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Computerized System of Regulation and Evaluation of Emergency Attending Mobile Unit Service – SAMU in the State of Santa Catarina Brazil

Grace T. M. Dal Sasso[a], Fernanda Paese[b]

[a] *Nursing Department, Health Science Center, Federal University of Santa Catarina, Brasil*
[b] *Nursing Student, Nursing Department, Federal University of Santa Catarina, Brasil*

Abstract

This study, which is characterized by a technological production and a methodological research presents the report of the development and the evaluation of a Computerized System of Regulation and Evaluation of the quality of SAMU in SC. The system was structured in 03 modules consisting of regulation, Web evaluation and mobile unit evaluation. The analyzed data revealed that the system has ergonomic criteria, usability and adequate content to work in emergency situations and it is multiplatform due to using open source language. Further, by including in its reports the SAMU quality evaluation indicators stablished by the Health Department , the system contributes to the continuous and systematic control of service quality.

Keywords:

information systems, emergency, regulation, evaluation

Introduction

The QualiSus program, result of a research applied by the Health State Secretaries National Council - Conselho Nacional de Secretários de Estado da Saúde (CONASS) and the Health Department, revealed that the lines in hospital emergency room, the long period of waiting to examinations and surgeries, as well as the inability of health units to receive patients, were frequent complaints among SUS usurers. The study data, concluded in the end of 2003, revealed that more than 90% of the Brazilian population is somehow Health System usurer [1], [2], [3], [4].

Facing this situation the Health Department elaborated the QualiSUS, which aims establishing a group of changes to offer more comfort to the usurer, encourage care according to the risk level, provide effective attention by the health professionals and decrease the period of permanence in hospitals. [1], [2], [3], [4].

As integrating part of QualiSUS it is noticeable the Emergency Attending Mobile Unit Service (SAMU/192). The service enables the organization and rationalization in the public sector. In the SAMU/192 regulation center, the doctor answering to an emergency call has autonomy to sort by triage and decide about the allocation of the patient according to information about emergency room availability in hospitals. With SAMU/192 there will be organization to the access to emergency rooms.

Historically , we know that the level of response to the critical life situation of victims of accidents, traumas and violence has been not enough, causing and perpetuating spontaneous patient demands in urgency situation and real or presumptuous emergency, in direction to hospital emergency rooms causing them not being able to offer a more qualified assistance[5].

SAMU was implemented in Sc in 2005 including seven (7) urgency regulation centrals, with 18 UTI Mobile Units and 56 Basic Life Support Units of SAMU.

In this way, the systematization of na integral attention network to the assistance of urgencies, organizing the flow of patients of basic needs until high complexity and giving a quality assistance is one of the priorities of the Health Department and State.

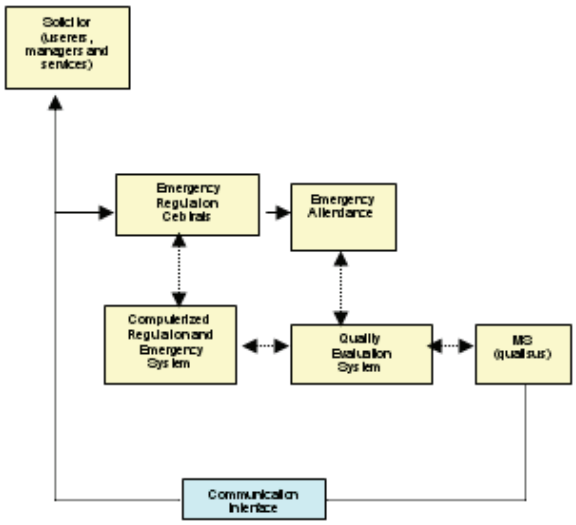
Following, in order to SAMU work properly , it is fundamental, through regulation centrals, the continuous and systemic accompaniment of urgency/emergency situations. This is possible by means of the development of a computerized systems of regulation and urgency assistance, with an ordinary language which can evaluate the suitability of this service in terms of controlling the indexes of demand and quality established by the Health Department. [1], [3],[4], [6].

Facing this ponorama, this study aimed developing and implementing a computerized system of urgency regulation of SAMU in the state of Santa Catarina as well as establishing the data which should integrate the information system of urgency regulation to evaluate the quality of SAMU in the State of Santa Catarina, form the indexes established by the Health Department.

Methodology

Technological Production and methodological research [7] which involved the participation through intentional or criteria choice of 06 people specified as follows: 01 regulator doctor, 01 nurse from intensive care unit, 03 systems analysts, 01 IT state manager and 01 Nursing student. The study followed ethical principles determined by the 196/96

Decree which determines the Regulating Rules and Norms of Research involving Human Beings and received the approval of the Research Ethics Committee of UFSC according to Protocol number 212/2005. The developing of SAMU system was based in the following flow structure:



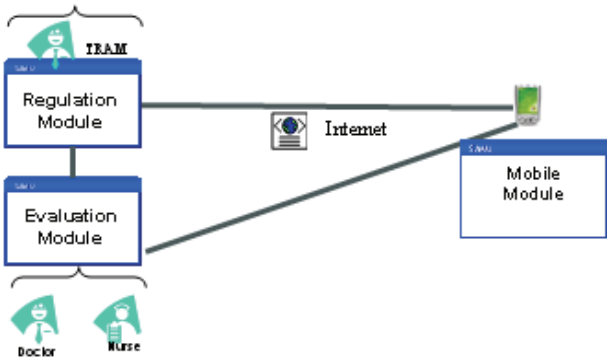
Picture 1 - Flow diagram

To the data collection the computerized regulation and evaluation of urgencies was used taking into account the following indexes: the number of attendance in emergency mobile units; the percentage of regulated emergency attendance, according to residential area; the percentage of emergency attendances regulated according to period of time; the percentage of attendances regulated according to demand; SAMU demand index according to neighborhood; time of response of emergency teams; time in local occurrence; time of total response; emergency mortality tax and main doctor diagnose. These items can be observed when implementing the system in the state of SC. However, they can already be obtained from the reports previously programmed. Still, a specific systems evaluation tool was used regarding the content criteria, usability and ergonomics [8]. The data were analyzed through descriptive statistics and qualitative description.

Results

In the development of the SAMU regulation and evaluation system the following phases were followed [8]:

1) Requirement Collection: problems of the emergency service and limitations to the development like time, place and economic. The system consists of 3 modules: regulation, Web evaluation and mobile unit according the following structure:

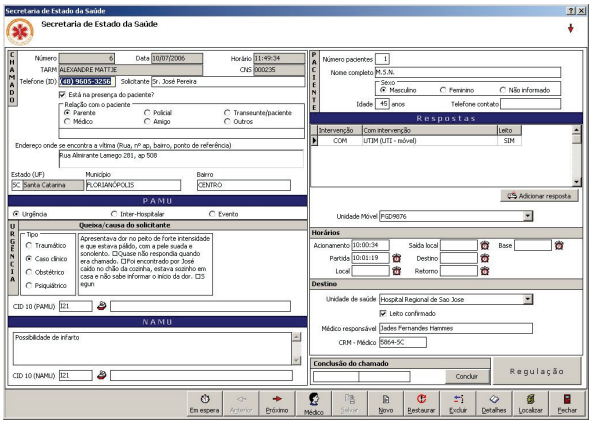


Picture 2 - SAMU Modules Structure

2) Analyses: choosing of the informatics tools to be used in and the design of the system. It was chosen that the Medical Regulation Module would be developed in Object Pascal language (Delphi environment) and JAVA to the File of Attendance of Web and Mobile patient, with database MY-SQL-SERVER. Delphi was chosen to the Medical Regulation Module due to the experience in the development of this language, made available by SES-SC and due to the facility of communication of other equipments. In the Web Evaluation Module JAVA was used, because it is an open code language, the framework available by SES-SC and its security. The database used was chosen because it is the pattern used at SES-SC in both Delphi and JAVA. It was also decided that the mobile system would be developed with Java technology (J2ME) because of, among other characteristics, its portability among different types of existing mobile devices in the market.

3) Project: definition, modeling of data and implementation in the computerized platform. The database of Regulation and Patient Evaluation via Web Modules was designed using IDEF1X patterns (definition of entity, relationship and characteristics) and, as a design tool of data, the ER-WIN was used. The Patient Mobile Evaluation system was conceived and implemented using the Objective Oriented Programming approach, in a way each distinctive group of evaluation was treated independently; however, keeping integration among all the groups in the general evaluation context. In this way, the system enables a progressive interaction and not necessarily sequential among the information universe which consists all the evaluation.

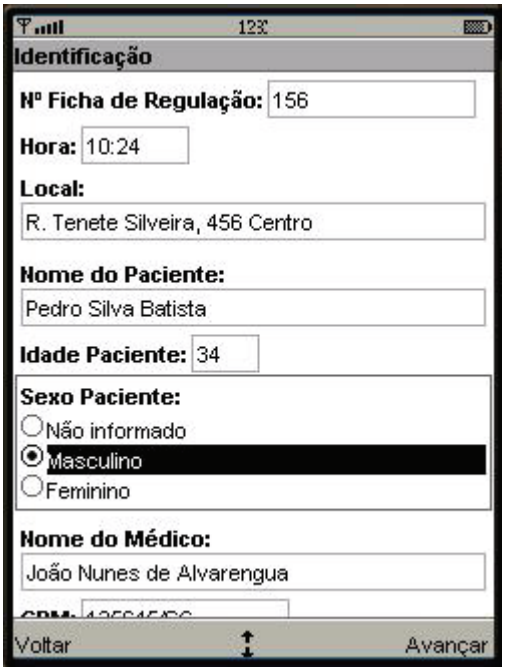
4) Implementation: development of the system in the reality of emergencies and test: pilot test of the system implementing and analysis of ergonometric and usability functions. In this phase, the system was structured in the computerized platform established this way:



Picture 3 - Example of Medical Regulation Module Screen

Picture 4 - Example of WebEvaluation of Patient Module Screen

The form of Medical Evaluation consists by items which identify the patient's situation in many areas. This evaluation comprehends in: Place Identification, Patient, Doctors Team. Initial State, Vital signals control and basic examinations, Breathing Evaluation, Cardiovascular, Neurological, Abdominal, Gynecological, Trauma, Burn, Hypotheses Diagnostics, Actual State and Doctor's Prescription. It also includes Glasgow scale, burn scale and progressive evaluation of trauma. The forms to emergency evaluation were also developed and organized according to CIPE – Classificação Internacional da Prática de Enfermagem - Nursing Practice International Classification - version 1.0



Picture 5 - Example of Mobile Evaluation Module Screen

The minimum necessary to the Mobile System work basically consists in a mobile device (PDA), which presents some type of implementation of the Java Virtual Machine (JVM) and has GPRS access through the qualified telephony operator. The readings carried through the patient's evaluation can be, when needed, typed and in other cases, selected by the usurer. The system presents synchronized menus to send and receive data and to browse among the evaluation modules. All access to the system is obligatory notarized through a login and password previously registered in the Web system.

From the structuring of the system, progressive evaluations were applied with the developing team discussing and reformulating the data in the system according to the needs and problems found. After that, a pilot test was organized simulating two real emergency attendance situations: one meningea syndrome and a hypovolemic chock due to displayed breaking.

04 appraisers from the informatics and health areas participated in this test, they evaluated the items: ergonometric and usability. The item ergonomics evaluated the criteria of organization, interface, content and technical. To each item scores were established from 1 to 5, being (5) excellent, (4) very good, (3) good, (2) regular, (1) bad. The data are presented in a statistics descriptive way. In the usability criterium 24 items were evaluated determined by scores from 1 to 5, being (5) totally agree, (4), agree, (3) disagree, (2), totally disagree and (1) not applicable according to qualitative analyses.

Table 1 - Ergonomics Evaluation

Score		Regulation Module						Evaluation Module						Móbile Module					
Critery		f1	f2	f3	MÉD	M.G.	D.M.	f1	f2	f3	MÉD	M.G.	D.M.	f1	f2	f3	MÉD	M.G.	D.M.
Organization	A	4	4	4	4,0	4,5	0,50	4	4	4	4,0	4,4	0,42	4	4	4	4,0	4,3	0,25
	B	5	5	5	5,0	4,3	0,17	5	5	5	5,0	4,7	0,33	5	4	4	4,3	4,2	
	C	4	4	4	4,0			4	4	4	4,0			4	4	4	4,0		
	D	5	5	5	5,0			5	5	4	4,7			5	5	4	4,7		
Interface	A	5	4	4	4,3			5	4	5	4,7			5	5	4	4,7		0,50
	B	5	4	4	4,3	5,0	0,0	5	5	5	5,0	4,8	0,2	5	5	4	4,7	4,3	
	C	4	4	4	4,0			4	4	4	4,0			4	3	3	3,3		
	D	5	4	5	4,7			5	5	5	5,0			5	4	3	4,0		
Content	A	5	5	5	5,0			5	5	4	4,7			5	4	4	4,3		0,0
	B	5	5	5	5,0	3,8	0,29	5	5	5	5,0	4,0	0,33	5	4	4	4,3	3,3	
Tecnic	A	4	5	4	4,3			3	4	4	3,7			3	4	3	3,3		0,17
	B	3	4	4	3,7			4	5	5	4,7			4	4	3	3,7		
	C	4	3	4	3,7			3	4	4	3,7			3	3	3	3,0		
	D	4	3	3	3,3			3	4	5	4,0			2	4	4	3,3		
					MG	4,4	0,4				MG	4,5	0,3				MG	4,0	0,3

Legend: Excelent (EX) 5; Very good (MB) 4: Good (B) 3; Regular (2); Bad (1). General Average (MG), Average shunting line (DM)

It was observed in the ergonomics evaluation according to table above in the evaluators perspective that the system is Very Good with an average variation of 4,0 to 4,4. The items content and interface received the best evaluations inside the ergonomics criterion with an average variation from 4,3 to 5,0. The technical item inside ergonomics criterion received a minor score, with average score variation from 3,3 to 4,0, specially because the system is under construction and the connection and communication among the modules (especially from mobile to fixed) are not finished. The average deviation among variables of ergonomics evaluation was around 0,4 to the Regulation Module and 0,3 to the Evaluation Module of patient form fixed and mobile.

Evaluation of usability

The main items approached by the evaluators to the usability criterion evaluation with scores (5) and (4) corresponding to totally agree and respectively agree were: the system easily runs on fixed and mobile platforms with no interferences, the system screens are clear, easy to read and interpret, the usurer is able to access the system easily, the menus are viable and easy to use, the system is modular and shows the structuring in the programming, the system has a limit of growing appropriate to the use demands, the memory requirements do not hinder the program running on the platforms, the system has automatic saving, the connection and communication among the Regulation and Fixed and Mobile Evaluation modules are appropriate, the system enables the recovery of data in the various modules, the hardware requirements are compatible to the reality, the system holds attendance network, the system has data locking.

Amongst items which received evaluation do not agree, with score (3), and that were marked only in the evaluation Regulation Module, are distinguished: does not run in different platforms; does not accept inexistent data and the system allows recovery of data in the various modules.

Positive aspects of the system are also distinguished: the agility, the neatness, the system is complete, it is easy to use it, friendly and it accomplishes the objectives. Another positive aspect is that it enables the emission of reports which contribute to the control and accompaniment of the quality of the attendance in SAMU from the indexes established by the Health Department. As negative aspects we have: the absence of the item help top the usurer in the menu of the Regulation and Web Evaluation Module, little functionality of tables of vital signals, scale of coma of Glasgow and progressive evaluation of trauma in the Mobile Evaluation module, as well as the lack of a complete database of streets and avenues of the State.

Discussion and conclusions

Although the system is not completely developed, it was perceived through the data collected during the pilot test that it has appropriate ergonomic criterion, content and usability to the emergency situations enabling the feeding of the system directly from the place of the accident. It is a pioneer and innovator system in Brazil due to including a complete structure of Regulation, Web and Mobile Evaluation of emergency embracing the doctor and nurse attendance.

The study also enables emphasizing that the information is a key element in the decision making and an essential requisite in the support and efficient management of health care, once it enables a systematic way of evaluating and comparing. It is recognized, though, as it is scored in OMS/OPAS[9],[10][11], that the access to information is an essential ingredient of the health services and planning, of supervising and health programs control, because it is a vital tool to evaluate the clinical interventions and management of health promoting activities.

In this way, the development of a computerized system of emergency regulation and attendance quality evaluation, from the establishment of definite indexes of quality which serve as ordinary and homogeneous measurement pattern, which constitutes in a permanent strategy of improvement of quality, at the same time it serves as a tool to the generation of new study fields.

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Address for correspondence

Grace T. M. Dal Sasso
Av. Gov. Ivo Silveria 177/ap502 Estreito
Florianópolis –SC – Brasil CEP:88085001
grace@matrix.com.br