



# 7 | "END OF LIFE", A SERIOUS GAME TO DEVELOP SKILLS FOR HEALTHCARE PROFESSIONALS

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## ABSTRACT

The increase in life expectancy has an impact on all areas of medicine in Europe. Health professionals, particularly nurses will have to be better trained to meet the palliative care needs of an ageing population. Therefore, the Serious Game "End-of-Life" was created to involve caregivers in a realistic palliative care context. This game was first tested with nursing students. Given the use of questionnaires, the new objective wants to test whether the game contributes to behavioral changes. The current article focuses on the methodology and the used analyses to assess the game.

## KEYWORDS

Serious-game, palliative care, relational skills, communication, education, nursing, assessment.

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Table 1 : Procedure



## CONTEXT

Demographic change in Europe is responsible for a growing need of palliative care [1]. Successful interventions in palliative care may improve patient's well-being and health, in part through effective communication [2]. This implies that caregivers (particularly nurses) must have relational skills in addition to medical techniques [3]. Relational skill acquisition in nursing is complex because skills build up as the nursing experience unfolds. Scenario-based learning used in nursing education could lead students to apply clinical behaviours without improving their self-awareness which is crucial for relational skills development [4]. Thus, virtual reality is particularly suitable for such a training since it places the student at the center of a realistic scenario outside the educational context. As e-learning currently focuses on surgery, a Serious Game, – “End of Life” (SG-EoL), was created [5] to develop caregivers' relational skills. Through several chapters, SG-EoL recreates interactions between a young nurse (the player) and a patient at the end of his life. For each intervention, the player must choose among several responses and accumulates points that reflect his behavior appropriateness toward the patient. A user test was conducted with nursing students using a questionnaire. Since it does not assess the educational effectiveness of the SG-EoL [6], a behavioral assessment will be carried out through an experiment.

## TARGETED ISSUES

As mentioned earlier, the need for training in palliative care is rising. Nurses are the most concerned health professionals by this demand. They need to develop relational skills to meet “good practice” standards. Relational skills development is therefore crucial to the implementation of quality palliative care. The use of a SG-EoL could help to reach this goal. A first user test has already been carried out through questionnaires showing a good adhesion of nursing students to this tool. Now we must test the behavioral game influence to see if its use can significantly improve nursing students' relational skills.

Thus, this project main objective is to investigate the SG-EoL effect on the development of nursing students' relational skills via an experiment.

As the project is currently underway, this article will focus on describing the methodology and analysing the statistical data, used to get to this objective, which explains why the operational hypotheses are exceptionally presented in the Results section.

## PROPOSED SOLUTION

An experiment was used to assess the SG-EoL efficiency. Nursing students were recruited to participate in the evaluation and were randomly assigned either to a test group where they trained with the SG-EoL or to a control group where they tested their palliative care knowledge with a quiz. Before and after using these games, the relational skills of both groups were assessed to determine if the SG-EoL

influenced their development. Specifically, the research proceeded as follows (table 1): A first phase videotaped the student' relational skills with a simulated patient at the end of his life. Then, each group received either the SG-EoL or the quiz and played for a month at a minimum frequency of once a week. The game got two additional chapters that let students follow the patient from his arrival in the nursing home until his death. A second phase also videotapes the student with the same patient. The video content will then be annotated using ELAN (version 5.8) so as extract the verbal and non-verbal data linked to relational skills [2] and compare them. Verbal content (socio-emotional, emotional, content and silences) and non-verbal indicators (emotional touch, many glances indicating attentive listening, many affirmative gestures (such as nods) and a more patient-oriented position) are the variables of interest that will be compared in both groups between both phases.

*We expect students to develop self-awareness, which will lead to the development of relational skills*





*Je m'assoieds sur le bord du lit à la hauteur de son torse et je regarde par la fenêtre tout en m'adressant à Agathe.*



*Agathe ne réagit pas.*

1. Je peux imaginer qu'il est difficile pour vous d'être ici.
2. Si vous ne répondez pas, comment voulez-vous que je vous aide ?

## RELEVANT INNOVATION

Using an experimental method to assess the SG-EoL allows using state-of-the-art statistical analysis techniques. Mixed models will be conducted to measure the use of verbal and non-verbal modalities depending on the use of SG-EoL or the quiz. Since these modalities are qualitative, Generalized Linear Mixed Models (GLMMs) will be produced in order to test the influence of the SG-EoL and the quiz between phases 1 and 2 on each modality [7]. These analyses are an extension of the General Linear Model (fixed effect model such as ANOVA or Regression) and have the advantage of modelling repeated data (such as data produced in phases 1 and 2) by taking into account a fixed part that represents the effect on the students, and a random part specific to each individual. As in the case of an ANOVA, fixed effects in GLMMs are the factors for which we want to observe a change in the interest variable (for example, a difference on the verbal content between the test and control group and phases 1 and 2). Random effects concern the modeling of the variance around subjects (nursing students). The model thus considers 1) the inter-individual variability, i.e. the difference in population behavior between both phases and both groups; and 2) the intra-individual variability, that is i.e. each subject specific behaviour between both phases and groups. So, thanks to significant results from GLMMs we are able to generalize the results to the target population.

## PROJECT OUTCOMES & RESULTS

The project is currently underway, 30 students have been recruited so far and have gone through the first phase of evaluating their interpersonal skills. Based on the videos, we will annotate and quantify the modalities of both variables verbal content and non-verbal indicators. After coding the videos of the second phase, we will conduct the statistical analyses described above to determine the game impact on the evolution of nursing students' interpersonal skills. Although we do not yet have results, we formulate specific hypotheses which partly depend on the research presented in the first section (context): about our main objective, we expect students to develop self-awareness, which will lead to the development of relational skills, during the different interactions with the patient. This should be expressed by a posture change when caring for a patient at the end of his/her life: specifically, we expect to see more empathetic, compassionate behaviors which lead to an increase of some verbal and non-verbal modalities after the use of SG-EoL. In particular, we expect an increase of socio-emotional, emotional (patient-oriented) content and silences. In addition, the student would also produce more emotional touches, more glances indicating careful listening, more affirmative gestures (such as nods) as well as a more patient-oriented position. The SG-EoL group should show a greater increase than the quiz one.

## CONCLUSION

A SG-EoL was created to meet the need of palliative care training. With this game we want to place the caregiver in a realistic clinical environment. A first user test was carried out on nursing students but couldn't confirm its educational effectiveness. Therefore, the current project aims at assessing the SG-EoL through an experimental setting and use of GLMMs to determine whether it has an influence on the relational skills development in nursing students.

## PERSPECTIVES & NEEDS

As the SG-EoL use is intended for all healthcare professionals, the next step will be to measure the game influence on different medical professions (doctor, nurse, nursing assistant...) in varied medical fields. This will require further developments of the SG-EoL by adding a wider range of answers and allowing players to insert their own answers. Considering the specific answers of each player could improve the game and enable the development of a specific version for each medical field.

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