

The Effectiveness of Interactive Clinical Case Study Simulation in Palliative Medicine

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Abstract— The medical students' interest in case studies used as an instructional strategy in modern medical education and in teaching tools like virtual patients and simulations is growing. Professional skills and knowledge about palliative care are widely accepted to be deficient and the medical care in palliative care settings remains inadequate. Reduced student-patient contact times in hospitals, mainly in palliative care settings with progressive chronic disease patients and increasing cost of technology means generated the need to create innovative methods that help students develop their clinical skills. Palliative medicine interactive clinical case study simulation (ICCSS) offers a cost-effective method to measure the impact of this virtual instructional tool on the students' clinical skills. It helped us to measure and compare their choices made in diagnosis, treatment, and follow-up process prior and after an educational module in palliative medicine. By simulating the most common patient profiles for palliative medicine, the interactive clinical case study simulation (ICCSS) allowed us to record the students' diagnostic and treatment decisions, to show the likely outcome of each decision, and to provide individualized feedback to identify and correct inappropriate decisions.

The interactive clinical case study simulation (ICCSS) can be successfully integrated with face-to-face teaching in palliative medicine like a supportive and innovative educational method.

Keywords— interactive clinical case study simulations, educational tool, palliative medicine, effectiveness, medical students.

I. INTRODUCTION

Modern computer technology has made possible the creation of simulated clinical experience and the precise measurement of patterns of clinical decision making. [1,2]. Reduced student-patient contact times in hospitals, mainly in palliative care settings with progressive chronic disease patients and increasing cost of technology means generated the need to create innovative methods that help students to develop their clinical skills. In addition the current methods for assessing changes in students' clinical practice by means of direct observation are too costly and time-consuming and this also rise the need to develop alternative to traditional

medical education [3,5,7]. E-Learning tools like virtual patients allow to help students to develop their clinical reasoning skills, without putting the patient at risk [4,6]. These educational methods maximize learning process offering exposure to new ideas and active discussions concerning: bad news communication strategy, differential diagnosis of the disease complications, alternative plans, prognostic estimations in quantitative terms. The learner has the opportunity to revise diagnostic and treatment decisions and is guided toward the optimal diagnosis and appropriate treatment. Clinical case simulations can assess clinical competence and provide an individualized educational experience. This kind of interactive technology environment can deliver complex data rapidly and at a lower cost than any other outcome measurement strategy. The interactive case study also appreciates the learner's behavior, it generates data of greater validity and it can be distributed and administered entirely by computer, with a minimal commitment of time and resources. [9,10,11,12]. There is also a potential for collaborative learning to break the isolation of learners realized in computer-based learning technologies. Advances in synchronous distance education and collaborative technologies like Weblogs, message boards, chats, e-mail, and teleconferencing are making such collaborative learning more readily available.

II. METHODS

Three interactive clinical case study simulations (ICCSS) were created by loading specific case information into a pre-programmed software template that has been designed to mimic the clinical diagnostic process, treatment selection and follow-up criteria in palliative medicine.

The aim was the improvement of palliative care education of medical students. The goals were to:

- (1) improve physician communications skills in regard to breaking bad news and end-of-life care;
- (2) integrate evidence-based medicine into patient recommendations; and
- (3) enhance clinical skills in the practice of palliative medicine, particularly the symptoms', evaluation, diagnostic decision, new complications recognising and management of total suffering.

These simulations were constructed as text-only module, as multimedia module with audio, video, and animation for maximum educational impact, and as an intermediate blend of text and multimedia. We recorded a group of 40 students' baseline skills and knowledge in palliative medicine prior to the interactive clinical case study simulations (ICSS) sessions. We administered the educational module in palliative medicine with interactive clinical case study simulations (ICSS) to the same group of students and we appreciated the students' improvements in making diagnostic and treatment decisions, the ability to recognise and correct inappropriate decisions and the impact of the educational programme on the students' clinical thinking. Three interactive clinical case study simulations included multimedia material, images, movies and audio recordings about an advanced breast cancer patient, liver cirrhosis with hepatocarcinoma and a stage IV chronic obstructive pulmonary disease patient. The interactivity was based on quantitative and qualitative feedback. The interactive clinical case study simulations recorded every decision the students made in diagnosis, treatment, and follow-up.

III. RESULTS

A number of 14 medical students (35%) out of 40 performed correct diagnostic and treatment decisions prior to the educational program in palliative medicine with interactive clinical case study simulations (ICSS), in comparison with 35 students (87%) which selected correct the diagnostic, treatment and the follow-up criteria after the ICSS palliative medicine module. ($p < 0.004$).

In addition, 21 students (52%) recognised their previous errors and corrected them.

Palliative medicine interactive clinical case study simulations (ICSS) offers a cost-effective method for measuring the impact of this virtual instructional tool on the students' clinical skills. It helped us to appreciate their choices made in diagnosis, treatment, and follow-up process. By simulating the most common patient profiles for palliative medicine, the interactive clinical case study simulations (ICSS) allowed us to:

- record the students' diagnostic and treatment decisions,
- show the likely outcome of each decision, and
- provide individualized feedback to identify and correct inappropriate decisions.

Most of the students considered that working with ICSS was fun and the format appealing. They found the cases interesting, the knowledge base of the cases appropriate and the key feature of the cases relevant for their clinical practice.

IV. DISCUSSIONS

Medical educators are facing different challenges than their predecessors in teaching tomorrow's physicians. The multiple changes in health care delivery and the advances in medicine have increased demands on academic faculty, resulting in less time for teaching than has previously been the case.

For "new" fields such as palliative care, and complementary medicine or genomics and geriatrics, is difficult to find time for teaching when medical school curricula are already challenged to cover conventional materials. Traditional educator-centered teaching is yielding to a learner-centered model and the recent shift toward competency-based curricula emphasizes the learning outcome, not the process, of education.[8]

The Federal Interagency Working Group on Information Technology Research and Development has recommended the establishment of centers to explore "new delivery modes for educating medical practitioners and providing continuing medical education".[11, 16, 20].

Simulation based learning provides:

- interactive learning in virtual clinical setting
- with no risk to patient and
- no liability for error and
- ability to provide real life clinical experience for superior learning.

The more advanced and sophisticated computers simulation based e-learning products allow students and medical professionals:

- to easily learn complex medical processes and
- perfect their skills.

Simulation learning challenge and motivate students and help them to identify their own strengths and weaknesses.

The important benefits of interactive clinical case simulations are:

- better retention, understand better,
- remember longer and decide faster,
- critical thinking development,
- freedom to make mistakes and learn from them,
- schedule learning anytime anywhere.

The interactive clinical case study simulations (ICSS) in palliative medicine fits that description.

Many studies of collaborative and interactive learning in medicine have shown higher levels of learner satisfaction, improvements in knowledge, self-awareness, understanding of concepts, achievement of course objectives, and changes in practice.[12,13,14,15].

A growing emphasis on competency-based medical education has forced educators to reevaluate their traditional

roles. In this changing time, educators no longer serve as the sole distributors of content, but are becoming facilitators of learning and assessors of competency. The interactive clinical case study simulations (ICCSS) in palliative medicine offer the opportunity for educators to evolve into this new role by providing them with new resources to facilitate the learning process.

We have found the interactive clinical case study simulation (ICCSS) to be a useful teaching and assessment tool integrated in the palliative medicine module. It allows learning to be individualized (adaptive learning), enhancing learners' interactions with others (collaborative learning), and transforming the role of the teacher.

Learning enhancement permits greater learner interactivity and promotes learners' efficiency, motivation, cognitive effectiveness, and flexibility of learning style. By enabling learners to be more active participants, the interactive clinical case study simulation (ICCSS) can motivate them to become more engaged with the content. Interactive learning shifts the focus from a passive, teacher-centered model to one that is active and learner-centered, offering a stronger learning stimulus. Interactivity helps to maintain the learner's interest and provides a means for individual practice and reinforcement. Learners have control over the content, learning sequence, pace of learning, time. All these allow them to tailor their learning style and experience to meet personal learning objectives.

The learning process efficiency is likely to translate into improved motivation and performance, resulting in better achievement of knowledge, skills, and attitudes. The interactive clinical case study simulation (ICCSS) and multimedia learning materials offers learners the flexibility to select options to accommodate their diverse learning styles. The integration of this educational method into medical education can favour the shift toward educators more involved as facilitators of learning and assessors of competency. [13, 14].

The good correlation between the observer's (examiner) and the recipient's (medical student) perception of this educational tool provides evidence of the validity of the assessment. Future areas for research may include assessing contexts for effective use of interactive technology environment in medical education, the adaptation of this educational tools to a wide variety of medical specialties and clinical settings, an exploration of methods for simplifying the e-learning creation process to gain wider acceptance and the use of a multimedia instructional design process by medical educators. In addition, data from ongoing evaluation will also allow curricular refinement.

V. CONCLUSIONS

The use of the interactive clinical case study simulations in palliative medicine demonstrated effectiveness improving the students' scores on case study exercises and offered the opportunity to identify and correct inappropriate decisions. The interactive clinical case study simulations were used as supplementary learning and formative feedback resource for students in a self-directed learning process.

Case-based e-learning can be successfully integrated with face-to-face teaching in palliative medicine like a supportive and innovative educational method.

Virtual patients and computerized teaching methods in palliative medicine education are powerful tools for healthcare educators, offering the right content when and where they need it.

However, because students often focus on the decision to provide or withhold the palliative care intervention, rather than paying attention to the patients' and families' values and concerns, face to face education (student- real patient) must be associated, mainly to improve students' communications skills.

This two educational methods could not be used interchangeably but integrated.

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