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The Role of Telemedicine in the Management of Maxillofacial Trauma in Emergency Departments - Preliminary Results

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ABSTRACT

New technologies have over the past forty years become widespread across all domains of basic and applied research particularly in health-related fields. Telemedicine is a form of remote medical practice using information and communication technologies. It connects one or more health professionals with other health professionals or with patients. Within the framework of emergencies in maxillofacial surgery, requests received for specialist advice often pertain to procedures to be followed for facial wounds, bites, burns, maxillofacial bone trauma or facial cellulitis. These requests for specialist advice were previously made by phone between emergency physicians and maxillofacial specialists, with exchange of patient photos by text messaging, which raised security issues. We collaborated with the Telehealth Normandy Health Cooperation Group (GCS TSNB) for the implementation of a mobile application using the “Therap-e” telemedicine platform. This platform links together websites and remote health professionals via the Internet. Physicians communicate over a mobile network or from a health institution, in online or offline mode, synchronously or asynchronously, using any medium (tablet, PC, Mac, smartphone). This scheme both ensures secure transmission of personal and clinical data (especially facial photographs) and records specialist advice in patient medical records. The purpose of tele-expertise applications in an emergency context is to provide a solution to the demographic problems facing

healthcare professionals and to rise to the growing challenges surrounding quality and security issues.

Keywords: telemedicine, emergency treatment, mobile application

INTRODUCTION

New technologies have over the past forty years become widespread across all domains of basic and applied research particularly in health-related fields. In a report from the French Medical Council issued in January 2015 on connected healthcare resources, the number of mobile healthcare applications worldwide rose from 6000 in 2010 to 10 0000 in 2013 [1]. Connected healthcare has been a resounding success.

Telemedicine is a type of remote medical practice assisted by information and communication technologies. It connects one or more health professionals with other health professionals or with patients. It facilitates diagnosis, preventive or post-therapeutic follow-up, requests for specialist opinions, therapeutic decision-making and monitoring of patient health status. The various telemedicine services are defined in the French HPST (Hospital, Patients, Health and Territory) Act, implemented in 2010, namely teleconsultation, tele-expertise, telemonitoring, and remote assistance with medical procedures [2].

Telemedicine has been officially recognized by law for 8 years, but has been in existence for over a century. The origin of telemedicine dates back to 1905, when Willem Einthoven, Nobel Prize in Medicine, transmitted the first ECG by telephone over a distance of 1.5 km [3]. The first use of interactive video communication in health care occurred in the late 1950s when the Nebraska Psychiatric Institute (USA) conducted a psychiatric teleconsultation via a two-way interactive television system with the Norfolk Hospital. Subsequently, NASA's (National Aeronautics and Space Administration) research projects led to the development of these telecommunication technologies for medical support of astronauts in space [4]. Recent developments in information and communication technologies and in particular the emergence of the Internet have led to a significant boom in telemedicine. In the field of maxillofacial surgery where visual clinical examination is of the essence, telemedicine has a significant role to play. Few peripheral hospitals have access to on the spot specialist assistance in maxillofacial surgery when managing facial infection or trauma in the

emergency department. At present, informal fallback procedures consist of sending photographs via the personal smartphones of emergency physicians. This exchange of medical personal data is not secure. Furthermore, the images remain stored in telephone memories, raising concerns about confidentiality and patient privacy, especially considering the fact that the majority of images in our specialty involve the face. Staff are on at-home call duty and not in-hospital call duty, hence the same difficulties arise in the emergency departments of university hospitals (both adult and pediatric emergency care).

With a view to implementing a mobile application using the Lower Normandy telemedicine platform, the maxillofacial surgery department of the University Hospital of Caen worked jointly with the Telehealth Normandy Health Cooperation Group (GCS TSBN). This group promotes the development of telehealth projects, in conjunction with the national and regional authorities in charge of health, telemedicine and healthcare information systems. More specifically, it has participated in the Telestroke project, designed to optimize emergency stroke management, in addition to the Domoplaies project for chronic wound monitoring.

The aim of this study was both to introduce the application and its uses and to outline our experience of using this tool in the provision of emergency care in maxillofacial surgery.

MATERIAL and METHODS

The “Therap-e” application, hosted by the Lower Normandy telemedicine platform, was developed in association with the GCS TSBN. Through web access (3G/4G, WiFi), the Therap-e platform linked together websites and remote healthcare professionals (Figure 1). To use this service in a healthcare context, healthcare professionals had to have a smartphone or tablet running IOS or Android operating systems and install the application on the appropriate device. The team requesting advice completed the request by specifying the patient's identity and providing additional information (medical history, current medication). The team also informed the patient of the exchange of medical photographs with other professionals and obtains consent (Figures 2 and 3). On the home page of the specialist team, there was a list of requests in chronological order. Medical photographs, imaging and video recordings could be transferred via the application. The maxillofacial

specialists then transmitted their opinion in a very straightforward manner consistent with three possible recommendations: on-site care; immediate transfer to the University Hospital; or deferred transfer accompanied by remote maxillofacial surgery consultation. It was possible to add comments containing advice on suture techniques, or which thread or dressing to use.

The application was mainly used for requests for specialist advice from emergency physicians. There were 3 types of maxillofacial emergency: soft tissue trauma especially when important structures (facial nerves, salivary glands, and ocular globes) are involved; bone and dental trauma; and emergencies of infectious origin. It was possible to create a PDF document summarizing the information transmitted by the requesting emergency physicians to the specialists. This document may also be included in the patient's electronic hospital records (Figure 4).

A preliminary evaluation was carried out after using the mobile application for 3 months in conjunction with the pediatric emergency department of the University Hospital of Caen.

RESULTS

After using of the Therap-e application for 3 months in association with the pediatric emergency department, 45 requests for specialist opinion were collected.

In 76% of cases (n = 34), requests for advice involved traumatic soft tissue emergencies, mainly the management of wounds which made up 33 requests. In more than half of the cases (n = 18), these requests were for advice on the management of penetrating or nonpenetrating lip wounds.

Bone and dental traumatic injuries were the object of 15% of emergency requests for advice, the majority of which were dental emergencies.

Maxillofacial infection emergencies accounted for 9% of the requests (Figure 5).

DISCUSSION

"Therap-e" allows health professionals to exchange information and share skills with other remote professionals and/or patients. Physicians communicate over a mobile network or from a health institution, in online or offline mode, synchronously or asynchronously, using any medium (tablet, PC, Mac, smartphone).

Medical photographs, imaging and video recordings can be transferred via the application. The high quality of the images favors accurate analysis. The use of video recordings for instance, allowed to remotely detect eye movement disorders or paralysis of the facial nerve or one of its branches.

The benefits of using Therap-e are multiple. On the one hand, it ensures the security of medical data with a login and a password specific to each professional. In addition, there is no storage of information on the "hard drive" of the phone. On the other hand, it enables the traceability of information-sharing with a PDF document integrated in the patient's electronic hospital records. Moreover, Therap-e provides epidemiological data on the incidence in Lower Normandy of traumatic and infectious maxillofacial emergencies.

The courts have laid down particularly strict rules, defined by various codes (public health, criminal and commercial) with regard to personal data. Image privacy protection is the right for any person to authorize or to oppose the acquisition and transmission of personal images. It is necessary to obtain free informed explicit consent for use of medical images from identifiable data subjects [5]. Consent to be filmed or photographed does not automatically signify consent to distribution. For consent to be viable and enforceable, it must define image distribution in terms of duration, format and geographical scope. Consent must be sufficiently explicit and obtained in writing. Indeed even if tacit consent is common practice, although the data subject may have expressed no objection at the time, he/she can always refuse consent at a later date, therefore it is preferable to circumvent any difficulties by seeking free and informed consent in writing.

In the context of telemedicine, notifying patients is sufficient for exchange of data between health professionals to be authorized. Where data hosting is concerned, consent must be obtained but it can be electronically dematerialized [6]. In any event, the patient retains the right to object.

With the aid of this application, physicians can access specialized medical skills whatever their geographical location. The implementation of these projects is led by regional health authorities, whose purpose is to guarantee equal access to care for patients and to improve practical coordination between professionals and health facilities. Patients experience shorter duration of care, eliminating unnecessary visits for specialist advice.

Mobile applications as a tool for secure and effective communication between health professionals have already been described in the literature in management of neurosurgical emergencies, hand trauma, and burns [7,8,9].

Several teams, notably in Amiens, France [10,11,12], have reported using the WhatsApp Messenger application for interaction between medical team members (attending and resident physicians) with the possibility of exchanging images and video recordings. The main disadvantage was the lack of traceability in the medical records of medical data exchanged on a patient [10]. Furthermore, the WhatsApp application is not protected by a password and user identity, raising data security and patient confidentiality concerns regarding the information exchanged [12].

In our experience, the number of requests for specialist advice formulated via telemedicine appears to be approximately equal to the number of requests we received per month before advice was transmitted by SMS messaging. This is evidence of the ease of use of the application which has not dissuaded the requesting physicians, even within the context of the emergency department.

This is a short-term single-center preliminary evaluation. It would be interesting to continue studying the impact of the application's use on the management of emergency department requests for specialist advice over a longer period of time and to include the other Normandy emergency services in their entirety.

CONCLUSION

This telehealth application, due to its ease of use, could represent a solution to the demographic problems facing specialist health professionals and meet the increasing demands exerted by quality and security issues by tracking and securing the transfer of personal data.

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Conflict of interest

All authors declare that they have no conflict of interest.

REFERENCES

- [1] Conseil National de l'Ordre des Médecins. Santé connectée, de la E-santé à la santé connectée. Le livre blanc du Conseil national de l'Ordre des médecins. 2015
Disponible sur: <https://www.conseilnational.medecin.fr/sites/default/files/medecins-sante-connectee.pdf>
- [2] Décret n° 2010-1229 du 19 octobre 2010 relatif à la télémédecine.
<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000022932449&categorieLien=id, 2010>.
- [3] Bashshur RL, Shannon GW: History of Telemedicine: Evolution, Context and Transformation, 2009.
- [4] HAS. Efficience de la télémédecine : état des lieux de la littérature internationale et cadre d'évaluation. 2011
https://www.has-sante.fr/portail/jcms/c_1622477/fr/efficience-de-la-telemedecine-etat-des-lieux-de-la-litterature-internationale-et-cadre-d-evaluation
- [5] Art. R. 6316-2 du Code de la Santé Publique
- [6] Art R. 6316-2 et R. 6316-10 du Code de la Santé Publique
- [7] Yaghmai V, Salehi S, Kuppaswami S, et al. Rapid wireless transmission of head CT images to a Personal Digital Assistant for remote consultation. Acad Radiol 2004; 11:1291-3.
- [8] Shokrollahi K, Sayed M, Dickson W, et al: Mobile phones for the assessment of burns: We have the technology. Emerg Med J 2007; 24:753-5
- [9] Aziz and Ziccardi. Telemedicine Using Smartphones. J Oral Maxillofac Surg 2009; 67:2505-9.
- [10] Sidhoum N, Assaf N, Herlin C, Dast S, Sinna R. WhatsApp : Improvement tool for surgical team communication. J Plast Reconstr Aesthet Surg. 2016; 69:1562-3
- [11] Johnston MJ, King D, Arora S, Behar N, Athanasiou T, Sevdalis N, Darzi A. Smartphones let surgeons know Whatsapp: an analysis of communication in emergency surgical teams. Am J Surg. 2015; 209:45-51
- [12] Drake TM, Claireaux HA, Khatri C, Chapman SJ. Whatsapp with patient data transmitted via instant messaging? Am J Surg 2016; 211:300-1

LEGENDS:

Figure 1: Therap-e application - login and password specific to each professional

Figure 2: Clinical information to be completed on the Therap-e application

Figure 3: Patient consent obtained electronically on Therap-e

Figure 4: Patient flow sheet summarizing data transmitted for specialist advice, generated by the Therap-e application

Figure 5: Breakdown of emergency requests via the Therap-e application

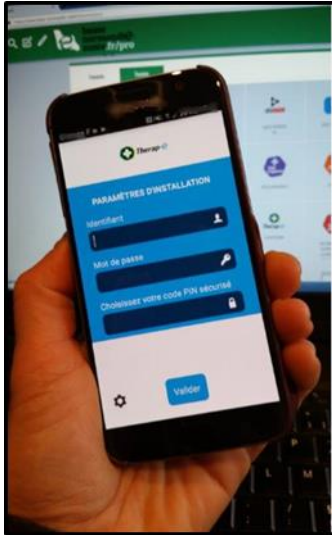


Figure 1: Therap-e application - login and password specific to each professional

CREATION DOSSIER

Informations patient

Nom de naissance*

Nom usuel

Prénom*

Date de naissance

Date de naissance

Sexe

M F Inconnu

Annuler Valider

Figure 2: Clinical information to be completed on the Therap-e application

CREATION DOSSIER

Consentement patient

Le patient a-t-il été informé de l'échange de ses données personnelles avec des professionnels de santé d'autres établissements, consentant ainsi à l'acte de télémédecine ? *

Oui Non

[Télécharger la note d'information au consentement à fournir au patient](#)

Commentaires sur le consentement patient

Informations complémentaires

Urgent

Annuler Valider

Figure 3: Patient consent obtained electronically on Therap-e

Fiche de liaison Urgences CMF	
Demande d'avis par télémédecine	
Date de la demande d'avis en télémédecine : 27/12/2016	
Etat Civil du Patient	
Nom : CHABANNE	
Prénom : YONI	
Date de naissance : 05/03/2012	
Sexe : M	
ATCD du patient et traitements en cours	
ATCD médicaux : <input type="radio"/> Oui <input checked="" type="radio"/> Non	
Traitements anticoagulants en cours : <input type="radio"/> Oui <input checked="" type="radio"/> Non	
Motif de la demande	
<input checked="" type="checkbox"/> Plaie de la face <input type="checkbox"/> Fracture maxillo-faciale <input type="checkbox"/> Brûlure <input type="checkbox"/> Cellulite de la face <input type="checkbox"/> Autre	
Documents transférés en télémédecine	
<input checked="" type="checkbox"/> Photos	

Figure 4: Patient flow sheet summarizing data transmitted for specialist advice, generated by the Therap-e application

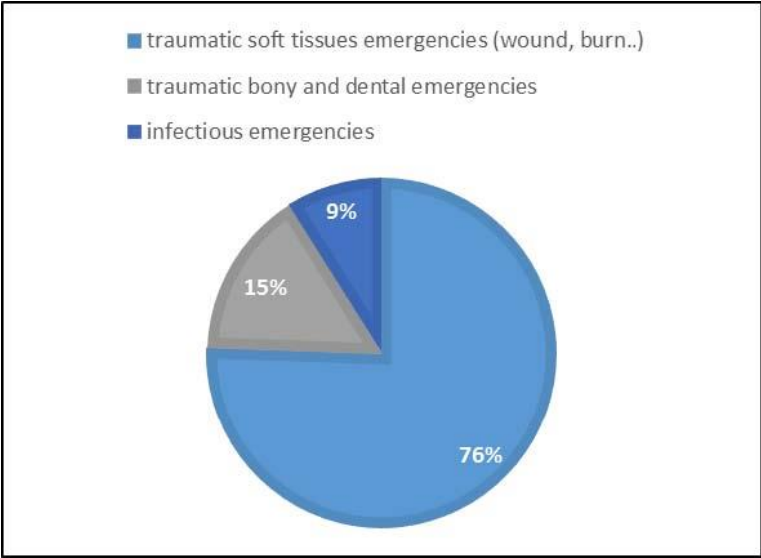


Figure 5: Breakdown of emergency requests via the Therap-e application