Agile decision support system for the management of tensions in emergency services using AIS techniques

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A B S T R A C T

At present, there is a tendency towards an emergency service favouring the complementarity and coordination of health actors. The vision consists of associating an effective production management of care requiring hospital patients' flows control. Nowadays, the permanent demand of emergency medical care management of hospital emergency services, _ Emergency Department, (ED)_ has become increasingly important [1], [2], [3], [4], [5]. To anticipate and manage the patient outflow is one of the most important dilemmas within emergency services worldwide. To deal with this patients' fluctuation, EDs require significant human, material resources and a high level of coordination among humans and materials [6]. Unfortunately, these resources are limited. The patients flux generates ED overcrowdings [6]. As a result, ED managers need to monitor patient flow continuously and detect either normal or abnormal patient behavior. Hospital information system plays an important role in developing hospitals efficiencies. To achieve that, we require a decision-making tool to control these situations.

The manipulation of data, and the making of satisfying decisions are the major challenges facing the construction of hospital decision support systems [7][8]. The objective is to realize an excellent control of the patient's flow basing on experience feedback, which often consists a sitting of adverse events knowledge base. This feedback is articulated on a starting loop collected from the ground; retrieving information, analyzing it and finding appropriate solutions. After analyses, it is possible to turn back to it, highlight suitable action to the emergency department, and finally deliver real retroactive loop of continuous updating from data fields.

We have adapted and applied AIS techniques in the hospital system. The main objective of our work is to provide relevant traces for decision-makers (which go back to the scenarios of the cases already passed by the emergency department), and afford them the most appropriate elements. The main objective is to improve real-time scenarios and supply hospital decision-makers with a minimal helpful set of traces. The filtering process integrates AIS techniques in which the negative and clonal selections are associated; the negative selection is applied to detect relevant traces, and the clonal selection helps to update the original database. The developed subsystem detects all suited sequences of actions and recommends decision-makers to find the right decision.

In favour of validating our idea, we have set up a subsystem called Emergency Management (EM). It aims to filter all the traces on the database to display only the relevant traces of the case entered on the interface.

The following figures show the results obtained from our system.

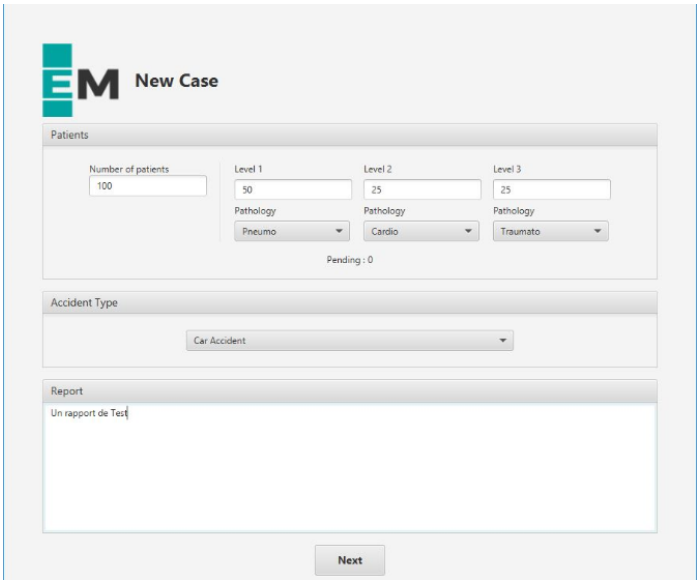

Figure 1. The results of the proposed algorithm for detecting relevant solutions.

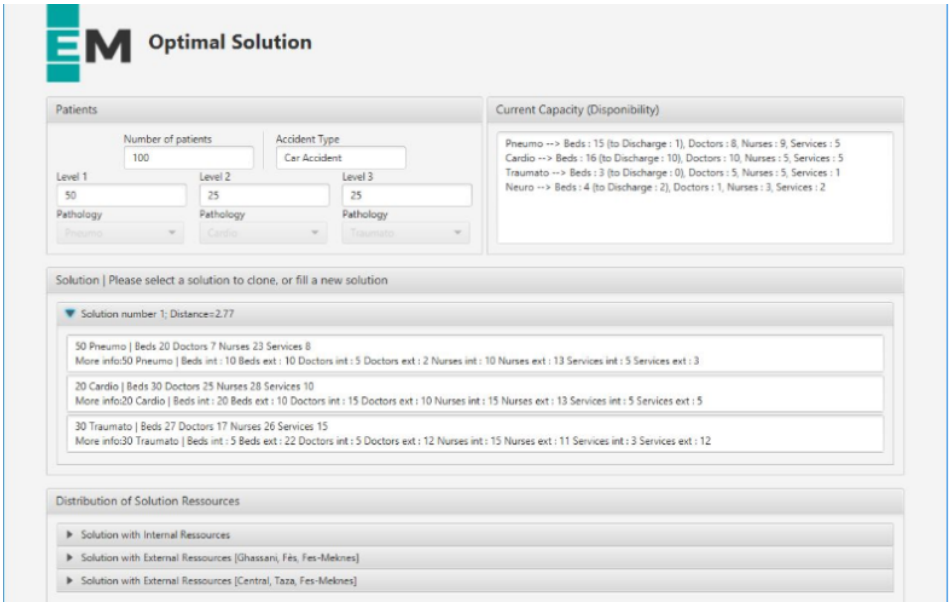

Figure 2. Displaying optimal solutions.

In this paper, the principles of the white plan have been computerized to bring up real-time responses to the hands of hospital decision makers for distributing patients regarding their urgency levels. The coordination in-between hospitals admitting of logistical, capacitive and budgetary constraints, and guaranteeing the safety of the already hospitalized patients in the hospital. We are going to fill the white plan boundaries in our system to provide an 'all-risks' strategy in emergencies.

The anomaly detection is one characteristic of the AIS techniques. We have adapted this feature from our concern, which is filtering and improving the hospital database knowledge. A bad scenario (set of irrelevant traces) is the solution that will not fit the urgent needs of the massive patient flow. We have adapted and applied AIS techniques to supplying hospital decision-makers with a supporting tool. The major ambition of our work is fairly presenting relevant traces to these administrators (which go back to their old solutions) and supply them with relevant elements in order to satisfy their needs.

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