Real-time Person Identification

Subjects: Information Technology & Data Management

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Definition

Technologies enabling for real-time person identification are largely available and present differences in multiple characteristics. The use of these technologies within healthcare becomes increasingly relevant, for example in the trauma room where a critical situation calls for a real-time overview of attending healthcare worker. In this context, a systematic litterature research was conducted to determine the presently available systems for real-time person identification in healthcare.

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In the critical setting of a trauma team activation, team composition is crucial information that should be accessible at a glance. This calls for a technological solution, which are widely available, that allows access to the whereabouts of personnel. This diversity presents decision makers and users with many choices and considerations. The aim of this review is to give a comprehensive overview of available real-time person identification techniques and their respective characteristics. A systematic literature review was performed to create an overview of identification techniques that have been tested in medical settings or already have been implemented in clinical practice. These techniques have been investigated on a total of seven characteristics: costs, usability, accuracy, response time, hygiene, privacy, and user safety.

1. Introduction

Acute trauma care for severely injured patients is performed by a multi-disciplinary team of in-hospital specialists. The team takes care of every major trauma patient presented to a trauma center 24/7 and is activated within minutes after announcement. A trauma team activation is a critical time-sensitive procedure where communication is vital [1][2][3]. Miscommunication is one of the big factors that can lead to an unwanted patient outcome [4][5]. Knowledge of the team composition is the basis for good communication within a team [6]. This is a challenge during acute trauma care, since the team composition differs daily and consists of a variety of disciplines [1][3]. Therefore, the identification of caregivers, to create a real-time overview of, for example, the name and function of the present caregivers at the trauma room would be useful.

Currently there are many techniques allowing for real-time person identification in healthcare[7], defined in this review as being able to identify a person at any given time. These techniques have already been implemented in different parts of the healthcare system, ranging from patient tracking [8] in hospitals to physicians' attendance[9]. Each technique, from Near-Field Communication (NFC) devices [10] to WiFi based systems [11], has different characteristics that make it suitable or not for specific applications. A project was initiated with the aim to design a system that would allow a real-time overview of present healthcare workers and team completeness during a trauma team activation. To achieve this design, a system to identify healthcare workers had to be chosen. This systematic literature review was performed to support the choice of such a system. In this trauma setting, where everything is mission critical, costs, accuracy, and speed are essential characteristics. Furthermore, the usability of the technologies is a context-specific aspect that has to be accounted for [12]. Many of these different characteristics have been investigated for the currently existing technologies. The diversity of the available technologies together with the number of aspects that have to be accounted for calls for a comprehensive overview. The aim of this qualitative systematic review is to assess the different types of real-time person identification available in healthcare and investigate their characteristics regarding costs, usability, accuracy, response time, hygiene, privacy, and user safety.

2. Methods

We performed two systematic electronic searches in PubMed and Web of Science according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [13]. The final search in these databases was performed on 11 May 2020. Removal of duplicates within the retrieved articles in the two databases was performed in EndNote X9 (Clarivate Analytics, Philadelphia, PA, USA) [14].

In line with the research question, a broad database search was conducted. The most important terms in our search string ([majr]) were “Radio Frequency Identification Device”, “Biometric Identification”, “Costs and Cost Analysis”, “Privacy”, “Safety”, “Safety Management”, “Equipment Safety”, “Hygiene”, “Infections”, “Dimensional Measurement Accuracy”, “Data Accuracy”, “Sensitivity and Specificity”, “Hospitals”, and “Health Care Category”. Search terms for identification using cards was added as text word field tags ([tw]). Search terms covering the outcomes of response time and usability were added as title field tags ([ti]). We used the setting “most recent” in PubMed. In both databases, we only searched for articles from the last ten years because we wanted to gain insight into the most recent technologies.

An article was included when it (1) described a technical solution or system for the identification of patients or healthcare personnel (2.a) that was currently being used in a medical setting (hospital, private clinic, or global health) or (2.b) for which the aim was to be used in a medical setting and (3) gave information on at least one of the outcome measures (costs, usability, accuracy, response time, hygiene, privacy, or user safety) regarding the identification component of the technique or system. Furthermore, the outcome measures were to be retrieved after (4.a) an implementation in healthcare practice or (4.b) a test of a prototype or proof of concept, in a test setting adequately simulating the medical setting and a medical procedure in which the identification method would be used. We only included articles describing the identification of living people by using non-invasive identification methods. We made the assumption that all studies describing Real-Time Location Tracking Systems (RTLS) used the identification of living persons even when this was not explicitly described, since a location could not be assigned to someone without identifying the person. We excluded the implementation of identification in out-hospital elderly care settings. Articles using identification based on DNA tests, X-ray, Computer Tomography (CT), and Magnetic Resonance Imaging (MRI) were also excluded. Articles describing surveys, regarding the overall use of Radio Frequency Identification Devices (RFID) in different hospitals, were excluded if their results could not be reduced to the individual applications of the technique. Lastly, reviews or articles that were not written in English were excluded.

Five investigators (HME, AK, AMALL, CNvdM, NLW), independently, screened the titles and abstracts of the citations for whether they met the inclusion criteria and if they were not in conflict with the exclusion criteria. Every title and abstract had at least been screened by two of the five investigators. When the investigators did not agree with each other, the article was included for full-text analysis. Full-text studies were divided over the same investigators. Every investigator received different articles than for the abstract analysis. Individual full-text inclusions and exclusions were presented to the other four investigators. Reviewers resolved discrepancies through discussion, and full-text selections were merged to one final set of included articles for this systematic review.

Assessment of quality and bias was conducted by using scales that were composed by some of the authors (AK, CNvdM, and HME). Data of the included studies were extracted on a data extraction form made by the authors including technical details of the identification technique, the identified subjects (patients and/or personnel), the (aimed) implementation setting and the goal of the article, the described outcome measures, the method on how the information on these outcome measures had been retrieved, and the results of the outcome measures.

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Keywords

identification;healthcare;tracking;smartware;usability;cost;response time;hygiene;privacy;data;mission-critical