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The Development of Automatic Triage Score Messaging System at Emergency Department: Using Modified Canadian Triage and Acuity Scale (MCTAS)

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Abstract

Triage is an essential component of emergency department (ED) patient management. Canadian Triage and Acuity Scale (CTAS) is a well known triage scale as a reliable tool for rapid patients assessment. The CTAS was modified and implemented to Asan Medical Center through electronic medical record (EMR) systems since April 2006. Automatic PDA messaging system of triage score to emergency medical staff was also developed. Local EMR database, the existing call system, and a new triage messaging interface were integrated. The system was designed as follows: Triage Nurses input modified CTAS score of a patient to nursing information sheet of EMR. If the modified CTAS level is critical, the triage score and other patient important information are instantly transferred to PDA phones of on-call staffs, and if patient's modified CTAS level is not critical, such information is transferred after 2 hours via reservation messaging process. This system is good for emergency communication and can be applied to other critical diseases as well like acute coronary syndrome.

Keywords:

triage, emergency, PDA computer, computerized medical record systems

Introduction

Triage is a critical reference when assigning emergency department (ED) patients' treatment priorities and treatment areas. Also, it is an assessment tool determining the time of stay at ED, and patients' expected outcomes. Canadian Triage and Acuity Scale (CTAS) is a 5-level triage system and is accepted as a more reliable tool than 3 or 4 level triage systems for rapid patient assessment at ED [1].

Asan Medical Center (AMC) is the Korea's largest tertiary referral hospital with 2,200 beds. Every day over 200 patients visit emergency room from all regions of Korea. Overcrowding is always a big threat for a critically-ill patient, because emergency personnel can not contact with him directly and instantly after his visit to ED [2].

AMC has been used other types of triage scale, such as AVPU (Alert, Verbal, Pain, Unresponsive) scale, Glasgow coma scale, Revised triage scale. These scales are simple and easy to use but sometimes inaccurate. These are composed of subjective measurements like blood pressure, mental status, etc.

So, after some modifications of the triage level, CTAS was introduced at AMC. Modified CTAS (MCTAS) scoring system was implemented to EMR system of ED. Automatic PDA messaging system of triage score was implemented for user's convenience and for the rapid triage information transmission. The developmental process and the architecture of the system were reviewed.

Methods

CTAS had been modified by five certified emergency nurses (CENs) and an emergency medical professor since December, 2004. The maximum reassessment time was shortened to one hour from two hour and the CTAS level of trauma patient was elevated a level higher [3]. These modifications were made after discussions of CENs and an emergency medical professor. Before the introduction of MCTAS, CENs had been used MATS (Modified Asan Triage Score) scale as an objective triage scale. The comparison study of the usefulness of two triage scale showed that MCTAS was more reliable than MATS in indicating the severity of condition of ED patients [3]. After then, MCTAS and its basic information were implemented to the EMR system on March 10, 2006. The user interfaces of MCTAS were developed after several times of discussions with the EMR developer team.

The automatic PDA messaging system of MCTAS was implemented with two purposes. The first one was to establish early and direct call system for emergent patients (MCTAS level I, II), the second was to alert on-call emergency staffs the delayed dispatch decision for non-emergent patients. The activation rules, contents of messages, message recipients were decided by emergency medical staffs. Automatic messaging service was started since March 17, 2006 after triage messaging interface was developed. The rules were adjusted twice, and a reservation messaging process was introduced after 3 months of the installation to serve the second purpose.

Results

The instant messaging system was implemented at first for high levels of CTAS: If a CEN inputs patient's triage score into a nursing information sheet window and restores it after other information inputted, the automatic triage messaging process is activated. If a patient's triage score is 1 (resuscitation) or 2 (emergent), EMR server sends it with patient dataset (e.g. patient's ID number, treatment area, chief complaint), and on-call staff's PDA number to SMS (short message service) server instantly through a triage messaging interface. After then, SMS sever sends the whole package of information to a PDA phone of an on-call staff within local wireless network area. If less emergent scores (3-5) are entered, the automatic triage messaging process is not activated. If a triage score of patient is changed to 1 or 2 during ED stay, this information is also automatically transmitted to on-call staff by above process.

The reservation triage score messaging system was implemented 3 months later: If less emergent patient (MCTAS score; 3~5) stays at ED more than 2 hours, reservation call is sent to on-call staff with the same dataset as above. This system was introduced to alert on-call emergency staffs the delayed dispatch decision for non-emergent patients and to solve overcrowding. However, too many messages were transferred to on-call staffs after reservation call system started. Because there are many patients with cancer and cardiovascular problem at AMC, patients could not be discharged easily with laboratory or imaging results only. The process was changed that the reservation call is sent to on-call staffs for only selected patients (fast-track area).

Discussion and conclusion

The overcrowding of ED is a common problem in Korea. This makes it difficult to assign patients proper priority for treatment based on the severity of their condition [3]. Triage is the process of quickly sorting and assigning the right patient to the right resources in the right place at the right time [4]. For this purpose, a comprehensive five-scale triage system has widely been accepted over other scaling systems as the most effective triage tool in ED.

Authors used CTAS for automatic triage messaging system after some modification. This system does not send all triage score of ED patient. The first consideration is a critically-ill patient. For this kind of patient, this system is an excellent communication tool between nurses and emergency medical staffs or between emergency residents and on-call staffs. This messaging system can replace paging system or notifying system in ED, especially for CTAS level 1 patient. Do we need to communicate with a colleague on the phone for the patient on resuscitation?

The reservation messaging system needs more evaluation. Too much PDA messages can be regarded as spam messages. The time limit, patient selection, and triage scores must be considered to change to reduce reservation call messages.

The automatic triage messaging system must be evaluated based on user's satisfaction, (system's) effectiveness, and patients' conditions in future studies. The optimum numbers of messages per day for emergency medical personnel are needed to investigate because more processes can use this automatic paging system. And the regulation of SMS messaging process must be established.

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