

Creation of a serious game exploring decision making by triage nurses in a stressful environment

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Keywords:

Decision-making, triage, emergency, nurse, serious game

Abstract:

Clinical judgment and decision making are critical components of the nurse function in emergency departments (ED), and more specifically in the field of triage (1). In order to test the influence of stressors on triage quality, we developed a serious game to reproduce real work conditions in an ED setting. The aim of this first study is to evaluate the feasibility and acceptability of this serious game. Further research is planned to use the serious game to measure nurses' emotions during triage.

Context:

Triage is one of the most important steps in patient admission in emergency departments. Triage decisions have an impact on patients' health and on the use of ED resources and organization (2). To our knowledge, there is no scientific data on a serious game giving a dynamic approach using 2D patients with clinical written vignettes in an interactive ED environment.—Previous research studies on triage evaluation have been conducted with written clinical vignettes, an observational approach, or a basic simulator that limits the reproducibility and realism of the triage process (3, 4). The creation of our serious game was a collaboration between different partners including the School of Engineering and Management (HEIG-VD), La Source, School of nursing, the University of Applied Sciences and Arts Western Switzerland (HES-SO), HESAV-University of Health Sciences the University of Applied Sciences and Arts Western Switzerland (HES-SO) and clinical experts from Geneva University Hospital and Lausanne University Hospital both partners of the Swiss Emergency Triage Scale (SETS®) group (Fig.1)

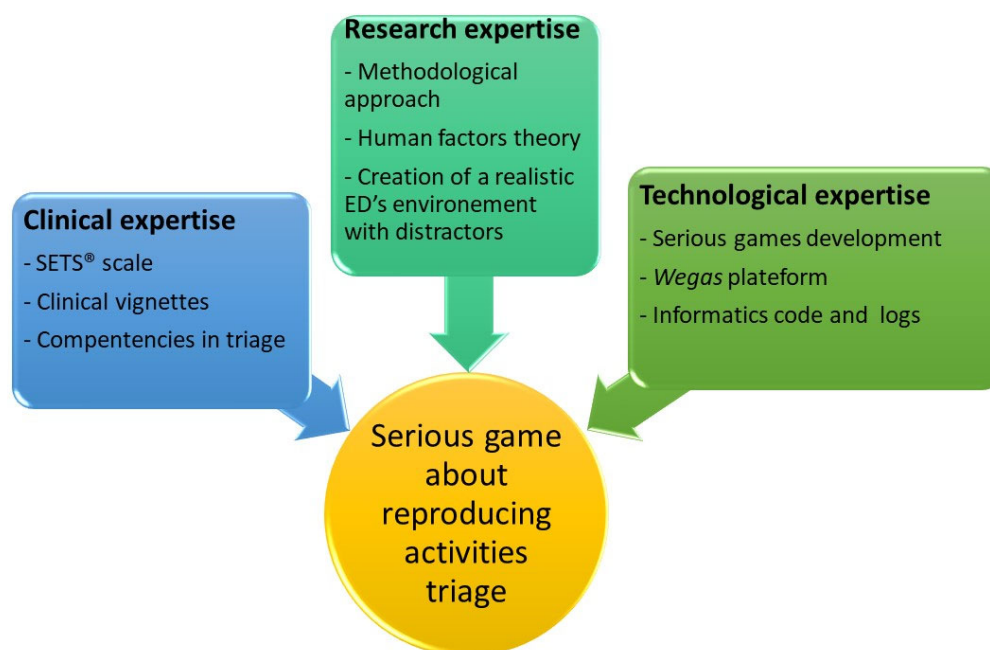


Figure 1: Conceptual view of the triage serious game

Targeted issue:

Triage activities rely on a complex clinical reasoning process. In 12 hours, a triage nurse assesses the severity of 80 patients, and makes several decisions for each of them. Currently, nurse's training in triage differs both in the number of training hours and in the training methods, that include direct coaching and vignette-based learning. Serious games are an innovative approach in educational health training. Our serious game revolves around the following main objective:

- Analysing decision-making in a realistic triage zone
- Assessing the emergency level degree chosen by the triage nurse on each clinical vignette
- Rating this serious game acceptability in an emergency nurse population

This work will report the different triage activities that we reproduced in this serious game, like reporting present illness history, collecting vitals sign measurements, or using SETS® specific criteria. We also describe technical features like sound effects, task interruptions and the design of the triage zone.

Proposed solution:

Triage is a dynamic activity based on patient-nurse interactions. To reproduce this activity, we started from a basic interactive simulator based on simple questions-answers interactions and including 30 clinical vignettes (5,6). This was our first prototype. To create a more realistic simulator, we, then, added a dynamic 2D virtual environment replicating an ED waiting room. We created 20 clinical vignettes whose accuracy and consistency were tested by nurse experts. We added 20 2D figures reproducing patient's arrival in emergency by ambulance or wheelchair. We modeled 10 interruption tasks and 10 sound effects representing distractors frequently present in an ED. They were programmed to interfere with specific tasks like anamnesis or vital sign measurement. The serious game records the questions from nurse's anamnesis (Fig.2), vital sign transcription, the chosen level of emergency and listing of presenting complaint of patient according to the SETS®. The serious game is hosted on the *Wegas* platform developed by AlbaSim (www.albasim.ch), the "serious game" research axis of the Media Engineering Institute at the HES-SO.

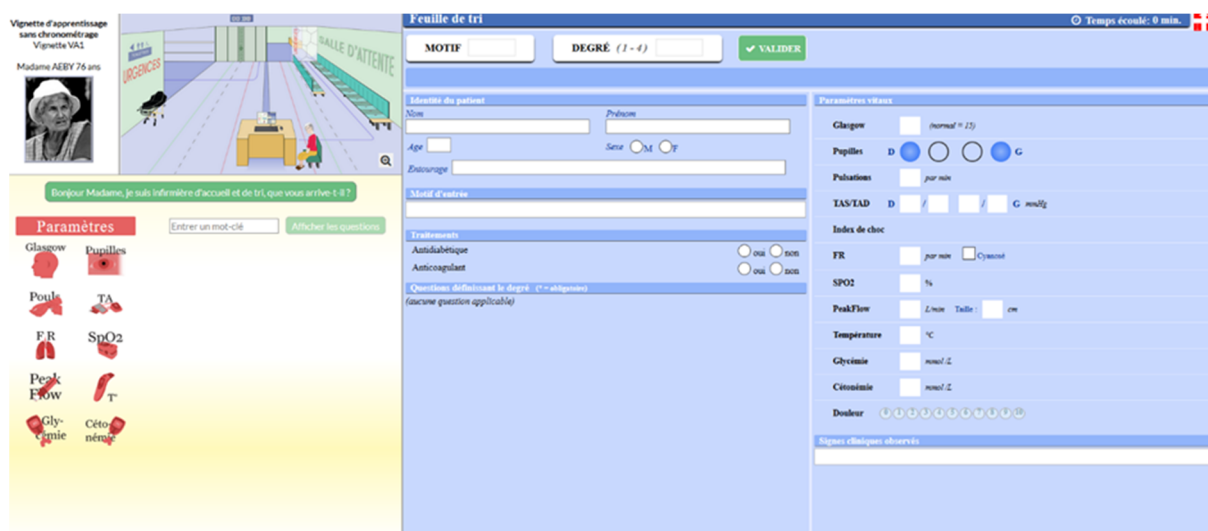


Figure 2. Illustration of one clinical vignette with all components about nurse triage

Relevant innovation:

This serious game offers a realistic immersion, reproducing triage activities like different mode of patient arrival i.e. Ambulance transport; sounds and task interruption. Triage process could be reproduced using classical simulation with standardized patients or high-fidelity mannikins. Both these solutions are very costly and difficult to integrate in a resource strained ED environment. Our approach is innovative, light and easy to use. Also, it proposes a valid alternative to initiate nurses to their triage function. This serious game is a valid tool to evaluate nurses' performance before exposing them to the real conditions of triage. Currently,

there are numerous EDs using the SETS[®] in the French-speaking part of Switzerland. Our serious game allows also to analyze the performance between diverse Eds triage comparing different results like needs in nurse's triage training. Furthermore, it can be reprogrammed to customize the content for the junior year of nursing bachelor program to learn for example the basis of patient anamnesis.

Project outcomes & results:

Our serious game was tested in a group of 80 triage nurses recruited in six Swiss EDs. The main outcomes of this study were to evaluate the serious game feasibility and acceptability:

- the serious game qualities were measured with AttrakDiff[®] scale (7)
- the serious game realism was rated using a visual analogic scale, where the nurse evaluates the perception of the realistic reproduction of triage activities.
- the research team used a research diary to note all technical difficulties during the session while nurses played the serious game on a laptop.

Conclusion:

This serious game is an innovative product to train triage nurses and to improve their performance and the quality of the entire process of triage, i.e. the accuracy of emergency level and presenting complaint of patient. Further research is planned to measure emotions like stress perception or clinical reasoning analysis. This is a first step to explore and analyze complex triage activities.

Perspectives & Needs:

To further evaluate the possibilities of our serious game, it is necessary to improve this first version by introducing stressors or adding other triage activities like waiting room management. A nursing doctoral thesis on measuring stress in triage nurses is being carried out. This serious game can also become a valuable tool for teachers and for quality improvement in emergency departments. Its implementation with longitudinal measures in emergency departments can be proposed to emergency nurses' managers.

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