

# Assessment of Technology Acceptance in Intensive Care Units

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## ABSTRACT

*The process of deploy a technology in critical services need to be very careful planned and processed. As an example it is the Intensive Care Unit (ICU). In the ICU the patients are in critically ill conditions and there are not available time to make experiences or to develop incomplete systems. With the objective to improve the implementation process, the same should be accompanied in order to understand the environment and user behaviour. In this case and with the goal to evaluate the implementation process, an assessment model was applied to a real system called INTCare. INTCare is a Pervasive Intelligent Decision Support System (PIDSS). It was deployed in the ICU of Centro Hospitalar do Porto and was evaluated using the Technology Acceptance Model 3 (TAM). This assessment was made using the four constructs proposed by the TAM and a questionnaire-based approach guided by the Delphi Methodology. The results obtained so far show that although the users are satisfied with the offered information recognizing this importance, they demand for a faster system. This work present the main results achieved and suggest one way to follow when some technology is deployed in an environment like is ICU.*

*Keywords: Decision Support System, INTCare, Intensive Care, Pervasive, TAM, Technology Acceptance, Technology Assessment*

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## INTRODUCTION

In the Intensive Care Units (ICU) the introduction of technologies can contribute to improve the Decision Making Process (DMP). As referred, ICU is recognized as a critical environment where the decision needs to be performed quickly and with a high level of accuracy. In the ICU it is applied a set of specific treatments related with a particular area of Medicine, called Intensive Medicine. Daily the ICU professionals are concerned with the patient care, being the patient documentation relegated to a second plane (Mador & Shaw, 2009). The DMP in Intensive Medicine (IM) is a critical process because it deals with human lives in serious life-risk conditions. In the ICU nothing can fail and if something wrong happens the result can be catastrophic and result in a loss of a human life. IM is a specific area of Medicine. Their knowledge is practiced in the ICU (Baggs et al., 2007). The introduction of intelligent decision support systems (IDSS) in the support of the DMP it is claimed by many of the nurses and physicians which work in ICU. The system should be available anywhere and anytime, operating automatic and in real-time. One of the main objective of this type of systems is decreasing the time of documentation tasks made by the humans. Although it also should contribute to give a better comprehension about the patient condition and at the same time predict future situations. In the ICU of Centro Hospitalar do Porto a set of experiences were made and a pervasive IDSS (PIDSS) developed, namely INTCare.

INTCare is a system developed by this research team and has as first goal to predict the patient organ failure and patient outcome in real-time for the next 24 hours. When the project started the most difficult aspect to overcome was the inexistence of electronic data. Most of the patient information were available only in the paper. This situation led the research team to deploy a platform which can help the ICU team in the documentation process. It was introduced a pervasive platform called: Electronic Nursing

Record (ENR). ENR can monitoring all the patient clinical variables.

With the development of the main project, other types of data sources were deepened and as result some new knowledge were obtained. Currently, INTCare it is considered by the ICU staff a very useful and complete platform, being composed by a set of pertinent information to the Decision Making Process (DMP). To this work a list of requirements was defined based on the needs of ICU and with the goal to make the system more suitable to the environment. They may be summarized as:

- R1:** To implement an online data acquisition component;
- R2:** To make available the laboratory results in an open format;
- R3:** To allow an open access to prescriptions, interventions and therapeutics;
- R4:** To dematerialise the nursing records;
- R5:** To integrate the main systems used in ICU in a single platform;
- R6:** Develop an automatic system to process and transforming the data.

Taking advantage of the modifications introduced (R1 to R6) it is possible to determine automatically and in real-time, using online learning:

- ICU Medical Scores (Portela et al., 2012);
- ICU Critical Events (P. G. Filipe Portela, Manuel Filipe Santos, Álvaro Silva, Fernando Rua, 2012);
- Probability of occur an organ failure probability and patient die (F. P. Filipe Portela, Manuel Filipe Santos, 2012).

In order to assess the technology developed, the Technology Acceptance Model (TAM) was adopted. It was chosen the most recent version: TAM 3. TAM 3 allow to evaluate the systems features (INTCare and ENR) and their importance to ICU. To complete this process a detailed questionnaire was developed. This

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