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INTERACTIVE PROCESS FOR MEASUREMENT VITAL SIGNS OF PATIENTS: PROPOSAL OF MULTIPARAMETRIC BRACELET

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1 Context

The service sectors in urgency and emergency hospital has the features work in a fast pace, sometimes with excess patients and overhead tasks for health professionals. Moreover, the dynamics of this process of care, includes actions that are dependent on the time and unpredictability of demand, with demands for punctuality and regularity of procedures (DAL PAI, 2011). Thus, one can understand that the urgency and emergency activities imply immediate care, because they act to detect and treat symptoms that may worsen in a short time, such as respiratory failure, cardiac arrhythmia, asthma attacks, circulatory disorders, fevers, among others. Thus, measurement procedures of vital signs (body temperature, heart rate, blood oxygenation and blood pressure) are the importance of detecting the physical condition of patients in the emergency care sector by providing necessary information to doctors so that they can determine the treatment to be started (POTTER & PERRY, 2013).

The use of information technology can assist in the execution of interactive processes, able to offer a monitoring of the actions of a system and enable the control and coordination of operational activities, providing a more efficient, from the correct indication of the collected data (BOWERSOX & CLOSS, 2009). Therefore, the real-time monitoring becomes a way for industry and health organizations to implement management and control systems (ZAMBELLI, 2004).

In this context, this paper aims to present a proposal for application of an automated process for real-time measurement and transmission of vital signs of patients in hospitals, consisting of a Multiparametric Bracelet. Therefore, there is a survey research and projects related to the theme, addressing the use of bracelet for the

measurement of vital signs. Later the diagnosis on the production of content and practical applications, there is the description of the project Multiparametric Bracelet, with details of its operation, benefits of discussion to the service sectors in urgency and emergency hospital and problems involved in the project design.

2 Method

This study seeks knowledge about the models of similar bracelets to the proposal from conducted a systemic research. After, we discuss solutions to the same.

Initially, there was research in the CAPES Journal Portal between the days 05/04/2016 and 05/10/2016, using the algorithms "vital signs AND wristlet", "vital signs AND bracelet", "sinal vital AND pulseira ", "sinais vitais AND pulseira". After application, we selected five documents had content related to the proposal for an interactive process for the measurement of vital signs, in the form of a bracelet product, described in Table 1.

Title	Authors	Year
Awareness and Using of Medical Students About Mobile Health Technology in Clinical Areas	Ehteshami et al.	2013
Fitness Trackers and the Web	Mcdermott.	2014
Tricorder: Consumer Medical Device for Discovering Common Medical Conditions	Somrak et al.	2014
Composition and deployment of e-Health services over Wireless Sensor Networks	Martínez et al.	2011
Living with alarms: the audio environment in an intensive care unit	Sinclair	2012

Tabela 1 – Selected Papers
Fonte: Elaborado pelos próprios autores.

In the study of Ehteshami et al. (2013), the authors interviewed 60 doctors and residents about mobile technology in healthcare. It was found that only 28% of respondents had knowledge of bracelets that transmit data from vital signs to mobile devices and report any kind of diagnosis, which shows the lack of technology among the public specialized in health.

The research of Mcdermott (2014) conducts a survey of different devices that assist in physical exercise. The bracelet analyzed gauged heartbeat, counts the number of steps and sends the data to the Web. The paper also provides mobile applications, GPS for bike, scales with Wi-Fi, and other ubiquitous devices, participants of context Internet of Things.

Somrak et al. (2014) discloses a bracelet prototype for measuring electrocardiogram and blood oxygenation (SpO2), and auxiliaries hardware modules (figure 1), as a camera, microphone, blood and urine for specific tests. Thus, one can diagnose hypertension, hepatitis, pharyngitis, tuberculosis, diabetes, and others.

Figure 1 - Bracelets with features for exercise.
Source: Somrak et al. (2014).

The research of Martínez et al. (2011) addresses the increase of ubiquitous devices - with connection to each other, making the functioning of the Internet of Things - discussing a middleware for data transmission between components/Wi-Fi sensors that can reduce by 53% the charge time the software and reduce of 12% the propagation time of an event.

Sinclair (2012) addresses the issue of audible alarms in UTI environment, which are from equipment. The research concludes that certain alarms generated by the equipment are required as report any errors. On the other hand, it is emphasized that health professionals spend a lot of time to explain to patients and their companions what the alarms, in addition to the stress generated by the patient.

3 Proposal: Multiparametric Bracelet

The Multiparametric Bracelet consists of equipment that integrates different functionalities for carrying out the data collection of vital signs (Figure 2), associated with a software for data management. The prototype is able to measure blood pressure, rate, temperature and breathing of the patient, and transmit these data in real time to the application.

Figure 2 - Conceptual model for Multiparametric Bracelet.
Source: Authors.

For operation of the bracelet, it is necessary to conduct an assessment of different sensors and how technologies can work together for the measurement data as blood pressure, rate, temperature and breathing of a patient. Interactive process for the measurement of data occurs in an automated manner without the need for a user command, such as in stop-mined functions of bracelets used in physical activities, as described in work of McDermott (2014).

Moreover, the definition of technologies is subject to the possibility of transmission data immediately. Because of middleware efficiency for transmission of data between components / Wi-Fi sensors searched by Martínez et al. (2011), studying the possibility of using the device in the proposed Multiparametric Bracelet.

To monitor the data generated by the bracelet, there is an online visualization software in order to carry out the management of all data and tells tions that are collected in an automated manner and also manually registered. With software for integrating data with the bracelet, you can perform the real-time monitoring of patients in the emergency care sector, with the immediate detection of critical medical condition, as can be seen in Figure 3. The software allows aid in decision-making of the clinical team as well as perform prioritization for patient care where significant changes in vital signs data.

Compared with the research of Sinclair (2012) about the audible alarms in the hospital, it is emphasized that the proposal of Multiparametric Bracelet not contain visual signaling or local audible alarm, not to cause anxiety in the patient to know what the statement is or cause the need for a professionalto explain the use of the device. Thus, all data and audible alarms are displayed and transmitted only to this software in the ward.

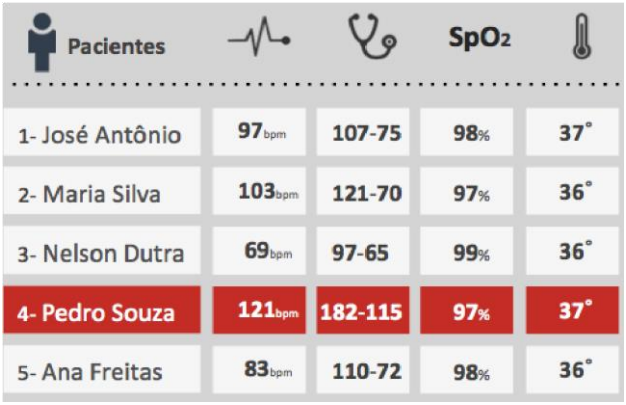

Figure 3 - Conceptual model for patient monitoring framework.
Source: Authors.

To develop the project, emphasizes the need for testing in real environment in order to identify possible difficulties for the installation and implementation of equipment for the transmission of data by detecting adequacy failures, signal interference or any problems for data collection. Likewise, one may also observe the correct and accurate performance of the alternative chosen for the process.

With real-time monitoring of the emergency care sector, which is executed by bracelet/software together, it creates a patient database and serve prices of the site, allowing the generation of indicators related to: average time waiting service; average service time; average length of stay in the unit, number of daily patients, amount of emergencial interventions, vital sign more change in the framework periods greater flow of picked-ments.

4 Conclusions

The purpose of the paper was to present the proposal of a Multiparametric Bracelet for use in the urgency and emergency sector. The application consists of an automated process for measurement of patients' vital signs (heart rate, blood pressure, blood oxygenation and body temperature) and transmitted in real time to a software responsible for managing the data.

The proposed Multiparametric Bracelet is based on concepts of Internet of Things, in which is the integration of different devices connected to each other to contribute to the accomplishment of tasks and access to information. The incorporation of technologies can ensure efficiency in the management of an urgency and emergency sector by identifying patients and transmitting clinical data.In this case in particular, with the integration of different equipment for measuring and monitoring the patient's

condition, it can have not only a reduction in the period of service, but also on constant monitoring to detect critical situations. Thus, one can direct the patient to the treatment at the right time when there is significant change in their health status, contributing to making medical decisions.

It is expected that the implementation of the automated process in the hospital can offer, in terms of management, improving the quality of health care with immediate monitoring of the flow of health facility visits, the clinical data history of patients is formed and the possibility of better use of employee working time, providing higher efficiency and service efficiency and greater security for patients.

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