The Faculty of Life Science Engineering's #shareresources4healthcare Challenge "Monitoring Support System for Medical Scoring Systems during Mass Triage Scenarios in Health Care"

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Abstract— Natural catastrophes and pandemics are unexpected disasters which will ultimately occupy fully health care infrastructures and medical staff capacities. Due to high patient incoming numbers, which are linked to these events, patient treatment must be prioritized based on the severity of a patient's condition and the availability of medical staff and devices. Mass triage & medical scoring systems are decision support systems which help decision makers to efficiently prioritize individual treatment during these difficult circumstances. The aim of this project is to develop an automated monitoring concept based on different triage & medical assessment processes in order to improve working conditions and reduce medical mis-determination.

Keywords— Triage systems in mass disasters, rapid emergency medicine score (REMS), acute physiologic assessment and chronic health evaluation (APACHE)

I. INTRODUCTION

The high number of incoming patients during disasters, whether the events originate due to natural, terroristic and/or biological causes, requires fast and effective decision taking from health care staff when it comes to prioritize individual clinical treatment of patients due to limited conditions (infrastructures, staff capacity, medical devices etc.). Mass triage systems were introduced as decision support tools for these specific events in order to support staff to prioritize patient treatment. [1] [2] Triage systems can be developed for pre-hospital (off-site) or at the scene (on-site) purposes. [3] In this project, the focus lies on on-site triage systems, presuming scenarios where patients can't stay any longer at home due to their condition. Moreover, medical scoring systems are used to monitor the patients in order to readapt treatment priority based on a patient's current status while health care staff availability is pending. [4] [5] [6] This project should give insight on the different systems that are available and compare them in order to identify recurrent vital signs and their weight factors for the so-called "clinical calculators" which were developed. [7]

II. Tasks

In order to specify the workload for this project, the following chapters elaborate the scope and out-of-scope perspective of the tasks and thus the resulting detailed work packages on which the participants must focus.

A. Overall Goal of the Project

The aim of this project is to offer a guideline which combines both mass triage and medical scoring concepts based on the best achievable compatibility, which is exactly what the participants must determine. By doing so, an adequate fundament is provided in order to design an automated monitoring system that supports health care staff to evaluate a patient current health status during time and material restricted work scenarios. At the very end, the collected information and other relevant outcome (algorithms, material lists, circuit designs, APIs etc.) should be made available to the public in form of a webpage and GIT repositories.

B. Specific Goal Definition

The project itself will be divided into specific stages whereas formed groups are going to work at each stage at a time. However, the groups are not forced to work through the stages sequentially. In order to achieve the best possible outcome, groups will work parallelly on the different stages.

Stages

- **Define:** Identify available triage & medical scoring systems. For both triage & medical score systems, compare the differences and similarities. Identify the most common vital signs which are used in these concepts for patient evaluation and define bio signal acquisition methods which are used in healthcare.
- **Research:** Research network possibilities by identifying relevant data bases in order to feed the scoring systems and discuss use cases and usability aspects with the explicit goal to invite specific stakeholders to join the cause.
- **Evaluate & Compare:** Combine the most compatible triage & medical scoring systems, identify use cases and provide tools to targets the most adequate support system combination based on predefined conditions.
- **Enhance (& Design):**
  - o **Mass Triage Concept.** Develop a prototype which enables to collect vital sign information in order to feed a monitoring algorithm which interprets the data based on the selected triage & medical scoring systems. The prototype should be a battery supplied, robust, easy to use, mass suitable standalone device which is able to measure essential vital signs such as oxygen saturation, heartrate, blood pressure and breathings per minute. Think of threshold and alert message concepts.
  - o **Medical Scoring Concept.** Based on API regulations for medical devices, develop a technical framework in order to retrieve data from medical devices to provide relevant information for an automated medical scoring system which can be used a clinical decision support system in hospital emergency departments.

III. The Greater Good

Ideally, one wants to develop a concept which helps to automate, combine and improve the available decision support systems. The concept should be available to the public and the resulting hardware components should be cost efficient, easy to get and assembling steps should be documented as detailed as possible in order to

assure fast reproducibility. The required software components, as well as their manuals, are provided as open source on a platform which guarantees efficient maintenance. The adequate implementation of unified and/or standardized proceedings are still missing for several reasons. [8] A recommendation for guided processes could be a beneficial outcome for health care in long term.

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