to provide remote consultation and dental health care for patients. It is an alternative to traditional methods that seeks to overcome their defects.

Advantages and limits of this technology should be well studied to confirm its feasibility and effectiveness, therefore a systematic review of literature was conducted in order to report international experiences of teledentistry, its benefits and limitations and to assess its feasibility.

**Articles and methods**

A search was undertaken using Medline database via "PubMed" interface. The following Mesh terms were used and combined then with the Boolean operator "and": "Telemedicine" and "Dentistry", "Remote consultation" and "Dentistry", "Telecommunications" and "Oral medicine", "Telemedicine" and "Dentistry" and "Quality of health care", "Diagnosis" and "Remote consultation" and "Dentistry", "Remote consultation" and "Surgery, oral".

The selection of articles respected the inclusion criteria which were: articles published in the period from 1994 to

2017 in French or English language, type of study: descriptive, cohort, case compared, case series and randomized controlled trial study or review of literature. The exclusion criteria were: publications in a language other than French or English and out from the period 1994-2017, articles that only the title was available, articles that full text was not available and data of the abstract were non-informative, articles don't answer the questions search or consisting in a letter to the editor.

**Data extraction and synthetizes**

A reading gride was respected for data extraction including.

Article identification, aim of article, type of study, country of teledentistry application, act of teledentistry, actors, specialty, way of data transmission, interface of data collection and storage, benefits, limitations, discussion, conclusion.

**RESULTS AND ANALYSIS<sup>[1-62]</sup>**

Search identified a total of 332 references, after respecting inclusion and exclusion criteria, suppression of duplicates and activation of filters, 62 articles were retained for review (figure1).

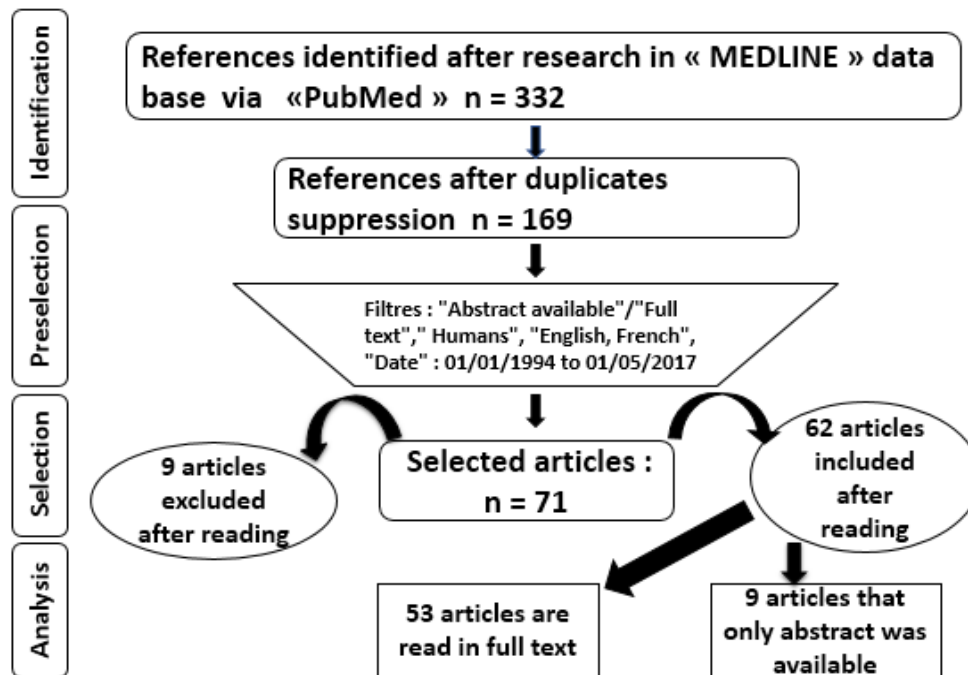


Figure 1: Flow Diagram of identifying relevant studies.

According to this review, many experiences of teledentistry were reported, there were majoritary described in America (34 articles) specially in USA (26 articles), then in Europe (26 articles), teledentistry was also reported in Asia (5 articles) and Africa (3 articles).

These experiences were conducted in many specialties such as oral medicine and oral surgery (18 articles), orthodontics (10 articles), pedodontics (6 articles), conservative dentistry (4 articles), periodontics and oral hygiene (5 articles), prosthodontics (1 article) and finally occlusodonty (1 article).

For data transmission, various ways are explored like e-mail (19 articles), specific software (14 articles), mobile

(14 articles), mobile applications (1 article), or simply the fax (1 article).

The most common type of study identified was Cohort study (28 articles).

According to the review, telemedicine in dentistry was explored in many applications, the largest number of studies reported the act of tele expertise (35 articles) and teleconsultation (28 articles), besides to the tele education (13 articles), tele motivation (8 articles), medical teleassistance (2 articles), tele administration (2 articles), tele surveillance (1 article) and tele diagnosis (1 article).

Table 1: Results extracted from the review study.

Type of study	Country	Specialty	Act	Mean of transmission
Cohort study	America	Oral Medicine and Oral Surgery	Tele expertise	E-mail
Case compared study	Europe	Orthodontics	Teleconsultation	Specific software
Descriptive study	Asia	Pedodontics	Tele education	Mobile
Literature review	Africa	Conservative dentistry	Tele motivation	Mobile applications
Randomized controlled trial study		Periodontics	Medical teleassistance	Fax
Case series		Oral Hygiene	Tele administration	
		Prosthodontics	Tele surveillance	
		Occlusodonty	Tele diagnosis	
			Tele communication	
			Tele maintenance	

**DISCUSSION**

The findings of this systematic review study confirm that teledentistry represents an emerging technology that

didn't stop to evaluate since the first project performed in 1994 within the department of defense with USA army.<sup>[16,57,63]</sup>

Various experiences of teledentistry were described in the literature, the largest number was reported in America and Europe. These experiences were identified in different type of studies including studies comparing teledentistry and conventional technologies, some studies describing a teledentistry system in many specialties such as testing the “Store and Forward telemedicine system“ for preoperative management of impacted third molar,<sup>[25]</sup> in addition to the study of Ewers and al in 2005 testing the feasibility and benefits of teleconsultation and tele expertise via UMTS (Universal mobile telecommunication system) in maxilla facial surgery.<sup>[46]</sup>

All studies included in the review were in favor of telemedicine and have proved it's success in dental medicine.

The present review described teledentistry in various specialties, the most common one was oral medicine and oral surgery.<sup>[1,4,5,28,36,48]</sup> Data transmission was exclusively electronic, the major way the e-mail.<sup>[2,9,32,41,45]</sup>

Many benefits of this new alternative were concluded from the study, such as providing better and fairer access to specialized oral health care services without geographical constraints, in addition to saving time and money and reducing medical care inequalities.<sup>[3,6,21,32,33,43,61]</sup> Also it facilitates communication between dentists themselves, with specialists and with their patients.<sup>[21,50,53]</sup> Teledentistry allows early detection of dental problems and early diagnosis of some oral lesions, that's leads to avoid subsequent damage and improves the prognosis.<sup>[14,33,34,42]</sup> Likewise, it facilitates continuing education and transmission of actual information and innovative therapy procedures keeping as a result dentists up to date regularly.<sup>[10,36,49]</sup> This technology is used also for the regulation of administrative tasks and remote preoperative management of patients waiting for oral surgery and then their follow up.<sup>[27,38,56]</sup> All these earnings contribute to promote oral hygiene motivation and education, amelioration of the quality of providing health care services and improving outcomes.

Nevertheless, this study identified some limits or some barriers to it's exploration. In fact, teledentistry requires an ideal training for actors about technology manipulation<sup>[19,31,41,55]</sup> and experienced consultant doctors.<sup>[21,27]</sup> In addition to the high cost of the teledentistry project installation,<sup>[2,16,59]</sup> the difficulty of office organization<sup>[9]</sup> and the possibility of technical accidents during the act of telecommunication.<sup>[33,18]</sup> This technology reduces the confidence between patient and physician due to the absence of face to face contact.<sup>[9,25]</sup> Also as limitations of teledentistry, the confidentiality is not guaranteed<sup>[31,46]</sup> and it requires patient agreement and the respect of legal medical aspects.<sup>[45,53]</sup>

All articles of this review defend teledentistry by proving it's multiple earnings even if it has some limits which are relative and contourable, therefore, according to this systematic review study, the validity and the efficiency of the teledentistry were confirmed.

## CONCLUSION

Teledentistry represents an emerging feasible technology using advanced telecommunication procedures, that contribute to enhance oral medical care. Nonetheless, studying it's cost effectiveness and weighing the pros and cross is necessary to it's practice.

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