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ORIGINAL PAPER

Family Medicine Education with Virtual Patients: a Qualitative Study

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ABSTRACT

Objectives: Virtual patients (VP) have been present within the medical education process for some time. Although they are assumed to be of great benefit for student learning, very little is know about student perception and outcomes of learning, especially during the pre-clerkship years. Therefore we have decided to investigate the use of VPs during lectures, which has never been analyzed before, but could present an opportunity for more effective and holistic learning. **Methods:** This was a qualitative study among the 4th year undergraduate medical students at the Medical Faculty, University of Maribor, Slovenia. Students, after completing 4 virtual patient cases during the semester, were asked to participate in focus groups. Using these focus groups we asked students to provide information about their perceptions of VP cases, their learning, and suggestions for educational improvements. Data was transcribed and analyzed using the grounded theory-based coding method (open coding). **Results:** Medical students reported having a positive attitude towards virtual patient learning. They perceived them as helpful for filling in knowledge gaps, learning appropriate patient care and clinical reasoning. However, especially within the setting of early clinical learning, students felt the need to discuss their questions with their tutors in order to achieve better learning outcomes. **Conclusion:** Students on teaching courses feel the need for structured instructor sessions and the integration of VPs in the course planning in order to maximize their learning outcomes.

Key words: family medicine education; computer assisted decision making; qualitative research; attitude; students

1. INTRODUCTION

Computer assisted learning in medical education has become a common medical education technique. It is defined as "any use of computers to aid or support the education and training of people" (1). Computer-assisted learning in general is believed to enhance the medical education process by enabling higher access to learning materials, a standardized process of education, and the potential for asynchronous learning (1).

Virtual patients (VP) are computer assisted educational resources presenting a clinical problem to the learner for managing online environments (2). These cases simulate real life situations, where the students are the decision makers. They decide on the history taking, clinical examination, diagnostics and therapeutics (3). These cases are meant to build clinical competency, fill educational gaps and allow the student to develop core values and attitudes towards the profession (2,3,4). Cook at al. stipulated, that VPs were not a method of instilling core knowledge to medical students but should be mainly used for advanced users for acquiring clinical reasoning. Clinical reasoning, the integration and use of various knowledge sources to develop a diagnosis and management plan is a skill that is often assumed and rarely specifically addressed. Yet research shows that it can be achieved through case-specific learning, however evidence as to whether VPs are capable of achieving this is currently still a gray area (5).

This technology an assisting method of medical education therefore could well serve towards enhancing student learning. Studies have shown that students felt more prepared for clinical work with patients if they had studied using virtual patients or problem-based learning cases before practicing in real life clinics (6). The use of virtual patients is perceived as a linkage between theoretical knowledge and clinical work in the clerkships (7). Edelbring et al (2011) presented a phenomenological study conducted on medical students during their clerkships in rheumatology. His findings suggested that virtual patients were a welcome addition to clerkship as they give students the structure missing in everyday work with patients. Also they allowed the students during the clerkship to connect their biomedical knowledge with their clinical experiences (7). The question therefore was whether students in a lecture course of family medicine had comparable attitudes and also benefitted from virtual patient learning platforms than students who just experienced them in clerkship environments.

At the Medical Faculty, University of Maribor, Slovenia, VPs have been used for several years during several courses, family medicine courses being one of them. Undergraduate medical education at the University of Maribor lasts for 6 years. Family medicine is taught during the 7th and 11th semester. The main themes of the educational process are: the use of clinical knowledge during early clinical exposure, doctor-patient communication, community orientation and practice management. The curriculum of family medicine consists of lectures, seminars and exercises. Students in seminars – during both years must write essays and present them

orally to their teachers and peers. The exercises are focused more towards primary care approaches and learning about families and communities, followed by clinical work under supervision. Teachers at the Department of Family Medicine also focus towards educational research within the field of teaching methods(8). Among them, they have successfully implemented the uses of movies in medical education (9) and identified deficiencies in decision-making by undergraduate medical students. As a result of these studies greater emphasis in the curriculum has been given towards approaches to consultation, modification of health behavior, and opportunities for health promotion (10).

As interventions in medical education need to be clearly evaluated on their strengths, weaknesses, costs and effectiveness in order to be implemented within further practice (11), we decided to conduct a theory-guided study to determine the students' attitudes towards the uses of VP cases during the family medicine courses.

2. METHODOLOGY

2.1. Types of study and settings

This was a qualitative study using focus groups. The study took place during March 2015 at the Maribor Medical Faculty. The study was approved by the National Ethics Committee (Registration number 104/02/15).

2.2. Participants

From total amount of 11 medical students, 2 male and 9 female, in the 7th semester of medical school participated in this qualitative study after completing the family medicine course. The participants were aged from 22 to 25 years.

2.3. Procedure

The 4th-year students were asked to complete virtual patient cases using the „MedU Family Medicine Computer-Assisted Simulations for Educating Students (fmCASES) virtual patient program for the Family Medicine clerkship". MedU is an online Virtual Patients repository, based in the USA. Institutions can acquire a license for using them from the Consortium maintained VP cases. The Editorial Board develops cases based on the US Medical curriculum and in accordance with the relevant scientific societies. Cases are structured to lead students from the initial complaint towards a differential diagnosis, investigation, and treatment. The University of Maribor decided to acquire the license to use VPs within the field of family medicine, surgery, internal medicine, and pediatrics. Students participated in 4 designated VP cases out of the 40 and had to complete them as part of their course assignments. The assignments had to be completed at any given time during the course without any other student-teacher engagement.

2.4. Focus groups

After the end of the semester, the students who had completed the VP cases were asked to participate in focus groups to determine: (i) the time they spent on studying using VPs, (ii) their perceptions of the strengths and weaknesses of VP learning, (iii) benefit perceptions from this educational method, (iv) the applicability of VPs within the domestic health system, (v) student proposals for improvements in educational outcomes and preferred modes of study. We conducted 2 focus groups with 8 participants participating in the first group and 3 participants in the second focus group. The questions posed in the focus groups were: 1) How much time did you spend on solving the VP cases and when did you address the cases, 2) What do you believe to be the benefits of learning with VPs, 3) What are the disadvantages of such learning, do you see any negative aspects of it, 4) What did you learn with this learning and how would you compare it to exercises, seminars, and lectures, 5) How did the patient care fit in with the Slovene health system, 6) In the future, do you find it feasible to use VPs for education. Would you like education with VPs to continue. Do you have specific proposals on how to continue and improve the process, 7) Did you maybe miss the possibility of discussing the cases with a teacher.

2.5. Data analysis

The focus groups were transcribed by MS and analyzed using the grounded theory-based coding method (open coding). Each segment of the focus groups was then coded with a short phrase to best describe the theme. After the coding, ZKK and MS summarized the prevalences of the codes, analyzed similarities and differences, and came up with final themes. The saturation point was reached.

3. RESULTS

The students identified the following aspects of using virtual patient cases: organization of course work, strengths of VP learning, weaknesses of VP cases, educational outcomes, cultural adaptation, and proposals for improvements.

3.1. Advantages of VP learning

Students pointed out that the layout of information was a particular advantage of the VP cases: "I have been given a lot of information about the case and also the information was presented in a very structured fashion, from beginning to the end." (female, 23) It was especially important to the students, that the information involved broader topics not just the specific patient case. The strengths of the cases were also the uses of different learning methods and questions posed during the cases: "Cases, where you can also see pictures are the ones you can remember best. Also you are given differential diagnoses and are challenged to think about them. Later on then, you consider them faster for patients." (female, 23) Students especially liked the clinical relevancies of the cases and thus filling in their knowledge gaps: "Just as if you were practicing in the clinic going through the whole patient care process but with the possibility of checking in books about the condition". (female, 22) The more positive advantages of this educational method were therefore the diverse information, prompt knowledge assessments and the structured patient evaluation within a clinical setting.

3.2. Organization of course work

This assignment was given to the students at the beginning of the semester, so they had 4 months to complete the course work. Therefore we posed the question about how they organized their learning. They pointed out that having the possibility of self-set timing of learning was a blessing and a curse: „We could choose when to complete the assignment. I waited until the end and then had a time management problem". (male, 22) Others also concluded:„It is great that you do not need to be present for the education to take place, you can fit it into your timetable". (male, 25) Different students therefore also had different approaches to when they started com-

pleting the assignments and they ranged from the middle of the semester to, as pointed out, the end of the semester. An important aspect of the VP cases is also time spent dedicated to learning. Students reported to have spent from 45 minutes to up to 2 hours per case. Yet it had to be considered that using the Internet for studying might also have triggered them to be less attentive to the cases and multi-tasks.

3.3. Weaknesses of VP learning

Students considered a particular weakness of the computer-assisted learning was the inability to discuss unclear answers with a tutor: „Most of us probably felt the same. We could not agree with some of the answers to the questions because you just do not have the patient in front of you." (female, 22) The spurious patient contact was also a disadvantage of this learning method. Students complained to be unsure, how the situation would play out in reality and how patients would respond in real life. Of importance to consider was also that students participating in this course are not native speakers. English is a foreign language for the students and represented an obstacle: „I think that a weakness was especially the open answer questions. From one point there is the possibility you do not understand the language enough and the other point is that you do not know what exactly you should write. Should it be a anamnestic summary or something else?" (female, 23)

3.4. Cultural adaptation

The virtual patient cases were developed for medical students primarily in the USA. Based on the American health system the question was how relevant it was for students within a different, domestic health care system. Although there were discernible differences, the students were content with the cultural adaptation: „There have been differences in patient populations' races and prevalence is difficult to apply to our home environments. However the patients are chosen as being representatives of different countries as well as for the examinations." (female, 22) The patient care was perceived to be ideal for teaching purposes: „Yes, it was done perfectly. Just as it should be in a ideal world, if you were to have at least half an hour per patient. In reality this is not possible." The diversity in patient behavior was also a welcome addition for the students: "It was really interesting to read about the different types of teas and preferences. Maybe it was not useful for my studies, but it was enriching." (female, 22)

3.5. Comparisons with other educational methods

Virtual patient cases compelled each student to be focused on the case, which is a contrast to the passive engagement in lectures or seminars: „If we compare it to seminars, here, with VPs you had to be more focused on what you were doing. When someone else is presenting his or her work it is not like that. VPs were much like when you wrote your own paper and you had to think about all the components. I just think you study more in-depth with VPs." (female, 22) In addition to the active engagement of each student, the students pointed out that this was also a welcome addition to the clinical work education, as they could slowly proceed through the process of patient evaluation in contrast to the fast pace of real GP work.

3.6. Proposals for improvement of virtual patient use

Virtual patients are seen as positive additions to the educational process, yet there still need to be improvements to the status quo. „A smart solution would be, that we would use these virtual patients instead of having to write papers. We could work in smaller groups and solve the patient cases together, working interactively and be more involved in the study process". (female, 22) They also added that discussion of the cases would be a welcome addition: „Complete the cases at home, and when you complete lets say 3 cases, then you could discuss and debate about them at class. Because sometimes you could not completely agree with the answers given in the cases." (female, 22) Students need discussion about the cases and structure to guide them when conducting the learning, to integrate the content better with other course activities: „ I would suggest you still have some timeline to complete the cases. If you do not have that you just put everything off to the last minute. So let us say that when you have an 'insomnia' lecture, that afterwards you are told to now complete within 14 days a VP cases on that topic at home and we will discuss it then. So you can consolidate the knowledge."(female, 23)

4. DISCUSSION

Our study confirmed that students value a structured approach with available information to fill knowledge gaps. Especially important is the aspect of students wishing for a guided discussion after the uses of the virtual patients or to solve virtual patient cases in a collaborative fashion.

Cook pointed out that virtual patients were especially important for clinical reasoning in undergraduate students (5). Therefore students who have just been introduced to the clinical environment (in their 5th and 6th semesters through internal medicine and surgery) are prime candidates in their 7th semesters for studying the impacts of virtual patients. They have been exposed to the clinical environment yet need to build a greater amount of clinical reasoning and connecting of information in order to advance in their medical education. Such an aspect can, according to the current body of evidence, be targeted using virtual patients (5, 6, 7).

Edelbring reported that clerkship students perceived their participation and outcomes from learning as being greater than with no tutor available after the completion of VPs. The students in the reported study did not place an emphasis on the presence of the tutors but the ratings suggested higher perceived learning benefits with tutors (12). In contrast Jäger reported that students perceived a higher learning benefit when studying VP cases alone. However, when evaluating the test answers. Those who scored the best were with a partner (13). Further in regard to specialty studies (e.g. urology courses) it is reported that students using the e-learning environment prior to taking exams scored higher than students using textbooks only (20% better results) (14). Results therefore indicated that there was a benefit to learning using virtual patients, yet it had to be further explored as to what this benefit is attributed to and how to best exploit it.

Students in our study were less clinically experienced, putting a greater emphasis on the need to discuss their questions with tutors or even peers in groups. Therefore it is important to further analyze the possibilities of tutor facilitation sessions after completing VP work. Similar conclusions were drawn during a Pediatrics clerkship in Switzerland. Students want virtual patients study to be integrated within the educational process, not just added-on to all other learning methods but an integral part, before meeting patients with the presented

diseases (15).

A limiting aspect of VP use in non-English speaking countries might also be the cultural adaptation and language barrier of the international (in our case US VP cases). Students pointed out that the language barrier was present, yet also Muntean (2013) points out that learning outcomes do not differ greatly when they compared international VP cases and domestic (Romania) patient cases (16). Therefore, the development of a tutor assisted, course integrated model of international virtual patient cases could enhance student learning and needs to be further explored.

5. CONCLUSION

Implications for medical education in the future

Conclusions drawn from our focus groups suggest that students, in order to benefit from the primary care virtual patients, desire an integrated approach of VPs in the course syllabus. There it was generally agreed that it would make sense to use VPs as a way of applying the knowledge gained through lectures and exercises about different multifactorial cases. That would also better organize students' course work. As an effect of these student perceptions there should also be better educational outcomes gained (12, 13, 14). It is now important to evaluate those changes in further research to understand the influences of such study settings for multifactorial learning as is present in family medicine. An especially important part is the positive attitude towards non-domestic virtual patient cases. The fact that students are willing and have a positive attitude towards foreign language and health system VP usage is especially crucial for countries with less resources to develop their own VPs. For such medical schools it seems that foreign VP cases are a feasible solution. Virtual patients have been mainly used for clerkships so this study adds to the knowledge as to how students with little clinical exposure respond to virtual patients and prefer their clinical reasoning learning to be. This qualitative study could have suffered from a bias from the moderator of the conversation as there is always the danger of participants steering the conversation towards one line of topic. However, we took measures to prevent this by asking broad open questions, thus enabling all participants enough time to speak freely. Further on, students use only the MedU platform for virtual patients, limiting their experience to the design offered by MedU. However, regardless of the limits to generalization, the results suggest common findings to be the common body of evidence. Therefore, the next step in VP research at the primary level must be a robust validated study on the impact of learning and settings that enable best learning outcomes.

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CONFLICT OF INTEREST: NONE DECLARED

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