

# The WhatsApp Application as a Teledentistry Tool in Oral and Maxillofacial Surgery in Cameroon

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**How to cite this paper:** Kwedi, K.G.G., Kwedi, R.K.K., Goethe Doualla, F.-C., Eboa Kwedi, C. and Bengondo Messanga, C. (2024) The WhatsApp Application as a Teledentistry Tool in Oral and Maxillofacial Surgery in Cameroon. *Open Journal of Stomatology*, **14**, 362-372.

<https://doi.org/10.4236/ojst.2024.148030>

**Received:** June 22, 2024

**Accepted:** August 5, 2024

**Published:** August 8, 2024

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## Abstract

**Introduction:** Technological advances have greatly influenced the healthcare sector. The ability to transmit information and deliver services using telecommunication tools continues to transform the way healthcare is delivered around the world. The aim of this study was to highlight the epidemiological, clinical and therapeutic profile of oral and maxillofacial surgery patients consulted using the WhatsApp application. **Methodology:** This was a three-year descriptive study with a retrospective data collection, from 2021 to 2023, of WhatsApp communications between our team and oral and maxillofacial surgeons in Cameroon. In this study, the type/content of messages received, the epidemiological data of practitioners and patients, the various pathologies diagnosed and the procedures performed were evaluated. **Results:** 319 communications were received for a total of 146 cases. Written messages associated with images (photographs and/or X-rays) were the most frequently received, at 85.62%. Hospitals in urban areas were the most represented at 93.84%. Oral health professionals in the private sector sent more messages (65.75%). In terms of diagnoses, tumour and cystic pathologies were the most common (28.08%), followed by impacted/retained teeth (22.6%). Patients were referred to our hospital for treatment in 62.33% of cases. **Conclusion:** The WhatsApp application is an easy-to-use telecommunications tool. It facilitates exchanges between practitioners and improves patient care in oral and maxillofacial surgery.

## Keywords

Teledentistry, WhatsApp, Oral and Maxillofacial Surgery, Cameroon

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### 1. Introduction

Oral and maxillofacial surgical conditions are many and varied. In developing countries, these conditions are most often neglected or poorly treated due to geographical inaccessibility, financial barriers and/or lack of specialist practitioners [1] [2]. However, technological advances in the information and communication sector have made it possible to overcome some of these barriers to healthcare. The ability to transmit information and deliver services using telecommunication tools is transforming the way healthcare is delivered around the world. They have greatly influenced the healthcare sector, giving rise to new fields such as telemedicine and teledentistry [3]-[5].

WhatsApp® (WhatsApp Inc., California, United States) is a telecommunications application that enables the exchange of personal or group messages, text or audio files, images or videos over an Internet connection. Its usefulness has been demonstrated in various clinical contexts. WhatsApp is an effective tool for facilitating the transfer of relevant patient information and enabling healthcare staff to discuss with other experienced colleagues, whether GPs or specialists, quickly and accurately [1] [4].

In Cameroon, although telemedicine is beginning to make inroads, it is not yet common practice. Several studies have described the use of telecommunication technologies in general practice. In 2019, Sap *et al.* demonstrated the favourable effect of patient education via a social network, using the WhatsApp application, in young type 1 diabetic patients [6]. In oral medicine, and more specifically in oral and maxillofacial surgery, few studies have been reported in this context. The aim of this study was to highlight the epidemiological, clinical and therapeutic profile of oral and maxillofacial surgery cases consulted using the WhatsApp application.

### 2. Methodology

This was a descriptive study with retrospective data collection, conducted over a period of 03 months from January to March 2024. Data were collected over three years, from 2021 to 2023, on WhatsApp communications between our team (oral and maxillofacial surgery specialists) at the Yaoundé University Hospital and general and specialist oral health practitioners in Douala and Yaoundé, Cameroon. The telephone number of one of the members of our team (the author), who was responsible for collecting the data, was given during educational programmes, academic colloquia, academic courses for doctoral students and doctors of oral medicine, and during congresses and scientific meetings on oral and maxillofacial surgery organised by our team or by the national order of dental surgeons of

Cameroon.

In this study, the consultation data included only the objective data usually collected during a traditional oral medicine consultation. The type/content of messages received and the multimedia data transmitted (clinical photographs, X-rays, medical images and laboratory results), the epidemiological profile of practitioners (location of referents and sector of activity) and patients, the various pathologies diagnosed, the patient's care pathway and the procedures performed were evaluated. It was determined whether the patient could be treated appropriately on an outpatient basis, in the health facility where the initial consultation took place, or whether they required specialist care at the referral/application hospital, the Yaoundé Teaching Hospital, Cameroon. Photos and videos were only viewed on the smartphone of one member, the author, for reasons of confidentiality. No computer screen was used and the images were neither enhanced nor modified. Data were entered and analysed using SPSS version 23.0 software.

### 3. Results

In this study, 319 data/communications were received for a total of 146 cases. Written messages associated with images of the cases (photographs and/or X-rays) were the most frequently received, with a frequency of 125, or 85.62% (**Table 1**). In epidemiological terms, hospital facilities in urban areas were the most represented, with 137 cases sent, *i.e.* 93.84% (**Table 2**). Oral health professionals in the private sector sent the most cases, 96 (65.75%), followed by those in the public sector, 39 (26.71%) (**Table 2**). Most of the messages received concerned male patients (56.85%), with a frequency of 83 cases and a sex ratio of 1.38. The average age of the patients was  $33 \pm 13.12$  years.

**Table 1.** Distribution according to the type of communication.

Type of message	Frequency (N = 146)	%
Text + image	125	85.62
Voice message + image	4	2.74
Text + vidéo	10	6.85
Voice message + vidéo	7	4.79

**Table 2.** Distribution of practitioners according to the sector of activity and their location.

Variables	Frequency (N = 146)	%
<b>Facility location</b>		
Urban	137	93.84
Rural	9	6.16
<b>Sector of activity</b>		
Public	39	26.71
Private	96	65.75
Confessionnal	11	7.53

In terms of clinical diagnoses, tumour and cystic pathologies were the most common, in 41 cases (28.08%), followed by impacted/retained teeth in 33 cases (22.6%) and infectious pathologies in 16.44% of cases (24 cases) (Table 3). Patients were referred to our hospital for treatment in 62.33% of cases (Table 4). The majority of cases were managed under local anaesthesia, *i.e.* 88.36% for a frequency of 129 cases. The patients referred (8 cases) in this study all had malignant tumours confirmed on receipt of their anatomopathological results. Their management required multidisciplinary follow-up (Table 4).

**Table 3.** Distribution according to diagnosis via multimedia.

Types of pathologies	Frequency (N = 146)	%
Impacted/retained tooth	33	22.6
Infectious pathology	24	16.44
Traumatic pathology	16	10.96
Tumorous and cystic pathology	<b>41</b>	<b>28.08</b>
Salivary pathology	6	4.11
Neuralgia and facial neuropathy	1	0.68
Temporomandibular dysfunction	8	5.48
Aesthetic defect/plastic surgery	12	8.23
Oroantral communication/fistula	5	3.42

**Table 4.** Distribution based on the treatment provided.

Variables	Frequency (N = 146)	%
<b>Healthcare pathway</b>		
Patient to practitioner	<b>91</b>	<b>62.33</b>
Practitioner to patient	55	37.67
<b>Type of care</b>		
Treated under local anaesthesia	<b>129</b>	<b>88.36</b>
Treated under general anaesthesia	9	6.16
Referred patient	8	5.48

## 4. Discussion

Teledentistry can be defined as the practice of using information and telecommunication technologies, in the field of dental surgery or oral medicine, to diagnose and provide advice on treatment or patient follow-up at a distance [2] [7]. Teledentistry is used to provide faster access to primary and/or specialist healthcare. It enables better collaboration between healthcare professionals. It can be applied in five ways, namely teleconsultation, tele-advice/education, tele-monitoring, tele-expertise and tele-assistance/surgery [2] [5]. Around the world, several studies have been conducted in teledentistry via the WhatsApp application. Zotti *et al.*, in 2015, investigated the usefulness of WhatsApp for improving oral hygiene compliance in adolescent orthodontic patients [8]. Petruzzi and De Benedittis (2016) studied the use of WhatsApp as a telemedicine plat-

form to facilitate remote consultation in oral medicine. They found that the use of WhatsApp and similar applications could be a good strategy for improving interactions between patients and practitioners, as well as streamlining communications between oral health professionals [1]. In 2017, Sarode *et al.* investigated the effectiveness of the WhatsApp app for obtaining second opinions on histopathological diagnosis in oral pathology practice. It was found that the transfer of photomicrographs via WhatsApp is an effective and practical approach to obtaining a second opinion on the “histopathological diagnosis of oral pathology”. The involvement of several observers reduces the rate of individual error and increases the chances of obtaining a correct diagnosis [9]. However, in our case, no studies had yet been carried out on teledentistry in our country.

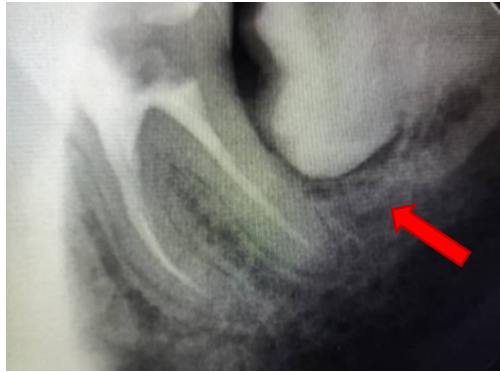
In our study, 319 communications were collated for a total of 146 cases. Documented/commented images or videos of patients’ oral and maxillofacial pathologies were taken remotely and then sent to a single member of our team who, after consultation with the other members of the team, was responsible for establishing an appropriate diagnosis, proposing treatment or ensuring patient follow-up. The messages associated with the images were the most frequently received in 85.62% of cases in this study (Figures 1-3). Our results are similar to those of Koparal *et al.*, in Türkiye (2019), who received more messages and images in their study, accounting for 86% of their communications [4].



**Figure 1.** Case 1a, panoramic dental X-ray showing a cystic lesion in the mandible.



**Figure 2.** Case 2a, cone beam showing an apical lesion on a maxillary central incisor.



**Figure 3.** Case 3a, retro-alveolar X-ray illustrating a mandibular wisdom tooth impaction.

In this study, hospital facilities located in urban areas were the most represented at 93.84% of cases. These results are contrary to those of Tamba *et al.*, in Senegal in 2021 and Wood *et al.*, in the United States of America in 2016, who noted a greater number of practitioners from rural areas, respectively 78% and 62% of their study populations [5] [10]. This could be explained by the fact that in our study, private oral health practitioners, who were more often based in urban areas, were the ones who sent the most cases.

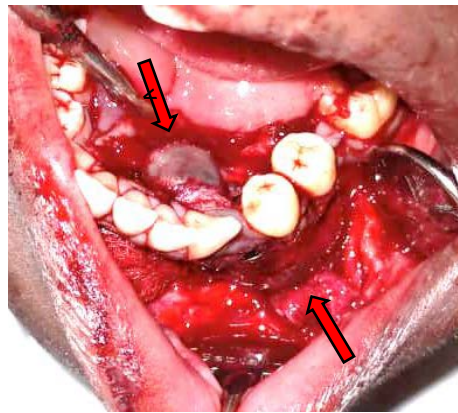
The majority of messages received concerned male cases in 56.85% of cases, for a frequency of 83 cases. Our results are comparable to those of Koparal *et al.*, and Wood *et al.*, whose studies found more men than women [4] [5]. The average age of the cases in our study was 33. These results are similar to those of Wood *et al.*, who reported an average age of 32 in their study [5].

Authors such as Rollert *et al.*, Tesfalul *et al.*, and Dhuvad *et al.*, found in their studies that there was no difference in a consultant's ability to obtain clinical information, make a precise diagnosis and draw up an appropriate treatment plan, whether in a face-to-face or remote setting [11]-[13]. In terms of diagnoses, tumour and cystic pathologies were the most common in this study followed by Impacted/Retained tooth. Our results are similar to those of Tamba *et al.*, who also observed more tumour and cystic pathologies in their study, representing 53% of cases in their study population [10].

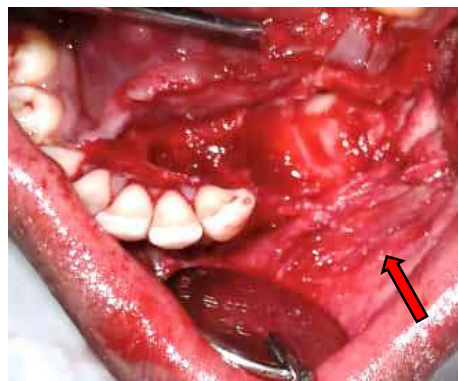
The vast majority of cases in this study were managed by our team (94.52%). Cases were referred to our department at the referring hospital in 62% of cases. Local anaesthesia was used in 88% of cases (Figures 4-6). Only cases of malignant tumours (08 cases) confirmed after biopsy were referred in this study. Their treatment required multidisciplinary management.

Although WhatsApp is a popular messaging application accessible in many countries, it is not suitable for teledentistry activities. WhatsApp was not designed with confidentiality and security of medical data in mind, exposing sensitive information to the risk of hacking and privacy breaches. WhatsApp lacks specific telemedicine thus, teledentistry features such as the ability to share certain DICOM-type medical images, organise secure video consultations or man-

age electronic records. As a result, WhatsApp would not guarantee the reliability and stability required for large-scale medical use in the healthcare sector [14] [15].



(a)

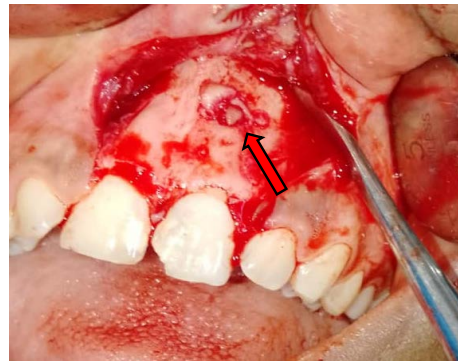


(b)

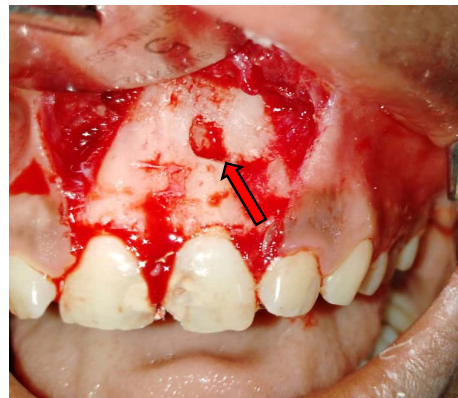


(c)

**Figure 4.** Case 1: (a) Intra-sulcular incision and exposure of the mandibular cystic lesion under local anesthesia; (b) Site after dental avulsion, excision of the mandibular cystic lesion and preservation of the pedicle; (c) Image showing healing of the site afterwards.



(a)



(b)

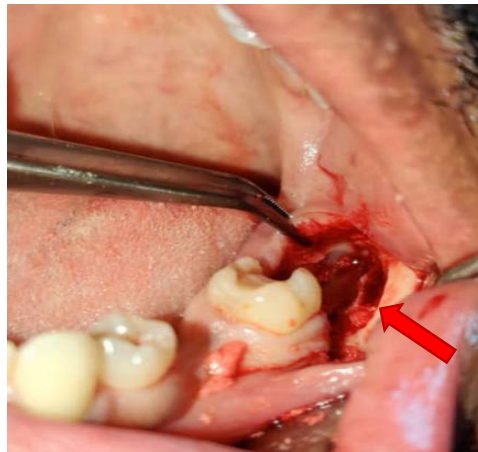


(c)

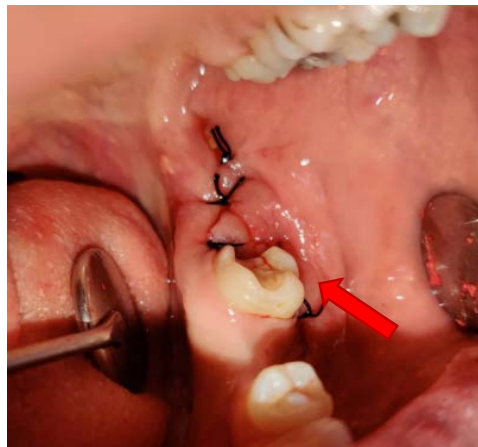
**Figure 5.** Case 2: (a) Exposure of the periapical lesion (local anesthesia); (b) Image after excision and apicoectomy on maxillary central incisor; (c) Intraoral image after healing.

Telemedicine, as a mode of healthcare delivery, has improved the quality and coverage of healthcare in many countries. While the healthcare systems of developing countries still face many challenges, the adoption of telemedicine can be a means of improving the coverage and quality of healthcare for their populations [16] [17]. Telemedicine in oral medicine and surgery (teledentistry) is still in its infancy in Cameroon, as in many other developing countries. To meet the

specific needs of teledentistry in developing countries, it is crucial to develop mobile applications dedicated to this task. An application that is intuitive, easy to use and adapted to the socio-economic realities of these countries.



(a)



(b)

**Figure 6.** Case 3: (a) Image showing the empty socket after wisdom tooth extraction under local anesthesia; (b) Intraoral image with sutures in place.

## 5. Conclusion

Teledentistry has great potential to improve healthcare delivery in developing countries, as rapid treatment can be initiated without distance being a constraint, thanks to information and telecommunication tools. However, despite the promising nature of teledentistry in improving the delivery of oral health care in developing countries, it is often associated with certain challenges such as the cost of equipment or Internet access. The WhatsApp application is an easy-to-use remote communication tool that can be accessed using a smartphone. It makes it much easier for practitioners to communicate with each other, thereby improving patient care in oral and maxillofacial surgery.

## Acknowledgements

To the health professionals who made this study possible: Dr. KENNE WANDO PEWO Diane, Dr. SANI NGANSO Nadine, Dr. MOKALA Yannick Stéphane, Dr. NJI NZIE Elise, Dr. SIDJE FEZEU Ariane Dores, Dr. TEFOUET MENDONKING Myriam Dr. EYIDI SOMBO Caroline, Dr. MUVADIMWME Stanislas, Dr. BILOUNGA MEKOUL Laure Blanche, Dr. MONGOSSO'O Claude Hortense, Dr. MAKEMBE Aline Yvonne, Dr. ZOUNG KANYI BEHLE Suzanne, and Dr. MASSO Myriam.

## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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