

UNIVERSITE DE NANTES

FACULTE DE MEDECINE

Année : 2019

N° 2019-50

THESE

pour le

DIPLOME D'ETAT DE DOCTEUR EN MEDECINE

DES de chirurgie générale

par

Mathilde MALINGE

née le 1^{er} novembre 1989 à Nantes

Présentée et soutenue publiquement le 25 avril 2019

**Evaluation of a clinical decision support system in oral and maxillofacial surgery
for primary care physicians: Maxillocllic.com**

Président et directeur de thèse : Monsieur le Professeur Pierre Corre

Membres du jury : Monsieur le Professeur Gilles Potel

Monsieur le Professeur Rémy Senand

Monsieur le Docteur Corentin Lacroix



REMERCIEMENTS

A mon Président et Directeur de thèse : Monsieur le Professeur Pierre Corre,

Merci de m'avoir guidée pour ce travail. J'ai beaucoup apprécié mon semestre avec toi. Et bravo pour ton inégalable implication dans ce service.

Monsieur le Professeur Gilles Potel,

Vous m'avez fait l'honneur d'accepter de participer à ce jury et je vous en remercie. Soyez assuré de mon entière reconnaissance.

Monsieur le Professeur Rémy Senand,

Merci d'avoir accepté de participer à mon jury. Votre engagement pour promouvoir la spécialité qu'est la médecine générale est un exemple.

Monsieur le Docteur Corentin Lacroix,

Merci de ton investissement notamment par le biais d'internet et des réseaux sociaux, dans ce domaine si vaste qu'est la médecine générale. C'est l'avenir sans aucun doute. Douze années après avoir partagé les bancs de la PCEM1, merci de participer à mon jury de thèse.



A ma Famille, ce qu'il y a de plus important :

A mes parents, « Moman », « Popa », je n'aurais pas pu rêver meilleurs parents. Merci de votre soutien quotidien.

Je nous revois à l'amphi de garnison en fin de PCEM1. Et nous voilà aujourd'hui dans cette salle de thèse... Merci de m'accompagner chaque jour, notamment pour ces longues études. Mais surtout pour tout le reste. Merci pour tous ces moments passés, présents et futurs.

Je vous aime.

A ma sœur Elise, son mari Julien et mes nièces Emma et Victoria qui grandissent bien trop vite. Merci pour ces séjours parisiens toujours gastronomiques. Ne changez pas.

J'espère que vous nous rejoindrez dans l'ouest bientôt !

A mon frère Vincent, suisse, badiste, et incollable en codes AITA. Pour Nantes c'est NTE. Ne l'oublie pas pour tes prochains voyages.

A Camille, pour tout ce que tu m'apportes au quotidien. Tu m'aides tellement.

Pour ces voyages, notamment ce voyage extraordinaire en été 2018. Mais aussi pour ces journées simples, pour tous ces moments, pour tout ce que l'on partage (même les discussions poussettes, recyclage et compagnie) ! A notre avenir, l'arrivée prochaine de notre petit ananas, à notre future maison en campagne avec je l'espère, mes chèvres et tes abeilles. Je t'aime.

A mes amis :

Au groupe des Jakoss : Nico, Popo, Benjam, Caro, Alice, Vincent, Dédé, Charly, Charles, Maëlle, Daph, Antho, Laura... Merci à vous d'être présents depuis toutes ces années. « Qu'il est formidable d'aimer » ! Vous êtes tellement importants pour moi, que notre amitié dure encore et encore...

Et à nos mini-Jakoss : Emma, Camille, Eloïse, Louis et les nombreux à venir !



A Lucie Poujade, ma Lulu, merci pour tous ces moments partagés depuis le début de l'internat, ces soirées, ces voyages, ces pizzas maisons, ces Disney, ces photos de lapins et de chats partagées... Je te souhaite le meilleur, et surtout que notre amitié dure « to infinity and beyond » !

A Morgane Leloup, ma Momoniño, une des plus belles rencontres de mon internat. Merci de ta joie de vivre, de tous ces moments partagés, je souhaite qu'il y en ait encore de nombreux, et bientôt chez toi !

A toutes ces personnes qui m'ont accompagnée pendant ces longues années, notamment Cécile, Aurélie, Morgane, mes copines de fac, et celles que j'oublie.

Au personnel du service de CMF et stomatologie du CHU de Nantes et au personnel du bloc, qui rendent nos journées moins pénibles... La liste serait trop longue, mais aux secrétaires, IDE, AS, Morgan... clin d'œil à vous tous ! Au service du CH de Saint-Nazaire également pour mon premier semestre dans la spé.

Aux PH, et à mes co-internes et chefs qui m'ont accompagnée durant ces années, avec une pensée plus particulière pour Grégoire, Fanny-Laure, Quentin, Marine, Maxime, Kévin, Anthony et Garance.

A notre épanouissement professionnel, où qu'il se fasse. Il faut savoir parfois penser à soi avant de penser aux autres.

Au Professeur Jacques-Marie Mercier : merci de continuer à partager vos connaissances et d'avoir prêté de l'intérêt à mon sujet de thèse.

Au Docteur Piot : merci d'avoir été mon chef pendant ce dernier semestre si particulier pour moi. Merci pour ta gentillesse, travailler avec toi a été un plaisir.

A Monsieur Richard Pace : pour m'avoir aidée à la traduction de ce travail.

Aux choses de ce monde si importantes pour moi... Je ne pouvais pas ne pas citer JJG! Mes amies les bêtes (et en particulier Balinou et Floconou), et toutes ces personnes, ces êtres, puis ces extraordinaires voyages laissant des souvenirs inoubliables...

« Les hommes perdent la santé pour accumuler de l'argent, ensuite ils perdent de l'argent pour retrouver la santé. Et à penser anxieusement au futur, ils en oublient le présent, de telle sorte qu'ils finissent par ne vivre ni le présent, ni le futur. Ils vivent comme s'ils n'allaient jamais mourir... et meurent comme s'ils n'avaient jamais vécu. »
Pensée du Dalaï Lama



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INTRODUCTION:

Facial pathologies are a frequent reason for consultation due to both infections and trauma [1-3]. The rise in the popularity of sports has been a significant factor for the prevalence of these facial pathologies [4-5]. Primary care physicians, general practitioners, and emergency medicine physicians who are faced with these pathologies are in need of additional training and new resources in this area [3]. These doctors must accurately treat patients who come to them for assistance including those affected with unique maxillofacial pathologies [6]. Dental emergencies are a particular challenge due to the limited number of oral surgeons and dental surgery facilities especially after business hours [7,8]. This has caused an increase in consultation request regarding these oral and maxillofacial incidents. In some health centers which lack the proper specialist departments, it is left to non-specialists who lack focused training in maxillofacial surgery and stomatology to consult the primary care physicians [9].

Clinical decision support systems (CDSSs) are currently growing in popularity and have shown a marked improvement through their use [10-13]. There are now many medical decision support tools [14-15] but none yet in maxillofacial surgery and stomatology. The design of such a tool would seem to be a solution to the problem encountered by general practitioners and emergency physicians; however, it seemed necessary to first evaluate it as soon as it was put online in order to tailor the tool to best meet their needs as much as possible.

The objective of this work was first to create and to publish a specific tool and then to evaluate it

MATERIALS AND METHODS:

1. Website

Our research was approved by our local institutional review board. The website's content was developed by the first author, resident in maxillofacial surgery and stomatology under the supervision of a senior maxillofacial surgeon and physician-scientist with the assistance of the website building tool Wix.com [figure 1].



Figure 1 : Maxilloclic homepage



1.1. Design Criteria

The target object of the site was to be used as a reference tool to help primary care and emergency physicians, who are in need of a consultation with a maxillofacial or stomatological specialist. In keeping with this goal, the design of the website must be easily editable to allow for regular updates to stay current with the last developments in the field. The site should also focus on the most common reasons for maxillofacial and stomatological consultations. The site must also clearly display its objectives, sources, and framework either on the homepage or in the legal notices. Most importantly, the site should meet all the quality criteria used by the French National Authority for Health for the evaluation of an online resource [16].

1.2. Content

Photos and videos were uploaded from the collection of the maxillofacial surgery department and the medical Imaging department of the University Hospital of Nantes. All media were used with written consent and anonymised [figure 2]. Before the site was released, it was linked to the Google Analytics © [17] statistical analysis tool, in order to obtain automatic data traffic and site usage.

Fracture des os du nez

Urgences

- Si on retrouve un hématome de cloison
- Si l'épistaxis ne se tant pas spontanément
- Eliminer fracas facial associé

Interrogatoire:
Contexte, épistaxis initiale, impression d'obstruction nasale?
ATCD de traumatisme nasal, trouble de l'hémostase connu, traitement anti-coagulant

Examen clinique:
Inspection: Déformation (dans tous les plans: face, profils, plongée), ecchymoses, Palpation: mobilité de la pyramide nasale, esquille osseuse
Examen endonarinale: rechercher un hématome de cloison (douleur, recherche obstruction uni ou bilatérale à l'aide d'un miroir) ++
Comparaison à l'état antérieur (photos),

Examen complémentaire:
Inutile en cas de fracture des OPN isolée

CAT:
Traitement de l'épistaxis traumatique en l'absence de résolution spontanée
Antalgiques
Lavage nasal au serum physiologique
Interdire au patient de se moucher devant le risque d'emphysème sous-cutané
Consultation CMF à 48/72h après fonte de l'œdème mais avant consolidation (qui se fait en 15jours) le temps de programmer un bloc si besoin avec photo antérieure au traumatisme

Points-clés

- Diagnostic clinique (Ne pas prescrire d'examen complémentaire)
- Consultation en CMF à **48-72h** du traumatisme avec photo ancienne face/profil
- Fréquent! 40% de l'ensemble des fractures du massif facial

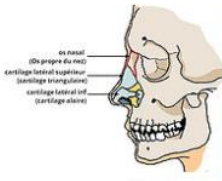
Particularités chez l'enfant

- L'hématome de cloison est plus fréquent chez l'enfant
- Consolidation rapide (en 7/10 jours), si besoin la chirurgie doit être prévue rapidement
- Un suivi régulier pour dépister une anomalie de croissance devra être réalisé

Ordonnance-type (adulte) 

Et ensuite?

*Une indication chirurgicale sera posée en cas de retentissement esthétique et/ou fonctionnel.
La chirurgie consiste à réduire la fracture par manoeuvres externes +/- endonasales.
Un méchage endonasal peut-être réalisé (sous couverture antibiotique pendant 5 jours) et une contention nasale (plâtre) pendant 10 jours
Le patient sera revu à distance (3/4 mois) pour évaluer l'existence d'une éventuelle déformation séquellaire.*







Vidéos

Figure 2 : « Nasal fractures »



2. Acceptability survey

An acceptability survey was developed according to Maisonneuve's principles of creating a survey [18] using the online tool Google Form© [19]. The survey was conducted just after the launch of the website to obtain an early evaluation. The purpose of the survey was to obtain information from people who tested the site regarding: the website's relevance, the quality of the scientific content, the ease of navigation, and the website's utility and impact on the daily practice of physicians. The link to the survey was published on the home page of the site for 3 months, and the website address was broadcast via the social networks of Facebook and Twitter. The study's respondents included general practitioners, emergency doctors, general practitioner residents and residents in emergency medicine all located in France. The responses of surgeons and specialists were excluded as they were not the primary target of the study. The sample size was set to a minimum of at least 30 responses, in order to obtain interpretable statistical results per Maisonneuve's suggestions [18].

The questionnaire was divided into 4 parts. Three questions regarding gender, age, and type of practice were asked to obtain demographic information on the respondent. Three linear scale (0-5) questions were asked concerning their professional experience. Four questions, two multiple choice and two linear scales, were asked about Maxillocllic.com website targeting its navigation, medical content and, use in future practice. Finally, one open-ended question was asked to note any comments or suggestions for improvement.



RESULTS:

The survey lasted 3 months from May 2nd to August 2nd, 2018. During this time, 128 responses were collected. After removal of non-compliant responses (from surgeons and specialists who were not the primary target of the study), 120 responses were included. Of the 120 respondents, there were 87 female (72.5%) and 33 male. The age of the respondents was dominated by the younger age group below 35 years (90%) followed by a limited number of responses 35 to 44 year age group (6.7%). The respondents were largely junior general practitioners (50%) with a smaller portion of established general practitioners (20%), and an even smaller amount of GP residents (16.7%). There was a limited response from emergency physicians (8.3%) and even smaller number of emergency residents. One respondent (0.8%) had a dual role as both a pediatrician and junior general practitioner.

The respondents responded overwhelmingly in affirmation (96.7%) to their current use of comparable sites outside the maxillofacial domain. One hundred and sixteen of the respondents rated frequent use (3/5, 4/5, or 5/5) to the question "Do you use websites (Antibioclic ©, Ophtalmoclic ©, Crat ©, etc ...) in your daily practice?" Only four of the respondent indicated they did not use those websites in their current medical practice.

The majority of respondents (55.8%) indicated their lack of comfort during maxillofacial and stomatological consultations with a 0/5, 1/5, or 2/5 response to the question "Do you feel comfortable during maxillofacial and stomatological consultations (facial trauma, oral infections)?" The answer to the question was rated on a scale of 0 to 5, ranging from "not at all comfortable" to "very comfortable". Three respondents (2.5%) felt that they had a good level of comfort (4/5 or 5/5), while 50 out of 120 respondents (41.7%) felt they had a moderate comfort level (3/5).



The overwhelming majority with one hundred and sixteen physicians (96.6%) indicated they were interested (ratings 3/5, 4/5 or 5/5) in the idea of a website providing support for the management of the patient with a maxillofacial or stomatological problem.

To the question about the ease of navigation on the site, rated from 0 to 5 (ranging from "very complex navigation" to "very easy navigation"), 98 doctors were very satisfied (81.6% of rating 4/5 or 5 / 5), 20 moderately satisfied (16.7% rating 2/5 or 3/5) and 2 very dissatisfied (1.7% rating 0/5 and 1/5). Regarding the scientific content, the question asking to evaluate the relevance of the medical content from 1 to 5 (1 being "irrelevant" and 5 being "very relevant"). One hundred six physicians (88.3%) rated 4/5 or 5/5, 10% rated 3/5, and 1.7% of respondents felt the medical content was irrelevant rating the content as a 1/5 or 2/5.

The large majority of doctors felt the website would influence their current practice. One hundred four physicians (86.7%) replied that they thought they could integrate Maxillocllic.com into their current practice. 85 physicians (70.8%) thought the website use may change their daily practice. 29 (24.2%) said they were not sure, and 6 (5%) will not change their practice following website's use.

There were 27 comments left on the survey. In summary: 5 people thought the site was more for emergency doctors; 3 people suggested adding iconography on the site; one person suggested pathophysiology recalls; 3 people commented on a navigation's problem on a mobile device; 3 people asked for additional details about pathologies or terms used; 1 person asked a question about therapeutic management; 1 person suggested a complete redesign of the site to align with existing sites; and 10 people have left friendly comments to express their satisfaction with the site.



DISCUSSION:

The objective of this study was the creation and the evaluation of a tool to assist general practitioners and emergency physicians who need additional resources regarding a consultation for an oral and maxillofacial issue.

We have created a free website, easily accessible during consultation because it is available from any internet-connected device. The name chosen is very evocative for young doctors and allows easy memorization. Maxilloclic is referenced on the main search engines: from the best known search engine, the first link of the search result "Maxilloclic" is this website. It has also been referenced on Kitmedical © [20] which lists web services and mobile applications useful in general medicine, including systems for medical decision support. After 3 months of use, 30 to 50 visits per week were recorded on average on the site.

The website is ergonomic in order to quickly obtain the desired data. The navigation is relatively intuitive: on the homepage, the user can find the pathologies that can be encountered in emergency, and in the field of maxillofacial surgery. Then, the searcher can refine their search with just a few clicks to get to the information sought. An important point is the highlighting of key points and emergencies concerning the different conditions. The tool was entirely designed by the authors, which would allow for easy modifications, from the updating of the pages according to the new recommendations and comments of the users, to further modifications if necessary. Finally, the scientific content of the site is based on published medical sources including the "Encyclopédie MédicoChirurgicale" and other recognized scientific articles where the references are available in the on the site.

In order to get a first impression of the opinion of general practitioners and emergency physicians on this online tool, we conducted a survey via Google Form ©



which included 120 responses. Our choice fell on this tool for various reasons including its ease of creating questionnaires and intuitive ergonomics. The survey's distribution was also intuitive with just a simple link and accompanying text specifying the purpose of the questionnaire and the time required to answer it. However, the main reason that Google Form was chosen was due to the ability to automatically process the results and present these results in the form of attractive diagrams.

As for the content of the survey, the gender unbalance was noticeable with nearly three-fourths of the respondents being female. This can be explained by the current demography of recently trained doctors in France. The majority age group is under 35 (90%) which is likely due to the generational technology gap. Likewise, 96.7% of respondents reported using similar medical resource websites practice sites daily. Having such a young audience also explains why the survey had 50% junior general practitioners. Furthermore, this young audience may explain why only 2.5% of respondents considered themselves fully comfortable with the maxillofacial field (5/5 rating). These data are in agreement with what is observed in the literature [3]. Maxillofacial specialties are rare in France [6], which probably explains a weakness in the training of residents, general practitioners, and emergency physicians in this area. As a result, 96.6% of respondents were interested in using a resource site in this area.

The survey indicated a positive response towards the navigation of the website Maxilloclic.com where 81.6% of respondents were very satisfied and 88.3% found its content relevant. The site is therefore considered ergonomic and scientifically relevant, which should facilitate its diffusion. The number of site visits in June, July and August was generally stable with a slight downward trend (192 - 152 - 125 visitors) which can probably be explained by the time of the survey during summer



holidays and vacations. Finally, 86.7% of physicians who responded to this survey believe they will integrate the tool we created into their current practice which is an encouraging result. Moreover, during the months of July and August, 18.5% of site users were returning user who had visited the site before. 70.8% of respondents thought that using the site will change their daily practice.

The use of CDSSs implies important prerequisites and the tool should never replace the good clinical sense and intuition of the doctor, as indicated on the homepage. This mention recalled the principle of individual medical liability stated in Article 69 of the Code of Medical Ethics: "The practice of medicine is personal; each doctor is responsible for his decisions and actions "[21]. This internet tool is a support for knowledge that is not often used because maxillofacial and stomatological incidents are not the most common in consultation. The goal of the resource is not to take responsibility away from the physicians but rather assist the physicians in their care for their patients. Similarly, these tools should not be easily accessible to patients. While the free nature of the tool is a benefit for the physicians, it can be a disadvantage if a patient tries to self-diagnose without the proper medical training and context. However, if we wish to remain within the criteria of the quality charter eEurope 2002 chosen by the French National Authority for Health [22], free and open access is an important element of evaluation for a health resource. A warning is present on the homepage to inform patients who fall on this website that it is not intended for them. One of the main concerns shared with us was related to mobile phone navigation problems. While the site was initially designed for use on a desktop computer due to its prevalence in general practice and emergency departments, we observed that many users viewed the site from their phones. It may therefore be wise to plan on the development of a mobile application in the future. To facilitate diffusion of the resource throughout the relevant



communities, the future also includes work on search engine optimization (SEO) by better referencing the various pages of the site on search engines.

Maxilloclic joins the increasingly large family of medical decision support sites: we hope to contribute to the dissemination and success of these tools, and to encourage new creations in this area. It is clear that in this context of constant growth of medical knowledge the future belongs to the tools which facilitate the recall of this information. These tools increase the effectiveness of our medical system and participate in reducing the number of medical errors.



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Professeur Pascale JOLLIET

Titre de Thèse : Evaluation d'un système d'aide à la décision médicale en chirurgie maxillo-faciale et stomatologie à destinée des médecins de premier recours: Maxillocllic.com

Résumé

Nous présentons l'évaluation d'un site internet destiné à aider les praticiens de premier recours face aux pathologies maxillo-faciales et stomatologiques: Maxillocllic.com. Il existe un réseau grandissant de systèmes d'aide à la décision médicale mais aucun site n'existait dans la spécialité qu'est la chirurgie maxillo-faciale et la stomatologie avant Maxillocllic. Une enquête d'acceptabilité a été menée parmi des médecins généralistes et médecins urgentistes. Elle a montré que 96,6% des répondants était intéressé par la création d'un tel site. Cent-quatre praticiens sur les 120 répondants pensaient l'intégrer dans leur pratique quotidienne.

La prévalence des pathologies maxillo-faciales, et le manque de service dédié à la spécialité dans de nombreuses régions a motivé la conception du site avec des informations concernant les pathologies les plus fréquemment rencontrées dans les départements d'urgence. Grâce à une navigation intuitive, il donne une vision large du sujet choisi, le but étant de guider le praticien vers un diagnostic et une prise en charge thérapeutique optimale.

MOTS-CLES

- Système d'aide à la décision médicale (SADM)
- Système d'information en santé
- Evaluation d'un support à la décision médicale
- Prise en charge des pathologies maxillo-faciales



NOM : MALINGE

PRENOM : Mathilde

Titre de Thèse : Evaluation of a clinical decision support system in oral and maxillofacial surgery for primary care physicians: Maxillocllic.com

ABSTRACT

We present the evaluation of an online resource to assist primary care physicians faced with maxillofacial injuries: Maxillocllic.com. There is a growing network of clinical decision support systems to assist primary care physicians but none existed within the maxillofacial specialty before Maxillocllic. An acceptability survey was conducted through a user poll targeting general practitioners and emergency physicians. It showed that 96.6% of the respondents were interested in such a website. One hundred and four of the 120 physicians who responded thought they would use the site in their daily practice.

The prevalence of maxillofacial pathologies, and the lack of a dedicated service to the specialty in many regions, motivated the construction of this site with information concerning the most frequently encountered pathologies in the emergency departments. Thanks to an intuitive navigation, it gives a broad vision of the subject chosen, the aim being to guide the reader towards an optimal diagnosis and therapeutic management.

MOTS-CLES

- Clinical decision support system (CDSS)
- Health Information System
- Decision Support System Evaluation
- Maxillofacial injury management