Design and evaluation of a patient website to reduce crowding in emergency departments: a preliminary study

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Abstract. The study aims to identify the information useful to support a patients' EDs' choice in order to design a patient Web-based system. For that purpose, a focus group and a formative user test have been performed. The results show that five types of information can be relevant. The spontaneous favored information is the "distance" to EDs. The "Wait time", that is sanctified in literature, is only used in a second time. A larger summative evaluation should be planned to evaluate and validate the befits of this kind of tool.

Keywords : Emergency, Crowding, Time management, Human Engineering

Introduction

Emergency department (ED) crowding is an international issue that may impact the access and the quality of healthcare [1]. Various tools have been designed to prevent crowding improving patient flow. Those tools either support the triage of patients as soon as arrived at the ED [2] or before they come to EDs [3]. In the latter case, one of solution is to inform patients on the wait time of local EDs through a Website or a mobile application to influence their choice of an ED in a given area [4]. Nevertheless, this information may induce unintended consequences potentially impacting patient safety whether the patient choose an ED not appropriate to their pathology just because its "wait time" is short [5]. This paper addresses the following question: what types of information (e.g. which "wait time"?) should be displayed to the patient on a Website to make an informed and safe decision?

1. Study context

The French project "Hospital: Optimization, Simulation and Tension" (HOST) aims at developing and implementing decision support systems to help professional of pediatrics ED to anticipate crowding [6]. Another solution explored is to design a tool supporting patients' choice of an ED in case of non-vital emergencies.

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2.   Methods

2.1. Identifying types of information relevant for the patient

A focus group was organized to (i) complete and validate the list of crowding indicators identified through data mining, (ii) select amongst them, those that could support patients' decision and (iii) discuss how to display this information in a patient tool. Nine partners from the project consortium with a sound knowledge of pediatrics EDs crowding were involved: the head physician of pediatrics ED, 5 computer scientists and 3 hospital databases experts.

2.2. Verification with patients

Based on the results of the focus group, an interactive mock-up has been design with Axure RP software®. This mock-up displays types of information that were selected during the focus group and that are automatically retrievable from the Health Information System were included. We imagine this mock-up like a Website.

   Six potential end-users (potential patients of ED) were involved in a preliminary formative user testing. They were asked to perform four tasks using the interactive mock-up to choose an ED (cf. Table 1) while thinking-aloud. Tasks were designed so as participants go through various searching modes of an ED.

Table 1. Tasks to performed during the user test and their related purposes.

Task	Description	Purpose
Task 1	"Choose an ED as regard to an home address that is given; it is not a vital emergency"	Which geographical search mode and type of information do participants prefer?
Task 2	"Choose an ED as regard to a home address and to a specific injury that were given; it is not a vital emergency"	Is the medical specialty a relevant criterion to choose an ED?
Task 3	"Choose an ED as regard to a geographic area (with no address and so, no distance to ED); it is not a vital emergency"	Is the ED choice possible when based only on the "wait time" (with no geographical information)?
Task 4	"Choose an ED as regard to a vital urgency"	Is the message "do not use the Website in case of vital urgency" sufficient to inform participants on the coverage of the Website?

3.   Results

3.1. Identifying types of information relevant for the patient

Ten types of crowding indicators were first identified; only 5 information's automatically retrievable from the HIS were selected to help patients to choose an ED : the wait time and this tendency, the medical specialties available in the ED, the ED location to display EDs near patient's location and a message informing on the purpose of the Website (only for non-vital emergencies). Moreover, it was specified that the purpose of the tool has to be highlighted and that user must be able to filter EDs according to the availability of medical specialties (e.g. ophthalmologic emergency).

3.2. Verification with patients

The homepage of the interactive mock-up proposes 3 modes (map, home address, geo location) to find all existing EDs within a 50km radius. The list of EDs, filtered with a medical specialty, is displayed on the "results" page. Five men and one woman (35,5

years, sd= 11,5) who visited at least once an ED with their own car completed the test. For tasks 1 and 2, 3 participants out of 6 think the "map" mode is faster than the "home address" mode to localize EDs . Participants prefer to base their ED choice first on the "distance" information and then on the "wait time" information. During task 2, 3 participants out of 6 filtered the results using the "medical specialty filter". For task 3, all participants used the "map" mode as they do not have a precise address. Four participants based their choice on the "wait time"; 2 used their knowledge to estimate the distance to the nearest ED. During those three first tasks, there was no mention of the "tendency of the wait time" information nor of potential information. For the vital emergency scenario (task 4) no participants used the Website but their decision was not based on their common sense rather than on the information -only for non vital emergency- shown on the Website mock-up: *"if I call the ambulance it's because I know your scenario is a vital emergency"*. Moreover, they all expressed that it is not clear for them what a vital emergency is: *"we have to know what is a vital emergency"*.

4. Discussion

During the test of the mock-up, participants did not express other need than the five identified types of information. While the literature focuses on the "Wait time" [4], results show that users referred first to the "distance" and then the "Wait time" maybe because they think it is not a reliable criterion. When the "distance" was not displayed, participants who know where to find an ED, rely on this knowledge rather than on the "wait time" information. The "medical specialties" filters, proposed in our mock-up, was used by patients to refine the list of ED for an appropriate choice to their pathology. However, this filters have to be highlighted for an optimal use. Participants stresses that distinguishing non-vital emergencies from vital ones is not obvious for them. To help them, a short questionnaire developed with clinicians and distinguishing types of emergencies could be added on the first page of the Website. The mock-up of the Website must be now re-engineered to include the short questionnaire and to fix identified usability issues on filters and suggestion of EDs depending location and wait time. To ensure the Website feasibility, the next step is to implement this modified mock-up using double entry of data to calculate the wait time witch will be displayed.

References

[1] M. Cautermen, D. Le Spégagne, *MeaH - Mission nationale d'expertise et d'audit hospitaliers, Réduire le temps d'attente et de passage aux urgences: Retours d'expériences*, Berger-Levrault, 2006.
[2] P.M. Roy, Y. Lannehoa, Le triage aux urgences. *Réanimation* **11** (2002), 480-5.
[3] S. Welch, L. Savitz, Exploring strategies to improve emergency department intake, *The Journal of Emergency Medicine* **43** (2012), 149-158.
[4] L. Neergaard, Some ERs post wait times by text, billboard, MSNBC (2010).
[5] American College of Emergency Physicians, Publishing wait time for emergency department care an information paper, *Members of the emergency medicine practice committee* (2012)
[6] F. Windal, K. Jeribi, G. Ficheur, S. Delgoul, A. Martinot, R. Beuscart, J.M. Renard, Peadiatric emergency department crowding : survival tree clustering for length of patient stay, *Stud Health Technol Inform*. **205** (2014), 1095-1099.

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