The Virtual Pediatric Standardized Patient Application: Formative Evaluation Findings

Robin DETERDING
Cheri MILLIRON
Department of Pediatrics
University of Colorado Health Sciences Center, Denver, CO

Robert HUBAL
Technology Assisted Learning Division
RTI International, Research Triangle Park, NC

This paper presents formative (i.e., not final project) evaluation data from the use of a responsive virtual human training application by medical students rotating through Pediatrics and by Pediatric medical educators. We are encouraged by the evaluation results and believe the iterative development strategies employed and the subsequent refinements in the scenarios will lead to important instructional and assessment tools for medical educators.

1.   Problem

Pediatric medical educators face instructional and assessment challenges regarding interaction skills. For instruction, limited faculty observation time of students, variable experiences with pediatric behaviors or problems, and mostly passive curricular material limit students' exposure to and practice with children [1]. The ability to experiment with different interaction strategies with children is restricted to real-world environments that aren't safe places to practice and learn (e.g., mothers don't take kindly to experimenting with different strategies on their ill and irritable children). For assessment, no reliable or valid standardized assessment uses children; as a result, what assessment is conducted is necessarily less authentic than assessment of interactions with adults. Students are frequently required to interact with a "parent" and discuss the child but the child is absent from the assessment. Performance-based pediatric interaction skills cannot be assessed in this manner.

Overall our project aims to study the use of synthetic child characters for training and assessment in pediatric medical education [2]. The goals are to expand cognitive, social, and linguistic models to improve the robustness of student / synthetic child interactions, and address face, content, and construct validity of scenarios.

We describe here work in refining existing scenarios involving a very young girl and her mother and a female adolescent and her father.

2. Methods

We iteratively fed results from student and educator surveys and testing into our models. During testing, participants engaged the synthetic characters in dialog in an attempt to check the patient's ears with a virtual otoscope (young girl scenario) or elicit a patient social history (adolescent scenario). Participants' dialog served to improve the depth and breadth of linguistic models. Participants' observed and written reactions served to improve cognitive and social models. A post-usage survey captured participant opinions about validity, performance characteristics, and beliefs on the utility of synthetic character technology for training. We asked:

(i)   Are the scenarios enjoyable?
(ii)   Do the scenarios address important clinical competencies?
(iii)   Do participants view the simulation as a learning tool?
(iv)   Is improved technical fidelity required for authenticity?

2.1   Participants

To date we have engaged 52 participants: pediatric experts (n=14) at the annual Council on Medical School Education in Pediatrics (COMSEP) meeting and novice Colorado medical students (third year medical students before the start of their pediatric clerkship).

2.2   Procedures

Pediatric experts and third year medical students, as part of their orientation to the pediatric clerkship, were invited to perform a young child's ear exam and an adolescent social history within synthetic character scenarios. The interactions were recorded for both groups. At the completion of the virtual experience, participants from both sources were given a post-usage survey that asked similar questions but was worded in an appropriate manner to each source. All participants signed consent forms and the University of Colorado IRB approved the study. Quantitative data was analyzed using SPSS (11.0) software and written responses were grouped by themes.

3. Results

All of our questions, noted above, were answered affirmatively. Pediatric educators surveyed at COMSEP felt these scenarios address very to extremely important pediatric competencies at which on average only half of their students are competent at graduation. Participating students initially rated response time and overall conversation as only somewhat realistic, and scenarios as only somewhat comparable or adaptable to real world situations; however, subsequent programming refinements improved these ratings. Participants felt that, if limited clinical experiences were available, synthetic characters would be helpful and would allow for more experiential learning. Even at this prototype stage, many students commented that they had already learned valuable lessons from interacting with synthetic characters in these scenarios (e.g., "not to just move to look right away at a child's ear but to try to establish rapport with the child first" or "that a parent needs to be out of the room to get a good social history from an adolescent"). Furthermore, even with sub-optimal fidelity (described next), students and experts enjoyed using the

simulations and felt with improved technology they were likely to learn with synthetic characters during their career.

Initially participants clearly felt that the prototype needed improved language and graphic fidelity to enhance authenticity. However, using participant input and performance data with the characters, refinements in the linguistic models have been made and a significant trend toward higher post-usage ratings achieved, especially in the young child ear exam where the language model was more fully defined. Participant input is now better recognized and synthetic character behavior (both children and parents) is improved for both scenarios.

4.   Conclusion / Discussion

Participants believed even the initial prototype could provide a learning experience and articulated specific concepts learned during their interaction with scenarios. They enjoyed the scenarios and believed these types of applications will be used to enhance their learning in the future. The prototypes were seen as addressing important clinical competencies, skills (i.e., conducting a young child's ear exam and an adolescent social history) that many educators felt were not adequately acquired by medical school graduation. Capturing formative data has been indispensable for enhancing scenarios and creating a refined product, which can now be more rigorously evaluated as an instructional or assessment tool.

Our early evaluation results are encouraging. They suggest that our iterative method of capturing student input and improving linguistic and cognitive models is an appropriate strategy and that virtual pediatric standardized patients may be accepted as an important educational tool with continued technical enhancement. Further development of virtual pediatric standardized patient applications and research in this area is warranted.

5.   Acknowledgements

6.   References

[1]   Hubal, R.C., Kizakevich, P.N., Guinn, C.I., Merino, K.D., & West, S.L. (2000). The Virtual Standardized Patient: Simulated Patient-Practitioner Dialogue for Patient Inter-view Training. In J.D. Westwood, H.M. Hoffman, G.T. Mogel, R.A. Robb, & D. Stredney (Eds.), Envisioning Healing: Interactive Technology and the Patient-Practitioner Dialogue. IOS Press: Amsterdam.
[2]   Hubal, R.C., Deterding, R.R., Frank, G.A., Schwetzke, H.F., & Kizakevich, P.N. (2003). Lessons Learned in Modeling Pediatric Patients. In J.D. Westwood, H.M. Hoffman, G.T. Mogel, R. Phillips, R.A. Robb, & D. Stredney (Eds.) NextMed: Health Horizon. IOS Press: Amsterdam.