



GESDAV

Virtual Mrs K: The learners' expectations and attitudes towards a virtual patient system in transcultural psychiatry

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ABSTRACT

Objective: Extreme trauma exposure is common among refugees and is associated with severe mental and public health illnesses. Current medical curricula often provide limited training in the management of this patient group about assessment and follow-up. This study was aimed to evaluate the users' opinions on a dedicated virtual patient (VP) system for refugee trauma cases that were developed as a tool to enhance clinical, interpersonal and intercultural competence and examine learners' expectations and attitudes regarding the system and their acceptance of it. **Methods:** The authors developed an innovative educational tool based on VP methodology portraying a traumatized refugee patient, mediated by video sequences as a learning platform to train medical students in the clinical management of this patient group. The tool was tested by a group ($N = 32$) of resident psychiatrists and studied using a mixed methodology, including self-reported data about expected and experienced attitudes, emotional attachment towards the patient and insights and feedback about the system. **Results:** The participants responded in a positive way towards this new educational system, ranking high in terms of experienced realism (median value 4 on a 5-point scale), engagement (median value 4.5 on a 5-point scale), concentration (median value 5 on a 5-point scale), and in terms of its ability to provoke emotional attachment toward the VP. The feedback module was considered a very important learning element. **Conclusions:** This VP system demonstrated high acceptance among participants and good potential as a training tool for the clinical management of refugee patients.

KEY WORDS: Clinical management, psychiatry, refugees, trauma, virtual patients

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INTRODUCTION

The world is more and more globalized and also affected by rapid change and is experiencing extensive diversity in transformations on many levels. During recent decades, the Nordic countries (Denmark, Finland, Norway, and Sweden), which previously had fairly homogeneous populations, have become much more culturally diverse [1]. Migration is driven by various factors that include the desire for economic improvement, seeking of asylum and personal safety, as well as relatives.

It is well-known that both the reasons and the process, and duration of the asylum process can cause extraordinary stress on individuals, and public health studies have shown that the levels of physical and mental illness among immigrants are double those of the Swedish-born population [2]. An epidemiological survey shows that immigrants, particularly refugees, have poorer mental health than do native Swedes [3]. This is confirmed by a systematic review and meta-analysis [4]. Therefore, there has been a request to integrate migration-related health issues

with the health-equity framework [5]. Cumulative trauma is associated with the psychiatric diagnosis of post-traumatic stress disorder (PTSD) and depression by a dose-effect relationship, i.e., increasing levels of trauma lead to higher rates and severity of PTSD and depression [6,7]. PTSD followed by mood disorders is the most common psychiatric disorder among this group [8,9]. The relative risk of hospitalization due to depressive disorder following unemployment is highest among immigrant women in Sweden [3].

Male refugees have a higher relative mortality risk of cardiovascular disease, diabetes, metabolic syndrome [10] and external causes of death than do non-refugees [11]. Mental health and physical illness after trauma are directly related to major lifestyle factors such as diet, smoking, obesity, lack of exercise, and alcohol/substance abuse [12].

Acquiring proper verbal and non-verbal communication skills, including the ability to overcome cultural differences in order to properly assess the refugee patient's trauma history and to

identify and in a proper way construct a treatment plan for these severe mental conditions is a complex matter that is crucial to clinical learning [13]. In some current medical training systems, these competences are informally integrated with clinical training under supervision, or trained by using actors who portray patients with specific mental-health problems (standardized patients), but in many other programs they are more or less neglected. However, the use of standardized patients comes with limitations, including the high cost of recruiting and training them, low diversity in cases portrayed, the limited ability to guarantee consistency on repeated presentations, as well as the crucial need of a supervisor to observe and provide feedback about the management of the patient [14]. There is, therefore, an urgent need for more effective and focused teaching and assessment methods for these important clinical skills.

Virtual patients (VPs) are defined as an “interactive computer simulation of real-life clinical scenarios for the purpose of health care and medical training, education or assessment” [15]. Over the past 15 years, these computer-based patient-case simulations have been studied and integrated in medical education, and have been shown to provide a realistic, reliable, safe, individualized, consistent and cost-effective environment for the training and assessment of clinical reasoning and decision-making skills [16,17]. VPs with narrative designs are even found to be valuable for teaching communication skills [18]. To the best of our knowledge, very few studies have explored the use of VP in psychiatric training [19] and only one report has been presented about a VP depicting an adolescent patient with trauma exposure [20].

In 2012, we presented the results of a pilot study with a small number of participants [21] that evaluated the user acceptance, educational potentials, and face and construct validity of a VP system designed to portray refugee trauma (RT) cases as an educational instrument for enhancing clinical, interpersonal, social and cultural competence. Partly based on the results of that study, we further developed our system by incorporating features including detailed individualized feedback and the use of a video-simulated virtual refugee patient.

This study aimed to provide a systemized understanding of users’ opinions on this dedicated VP system for RT cases that were developed as a tool to enhance clinical, interpersonal, and intercultural competence and examine learners’ expectations and attitudes regarding the system and their acceptance of it.

METHODS

The Refugee Trauma Simulation System

The design and construction of the dedicated RT VP system called RT simulation (RT-SIM) was based on a preliminary version that we developed in 2009 and tested during our pilot study [21]. The VP case depicted a female Bosnian refugee patient, “Mrs. K”, with severe mental trauma exposure and symptoms of PTSD and depression. New features and improvements were integrated, based on the results of the aforementioned study.

The patient [Figure 1] is depicted using pre-recorded video clips. The clips were obtained through filming a female actor, building up a large database of pre-recorded video sequences referring to the patient’s responses according to the case’s manuscript as well as generic responses and reactions (i.e., the patient getting in and out of the examination room, waiting for the doctor’s questions, crying, coughing, etc.). These video sequences were then programmed into the system in order to create an interactive dialog between the learner (who chose the questions from a list of available medical interview questions) and the VP. The system allows user-interaction in the following areas: Medical interview, physical examination, screening instruments, laboratory and imaging tests. Depending on factors such as the trust built between the patient and the clinician at the given point of time, the VP can respond differently to the same questions on different occasions. Upon completion of the clinical examination of the VP the student was transferred to the “preliminary assessment” module where he or she is asked to fill in and justify the patient’s history and diagnosis, including differential diagnostic reasoning and treatment plan.

A new, improved feedback module in RT-SIM features two parts: (1) Individualized and automated feedback by the VP herself, giving the refugee patient’s perspective on topics such as the level of empathy she perceived, the questions asked and their relevance to the problems she was experiencing. This feedback is given as a video presentation of the VP talking directly to the learner, and it is based on actions taken during the examination, questions asked (based on the type and number of questions and order of asking) and the use of communication skills (i.e., the use of “mirroring” and summarizing of the patient’s answers). For every aspect mentioned during the feedback, different video responses were pre-recorded, and the most relevant response was presented to the learner. The feedback from the VP is followed by (2) individualized and automated feedback by a virtual advisor (VA). This formative feedback was presented in text form, and generated once again depending on the learner’s management of the case. It gives structured and detailed comments about different actions taken during the medical interview and provides recommendations for improvement if warranted.

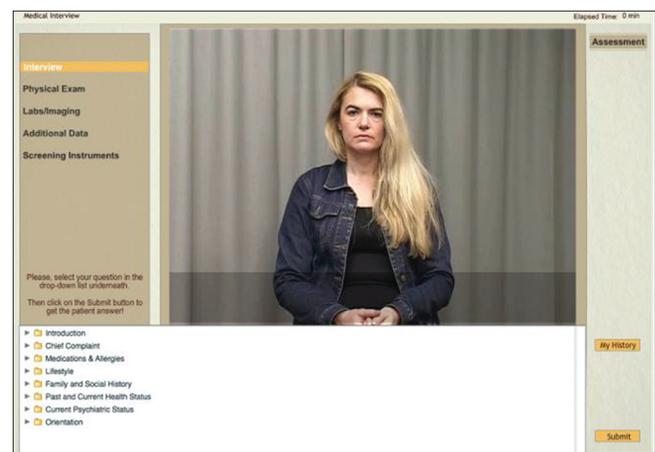


Figure 1: History-taking module. Screenshot of the refugee trauma simulation system illustrating the history-taking interview module

Participants

A total of 32 (20 female, 12 male) residents in psychiatry from three major university hospitals in Sweden (Karolinska University Hospital in Solna, Karolinska University Hospital in Huddinge and the University Hospital in Linköping) volunteered to participate in our study in response to e-mail communications. The mean age of the participants was 35.6 (female: 35.5; male: 35.9; range: 28-51) and the mean length of time spent as residents in psychiatry was 2.3 years (female: 2.4; men: 2.1; range: 0-5).

Study Design

The participants received written information about the study and informed consent form by e-mail some weeks before their participation. The study was conducted in the aforementioned hospitals, in quiet group rooms where the participants had access to computers and wired headphones [Figure 2]. A short oral introduction about the purpose of the study and the use of the VP system was given to the participants. Upon completion of the informed consent, the participants were handed the pre-test paper version of the KI-VP-Learning Experience Questionnaire (KI-VP-LEQ) and asked to fill it out. The KI-VP-LEQ consists of 27 Likert items aiming to explore the participants' preconceptions, attitudes and expectations toward the VP by eliciting baseline cognitive and affective states. It has previously demonstrated high reliability and criterion validity [22,23].

Upon completion of the pre-test questionnaire, the participants obtained access to the VP system and were asked to interact with the VP for about 45 min. During this interactive session they were expected to take a medical history, perform all necessary examinations and provide a summary of their assessment and treatment plan. All of the actions taken by the participants during the session were systematically and chronologically saved in local log files. When this part was completed, the post-test version of KI-VP-LEQ was handed out. This version consists of 25 Likert items that aim to provide insights about



Figure 2: Virtual patients (VPs) system testing set-up. A group of resident psychiatrists interacting with the VP in a quiet computer room (photo by I Pantziaras, 17 April, 2013)

the participant's actual experience during the interactive session as well as open-ended questions about the perceived usefulness and educational value of the system.

In order to further investigate the participants' experience and their perceptions of and attitudes regarding the system, individual semi-structured in-depth follow-up telephone interviews were conducted 3-4 weeks after the interactive session. The interview guide used was prepared by the research team and tested during our pilot study [21]. The interviews were audio-recorded and had a mean duration of 19 min and 21 s (minimum: 11 min, 46 s; maximum: 30 min, 2 s).

The Regional Ethical Committee at the Karolinska Institute examined the study and determined that the project does not include any sensitive personal data and it is not considered research according to the Swedish ethics law. Formal ethical approval was therefore not required, but an advisory opinion (Registration No. 2011/321-31/3) was obtained. All participants gave their informed consent prior to the inclusion in the study.

Data Analysis

A mixed methodology [24] was used in order to collect both quantitative and qualitative data. Quantitative data acquired from the pre- and post-test versions of the KI-VP-LEQ questionnaire were analyzed by producing descriptive statistics using Stata v.12. This analysis included the computing of median values of all Likert items included. Sign test was performed in order to test the hypothesis that there were no significant differences in the medians of pre- and post-test items. Responses from the telephone interviews conducted were analyzed according to a revised inductive content analysis based on Granheim and Lundman's model [25]. All of the authors of the present study repeatedly read the transcribed interviews in order to organize the qualitative data by applying open coding and creating a theme, categories and subcategories. Table 1 shows an example of the qualitative analysis.

RESULTS

All of the participants ($n = 32$) completed the study and returned completed pre- and post-test questionnaires. For reasons such as shortage of time, clinical work or residents having moved on to another clinic, 9 of the 32 (28%) participants did not participate in a follow-up telephone interview and were, therefore, excluded from the qualitative analysis. Table 2 demonstrates the participants' self-reported IT proficiency and experience. The vast majority of the participants (97%) reported average to expert proficiency in using computers, with men reporting "high knowledge" in a larger proportion (50%) than women (20%). Eighty-eight percent (88%) of the participants reported a "positive" to "very positive" attitude toward using medical simulation in their education. Only 15% of the women reported having played video games from "sometimes" to "very often" during the last year, compared with 66% of the male participants.

Table 1: Example of the qualitative analysis

Meaning unit	Condensed meaning unit	Code	Sub-themes	Theme
It was really fun to try this. I was rather surprised that one could get so engaged. When you use headphones also you get into the situation really quickly and it feels surprisingly easy to get engaged	I was surprised that it was so easy to get so engaged by the situation	Engaged by the situation	To get engaged by the learning activity	An engaging and touching learning activity
What I mostly remember from the activity was that I got so much engaged during the whole time	I was so much engaged during the whole time	Engaged by the activity		
She had a strong story, it was a strong case. I got really touched by her story	I got really touched by her story	Touched by the virtual patients story	To get emotionally touched	
I was very touched by her story, unexpectedly much. I was extremely touched by her trauma	I was extremely touched by her trauma story	Touched by the virtual patients trauma story		

Table 2: Self-reported IT proficiency and experience (percentage distribution)

IT proficiency	All (N=32) (%)	Women (N=20) (%)	Men (N=12) (%)
My knowledge on using computers is			
Non existent	0	0	0
Low (only e-mails)	3	5	0
Medium (e-mails, word)	59	70	42
High (Excel, graphics)	31	20	50
Expert	6	5	8
During the last year, I have played computer/video games			
Not at all	34	35	33
Rarely	34	50	8
Sometimes (every month)	16	5	33
Often (every week)	13	5	25
Very often (daily)	3	5	0
During the last 5 years, I trained using some kind of medical simulator			
Not at all	41	45	33
Rarely	56	55	58
Sometimes (every month)	3	0	8
Often (every week)	0	0	0
Very often (daily)	0	0	0
My attitude toward using medical simulation in my education is			
Very negative	3	5	0
Negative	0	0	0
Neutral	9	15	0
Positive	66	65	67
Very positive	22	15	33

Results from the qualitative analysis are presented in running text and, when appropriate, related citations are used in order to illustrate the themes. Four themes and 15 sub-themes were identified during the analysis of the follow-up phone interviews. Table 3 shows an overview of these themes and sub-themes.

Reported Expectations, Perceptions and Emotional Reactions towards the Learning Activity

Table 4 demonstrates the participants’ expectations and attitudes towards the VP during the interactive session as collected from the pre- and post-test version of KI-VP-LEQ. In terms of the realism of the system, the participants gave a rather high rating (median value of 3 on a 5-point scale) regarding expected realism (“I am going to experience this exercise as realistic”) before the interactive session with the VP, but significantly higher (median value of 4

Table 3: Themes and sub-themes found in the content analysis

Themes	Sub-themes
A realistic clinical simulation	Felt alive More realistic than expected Remembered the patient as if she was real
An engaging and touching learning activity	Engaged/captured by the learning activity Emotionally touched by the patient’s story It caused feelings of empathy Touched but less than with a real patient
A fun and exciting learning activity	Enjoyable/fun activity Interesting patient case Exciting and capturing activity Don’t have to worry that you will do a mistake
A useful feedback module by the virtual patient herself	A very necessary component of a learning activity Rarely provided in real life Well formulated and constructive What I remember most of the activity

on a 5-point scale) on the post-test item about the realism they actually experienced (“I experienced this exercise as realistic”). The participants gave a high rating to the fact that the VP system was structured in a way that parallels a real clinical investigation and gave them the opportunity to apply their knowledge (median value of 4 on a 5-point scale). A video presentation of the patient during medical history-taking was considered an important factor that contributed to the experienced realism of the system, achieving a median value of 4 on a 5-point scale (1 = Does not contribute at all, 5 = Contributes to a high degree). The majority of the participants commented on the realism experienced during the follow-up phone-interviews, too:

“It was realistic. I really wanted to help her; it was a very real story.” (Participant 14)

“I think that it actually felt pretty real. Then there is a difference compared to a real patient that (with the VP) you don’t become so eager to find a solution. You can keep a cool head and think a bit more. But absolutely, I think it felt real.” (Participant 20)

“She felt real. There was just a screen separating us, but she felt like she was in the room...” (Participant 1)

The VP system was also perceived positively in terms of engagement, with the participants scoring the post-test items very highly: “I was deeply engaged during the exercise” (median value of 4.5 on a 5-point scale) and “I was intensively concentrated during the exercise” (median value of 5 on a 5-point scale). Both items differed significantly from the participants’ expectations about their engagement and concentration, indicating that the

Table 4: Attitudes and perceptions

Pre-test	Median (range)	Post-test	Median (range)	Significance
I know exactly what is expected of me during the exercise	3.5 (1-5)	I knew exactly what it was expected from me to do during the exercise	4 (1-5)	
I wish I did something else right now	2 (1-3)	I wished I did something else during the exercise	1 (1-4)	0.03
I feel frustrated right now before the exercise	2 (1-5)	I felt frustrated during the exercise	2 (1-4)	
I feel that I have full control of the coming exercise	3 (1-5)	I felt that I had full control of the exercise	3 (2-5)	
I am going to be deeply engaged during the exercise	4 (3-5)	I was deeply engaged during the exercise	4.5 (3-5)	0.006
I am going to be intensively concentrated during the exercise	4 (3-5)	I was intensively concentrated during the exercise	5 (3-5)	0.01
I am going to be so focused on the exercise that I will lose the sense of time	3 (2-4)	I was so focused on the exercise that I lost the sense of time	3 (1-5)	
I feel self-confident	3 (2-5)	I felt self-confident	3 (2-5)	
I am going to experience this exercise as realistic	3 (1-5)	I experienced this exercise as realistic	4 (1-5)	0.03
I will forget everything that will be going on around me	3 (1-5)	I forgot everything that was going on around me	4 (1-4)	0.02

Self-reported expected (pre-test questionnaire) and experienced (post-test questionnaire) attitudes and perceptions toward the VP system (1 = "highly disagree", 5 = "highly agree") (Median values)

system engaged them more than they actually expected. The participants even reported that they to a high degree forgot everything going on around them, and to some degree became so focused that they lost the sense of time.

Figure 3 demonstrates the participants' self-rated emotional reactions during the interactive session with the VP as scored directly after the session. Their experience was perceived positively, being rated as "fun," "exciting" and "pleasant," and their own reactions being described as "touched" and "engaged," giving a promising indication that this VP system can evoke emotional attachment and authentic empathy toward the VP.

The system's ability to evoke emotional attachment was discussed by the majority of our participants during the follow-up phone interviews. Most of them expressed their positive surprise regarding this emotional reaction:

"I was touched by the VP very much. It was a pleasant surprise, I think, that one can actually get so much into this-it felt like I really wanted things to go well for her. It was a pleasant surprise-it felt like I didn't think that this was an exercise and not a real person." (Participant 13)

"I was touched really strongly: She had a strong story and it was a strong case. I was really touched by her story." (Participant 8)

Although, compared with real patients, the majority of our participants reported that they would have felt more touched in a real-life clinical interview.

"There are differences. (With the VP) you can take a distance... You have the technical equipment between (you and the patient), the patient is not present in the room, and you miss the direct communication. You have to click here and there." (Participant 11)

"There was not a big difference regarding the content of the interview. But emotionally they were different. It was harder to sense the mood and the atmosphere and, therefore, adjust the questions." (Participant 16)

Compared with a paper case, our VP system was considered as much better, scoring a median of 5 on a 5-point scale (1 = much worse; 5 = much better).

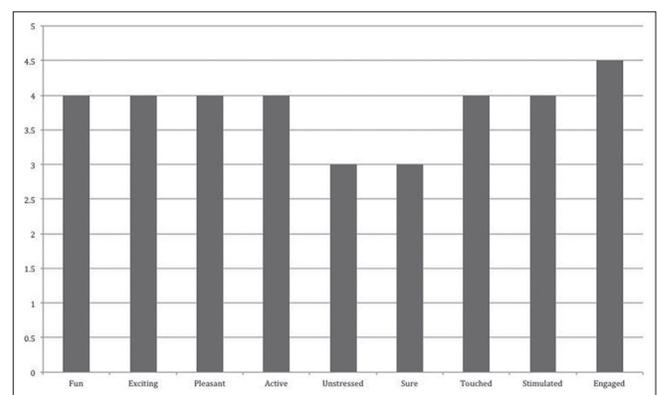


Figure 3: Self-rated emotional reactions to the virtual patient learning experience (1 = highly disagree; 5 = highly agree). $N = 32$ (Median values)

The Importance of Feedback from The VP and The VA

The automated individualized feedback provided by the VP system upon completion of the session with the VP was generally considered a very important component, scoring a median of 5 on a 5-point scale (1 = not important, 5 = very important). The feedback provided by the VA consisted of concrete advice on clinical and communications skills and was highly appreciated by the participants, also scoring a median of 5.

"It was really good. A supervisor would probably not be so explicit, fearing that I would get insulted. I think it was good that the feedback was so detailed about what I did wrong without worrying if I would get offended. This is exactly why I would use this system again. At the same time I didn't take this criticism personally and I didn't feel that I had to explain myself, which was great!" (Participant 12)

The feedback by the VP provided an insight into the patient's perspective and was also considered an important component of the system by the participants, scoring a median of 4 on a 5-point scale.

"I was thankful to get feedback from the patient-it is not something you get often. It felt like a ... luxury, that a patient evaluates the interview. It was good that it gave both

positive and negative feedback, with suggestions. It felt good.”
(Participant 8)

The participants scored the importance of feedback regarding five aspects of clinical training as follows (median, on a 5-point scale): Knowledge and understanding (5), Skills and assessment ability (4), Perception ability (4), Psychosocial competence (4) and appropriate time usage (4).

DISCUSSION

The main aim of this study was to examine the participants' expectations, attitudes and acceptance as regards a new educational platform, based on the VP technology, as a training instrument in psychiatry for enhancing the learners' clinical, interpersonal and intercultural competence in the encounter with traumatized refugees. The current RT-SIM VP system was based on the previous, preliminary version that was tested in a pilot study involving a small number ($N = 9$) of participants [21]. The two main new features of this final version were the addition of a video presentation of the VP that aimed to enhance the perceived realism as well as the improvement and enrichment of the automated, individualized feedback from the virtual refugee and the VA provided to the participant upon completion of the interaction with the VP. In this study, we applied triangulation of data methods by using both qualitative and quantitative methodology in order to enhance credibility, dependability and confirmability. Quantitative results from the KI-VP-LEQ questionnaire were not only used to investigate our research questions but also to crosscheck data and minimize potential distortion from the phone interviews conducted [26].

The results presented in this study demonstrate that the participants responded in a positive way toward this new version of our VP system, experienced realism, engagement and concentration, as well as the ability of the system to provoke emotional attachment toward the VP. This confirms previous findings from computer-mediated communication research indicating that highly engaging and challenging interactive media interfaces promote deeper motivation and concentration [27]. Our results also support previous findings that VP systems that provide an interactive conversational interface can establish an interpersonal relationship and elicit emotional responsiveness in the user leading to high involvement [28].

VPs enable a constructivist pedagogy and a situated learning approach where the student often unintentionally acquires knowledge and skills by performing tasks in authentic learning environments [29]. Such environments can be considered authentic if they successfully mimic real-world situations [30]. It is, therefore, important that our participants highly considered that this VP system was constructed in a way that highly resembles a real clinical investigation and allowed them to apply their knowledge. It is also very promising in this respect that our results confirm the preliminary results from our pilot study, conducted in Sweden, as well as of a pilot study conducted in the USA [31], with high scores on an experienced realism. The

scores on realism were actually higher in this study, the fact that can be explained by the integration of the video presentation of the VP in this version. Moreover, experienced realism was rated significantly higher than was expected realism in the pre-test questionnaire, indicating that this version of the VP system fulfilled and surpassed the participants' expectations in this respect.

The integration of automated, individualized feedback was rated by the participants as “very important.” The feedback provided, which was based on the participants' actual performance during the interaction with the VP, was generated by the VP system, based on a number of “rules” that were pre-programmed into the system and took in consideration parameters, such as, which questions did the user ask, when in the course of the interview where they asked, how long did the interview last, what examinations where performed and what conclusions did the user come up with after the interview. The feedback was provided both by a VA (the expert) as well as by the VP herself. It was formulated in a way that would hopefully lead to modification of the students' thinking and behavior, with improved learning being the ultimate goal. We, therefore, consider it as being formative according to the definition of Shute [32]. Most of the participants' reactions about the feedback provided were positive, but there is still need for fine-tuning and improvement in order to become more exact, relevant and individually adjusted.

In general, responses from the qualitative analysis indicate a very positive attitude and high acceptance as regards this educational tool for training clinical and interpersonal competences in psychiatry. A limitation of the VP system, however, was reported to be the lack of the ability to formulate orally, or in writing, their own questions or comments to the VP, which confirms findings from other similar studies [33]. A future version of this system should integrate the ability to formulate one's own questions in free text as well as the ability to conduct repeated sessions with the VP. Other improvements might include the ability to save or print the feedback for future reference, the chance to plan a meeting with the patient by having access to the VPs medical records in advance, and the use of touch-screen based visual displays.

Limitations of the study include the rather small number of participants, which limits the ability to draw conclusions about certain sub-groups in our sample, i.e., according to gender, work experience and IT proficiency. However, we consider our study group to be representative of a specific target group, as the majority of the then-active resident doctors in the three university hospitals, were included and completed the study. Selection-bias cannot be ruled out due to the non-random selection of our sample.

There is a crucial need for educational instruments targeted to the clinical management of severely traumatized refugee patients with mental and public health disorders. The VP system described and tested in this study demonstrated high acceptance among resident psychiatrists and good potential as a training tool for this purpose. High scores regarding experienced

realism, engagement and concentration, as well as the ability of the system to provoke emotional attachment towards the VP were observed. Little is known about the impact of interactive learning sessions with VP on knowledge transfer and retention [34]. This study did not examine any actual learning outcomes, but this is something we intend to investigate in a future study. Future studies should include randomized control studies with patient care outcomes as well as studies of the impact of working collaboratively (in pairs or groups) locally or on-line, integrating cultural and gender differences as components of the learning process.

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