Students' Evaluation of Audiology Simulation Training

L'évaluation des étudiants d'une formation en audiologie utilisant des mises en situation

KEY WORDS

AUDIOLOGY
CASE SCENARIOS
DEBRIEFING
EDUCATION
EVALUATION
MANIKINS
SIMULATION
STANDARDIZED PATIENTS
STANDARDIZED PARENTS

Ahmad A. Alanazi
Nannette Nicholson

Ahmad A. Alanazi,
King Saud bin Abdulaziz University for Health Sciences, Riyadh, SAUDI ARABIA

Nannette Nicholson,
University of Arkansas for Medical Sciences, Little Rock, Arkansas, USA

Abstract

The use of simulation in the field of audiology as a strategy and tool for teaching and learning in clinical education programs is increasing. Eliciting feedback from students is important to design, improve, and implement successful simulation learning experiences. Yet, few simulation studies have reported outcomes of student feedback following simulation training. The purpose of this study was to explore students' perceptions of the simulation training components following 3 simulated hearing screening and parent counselling scenarios. Seventeen Doctor of Audiology (Au.D.) students participated in a simulation training, which included the use of a manikin, standardized parents, 3 case scenarios, debriefing sessions, and assessment. This cross-sectional mixed-methods study used a 12-item survey to elicit feedback from the students' perspective about simulation training components. This survey consisted of 10 statements with a Likert scale rating response methodology (1 = strongly disagree, 7 = strongly agree) and 2 open-ended questions to elicit written comments. Participants completed the feedback perception tool after the final case scenario. Overall, students agreed or strongly agreed (M = 6.74, SD = 0.32) that the simulation event enhanced their learning experience and opportunities for quality improvement were identified. Results showed student appreciation and recognition of the simulation training as adding value and enhancing their learning experience. Attention to details, organization, adequate time, participants' feedback, and evaluation when planning and preparing simulation training is one way to achieve higher participant satisfaction levels. Additional research on student perception of simulation training components will provide evidence to inform future simulation training.

Abrégé

Il y a une augmentation de l'utilisation de mises en situation comme stratégie et outil de formation et d'apprentissage dans les programmes d'enseignement clinique du domaine de l'audiologie. Une rétroaction de la part des étudiants est importante pour la conception, l'amélioration et la réussite de l'implantation d'expériences d'apprentissage utilisant des mises en situation. À ce jour, peu d'études ont recueilli la rétroaction d'étudiants ayant participé à des mises en situation. L'objectif de cette étude était d'explorer la perception des étudiants à l'égard de diverses composantes de mises en situation cliniques, et ce, après qu'ils aient participé à trois scénarios simulant des dépistages auditifs et du *counseling* à des parents. Dix-sept étudiants au doctorat en audiologie ont participé à une formation utilisant des mises en situation et comprenant l'usage d'un mannequin, de « patients simulés », de trois scénarios de cas, de périodes de discussion guidée entre le participant et l'animateur (*debriefing sessions*) et d'évaluations. Cette étude transversale à méthodes mixtes a utilisé un sondage composé de 12 items pour recueillir la rétroaction des étudiants concernant les différentes composantes d'une formation utilisant des mises en situation. Ce sondage comprenait 10 énoncés utilisant une échelle de Likert (1 = fortement en désaccord, 7 = fortement en accord) et deux questions ouvertes pour susciter des commentaires écrits. Les participants ont complété le sondage à la fin du troisième scénario. De façon générale, les étudiants ont indiqué qu'ils étaient en accord ou fortement en accord (M = 6.74, ET = 0.32) avec le fait que les mises en situation avaient optimisé leur expérience d'apprentissage et ils ont identifié des améliorations potentielles de qualité. Les résultats ont montré que les étudiants appréciaient et reconnaissaient la valeur ajoutée d'une formation utilisant des mises en situation sur leurs apprentissages. L'attention portée aux détails, à l'organisation, à la durée, à la rétroaction des participants et à l'évaluation lors de la planification et de la préparation d'une formation utilisant des mises en situation sont plusieurs façons d'obtenir un taux de satisfaction plus élevé de la part des participants. Des recherches supplémentaires recueillant la perception des étudiants à l'égard des composantes d'une formation utilisant des mises en situation fournira des évidences afin de façonner les futures formations utilisant cette méthode d'apprentissage.

Simulation is one of the most valuable innovations in clinical education, and is defined as "an act of imitating the behavior of a physical or abstract system, such as an event, situation or process that does or could exist" (Baek, 2009, p. 27). Simulation has become an accepted strategy in clinical education and training for healthcare professionals for two reasons: (a) increased attention to and emphasis on patient safety, and (b) evidence-based efficiency of simulation as a learning experience. Simulation training improves technical skills (Cook, 2014; Karakus, Duran, Yavuz, Altintop, & Caliskan, 2014; Ohtake, Marchilene, Schillo, & Rosen, 2013) and non-technical skills, such as critical thinking and decision-making (Lapkin & Levette-Jones, 2011; Wotton, Davis, Button, & Kelton, 2010). Simulation supports student practice with no fear of harming patients, thus reducing error and anxiety (Dearmon et al., 2013; Yule, Flin, Paterson-Brown, & Maran, 2006). The use of simulation as a learning environment is an innovative method for training audiology students; however, the use of simulation in audiology is still in its earliest stages (Alanazi et al., 2016). Simulation training can be divided into two categories: (a) simulation environment and (b) learning experience. These categories consist of several important components, such as manikins, safe environments, case scenarios, standardized patients (SPs), facilitators, debriefing, and students' satisfaction.

Simulation environment

The simulation environment is a physical place where simulation training is conducted and where the facilitator creates a friendly learning atmosphere (i.e., a safe environment), focuses on the learning objectives, and manages time (Fanning & Gaba, 2007; Meakim et al., 2013; Rall, Manser, & Howard, 2000). The simulation facility requires space, staff (e.g., facilitators and technicians), technology (e.g., video-playback systems and cameras), roles, objectives, time allocation, manikins with different fidelities (i.e., low, mid, or high fidelities), observing and debriefing rooms, adequate funding, access to SPs, etc. Orientation to the simulation environment before simulation training is also a critical part of creating the safe environment. All of these requirements help in providing successful educational experiences.

Although "simulation is a technique, not technology" (Gaba, 2007, p. 126), simulation training often depends on manikins. The use of manikins can enhance the students' learning experience because of their advanced capabilities and outputs, such as physiological changes (Epps, White, & Tofil, 2014). Manikins have been successfully used in both learning and assessment of clinical skills to achieve many learning objectives (Blackstock & Jull, 2007). The simulation accuracy of imitating reality determines the level (i.e., low, mid, or high) of manikin fidelity (Issenberg & Scalese, 2008; Wu & Shea, 2009). Low-fidelity manikins are frequently used in medicine because of their lower cost and the potential for repetitive use (Grober et al., 2004). A common misconception reported in the literature is that a high-fidelity simulation is better than a low-fidelity one. High-fidelity simulation is useful for skills involving interactions between students' cognitive and hands-on skills, as well as interaction with other healthcare personnel in the same simulation training (Gaba, 2006). Maran and Glavin (2003) suggest that manikins, regardless of their fidelity, are almost all potentially useful, but because of a lack of clear educational goals, many manikins are insufficiently used.

Manikins can be either controlled by an operator (e.g., a facilitator), or are automated (i.e., autonomous), changing status according to the intervention (Epps et al., 2014). The use of manikins as a teaching and assessment tool has recently been reported in the field of audiology (Alanazi et al., 2016; Kaf, Masterson, Dion, Berg, & Abdelhakiem, 2013). However, few manikins are available to train audiology students. For example, Baby Isao, manufactured by Intelligent Hearing Systems (2016), is a high-fidelity manikin that can be used to teach infant hearing screening and diagnostic techniques (i.e., otoacoustic emissions [OAEs] and auditory brainstem responses [ABRs]). OAEs are sounds emitted by the cochlea, either spontaneously or evoked by an auditory stimulus. ABRs are neuroelectrical signals (or auditory evoked potentials) generated by the auditory nerve and brainstem in response to an auditory stimulus. The simulator used in the current study consisted of the Baby Isao doll, the simulator box, a laptop computer, and software.

Learning experience

Standardized patients (SPs). SPs are trained actors who mimic or present particular scenarios. Prior to the use of SPs, training and evaluating healthcare students was performed by observing students' clinical skills with real patients (Stillman et al., 1986). This method was not efficient due to the differences between patients in terms of symptoms and other situational factors such as appointment time, attendance, and difficulties with accommodation of all students to observe one case. Thus, other training and evaluation methods were developed to assess healthcare students' skills, one of which is the use of SPs (Howley, 2013). The use of SPs has become one of the most common forms of physical examination and communication skills assessments in medical education (Epstein & Hundert, 2002). In audiology, there is shortage of

published studies that use SPs as an educational method (Alanazi et al., 2016).

Case scenario. The case scenario structure and content depend on the purpose of using SPs (i.e., the goal of the SP encounter). If the learning expectations of the simulation training are set at high learning levels (e.g., students implement all the core competencies of interprofessional collaborative practice: (a) values and ethics, (b) roles and responsibilities, (c) interprofessional communication, and (d) teams and teamwork), then a detailed case scenario is needed to meet all of the objectives (Howley, 2013; Interprofessional Education Collaborative Expert Panel, 2011). Although efforts to develop a guide for preparing SP case scenarios in healthcare simulation have been proposed (Baile et al., 2000; Cahill, 2015; Kim et al., 2006; Seropian, 2003), there remains a shortage of developed SP cases and related materials in the literature (Howley, 2013). For example, Seropian (2003) suggests that case scenarios include several elements: (a) objectives, (b) personnel and equipment, (c) computer setup and operator instructions, (d) paperwork and supporting documentation, (e) context, (f) knowledge and teaching information, (g) references related to the objectives, and (h) notes for further improvement of the scenarios. Kim et al. (2006) report that case scenarios should be: (a) relevant, (b) realistic, (c) engaging, (d) challenging, and (e) instructional. Generally, SPs could be involved in the simulation training in three ways: (a) the pre-encounter stage, where information about the SP is given to the student before the actual encounter; (b) the encounter stage, where the student meets the SP; and (c) the post-encounter stage, where feedback is given to the student by the SP (Dinsmore, Bohnert, & Preminger, 2013).

Debriefing. Debriefing is a process following the simulation exercise consisting of a guided discussion between facilitators and participants in an effort to enhance understanding of what went well and what could have gone better during the simulation exercise. Debriefing helps participants connect what they have learned in the simulation training with previous knowledge to enhance their learning (Fanning & Gaba, 2007). There is no standard structure of the debriefing process; nevertheless, several models have been proposed to help educators organize the structure, such as the Guidelines, Recommendations, Events, Analysis, and Transfer (GREAT) model and the Promoting Excellence and Reflective Learning in Simulation (PEARLS) framework (Dufrene & Young, 2013; Eppich & Cheng, 2015; Owen & Follows, 2006). The PEARLS framework specifies four distinct phases of the debriefing process, including: (a) reactions, (b) description, (c) analysis, and (d) summary. This approach focuses on identifying positive aspects of the training (what went well) as well as negative aspects (what could have gone better), while eliciting suggestions regarding aspects they would change if given another opportunity. The goal is to use context-specific factors, including choice of approach, time availability, students' rationale for action, and learning/performance gap between objectives and knowledge, skills, or behaviours, thereby facilitating and maximizing clinical decision-making (Eppich & Cheng, 2015).

Debriefing is still considered the underdeveloped part of simulation training (Neill & Wotton, 2011). Participation in debriefing is expected to increase the participants' ability to transfer knowledge to real situations (Halm, Lee, & Franke, 2011). For example, Ryoo and Ha (2015) explored the effect between the use and non-use of debriefing on clinical performance competency among 49 second-year nursing students. They found that the debriefing group (n = 24) scored significantly higher than the non-debriefing group (n = 25) in communication skills and in another 15 skills in the psychomotor domain. Similarly, Shinnick, Woo, Horwich, and Steadman (2011) examined the difference in knowledge of heart failure among 162 students who were assigned into debriefed and non-debriefed groups. Debriefed students showed an increase in knowledge of heart failure. Morgan et al. (2009) divided 71 anesthesiologists into two groups (debriefed and non-debriefed) and found that the non-debriefed group scored lower on technical skills.

Facilitator. The role of the facilitator can be filled by a trained simulation facilitator, faculty member, or student, depending on the level of facilitation needed: high, intermediate, or low (Fanning & Gaba, 2007). The debriefing process and role of the facilitator are integrally related. While the literature suggests using debriefing as an integrated component of healthcare simulation training, few studies report outcomes of the debriefing process or debriefing practices, particularly in audiology (Alanazi, Nicholson, & Thomas, 2017). Fanning and Gaba (2007) stated, "There are surprisingly few papers in the peer-reviewed literature to illustrate how to debrief, how to teach or learn to debrief, what methods of debriefing exist, and how effective they are at achieving learning objectives and goals" (p. 115). Recognizing this gap in information, Lusk and Fater (2013) explored the debriefing process and role of the facilitator and debriefing process across disciplines such as aviation, psychology, education, medicine, and nursing, and identified common themes and practices. A common practice is the use of Tanner's model of clinical judgment to facilitate critical thinking and clinical decision-

making skills. This model incorporates four phases, including: (a) noticing, (b) interpreting, (c) responding, and (d) reflecting. This continuous cycle of moving in and out of phases (reflection-in-action and reflection-on-action) provides students with opportunities to practice generalization and application of clinical judgment (Lusk & Fater, 2013). Thus, the debriefing process within the simulation training session serves as a platform to coach and assist students as they learn to apply and generalize skills. The PEARLS framework of facilitation can be used in conjunction with Tanner's model of clinical judgment to optimize student learning outcomes and skill development.

Why students' perception of the simulation training is important

Training students in the simulation facilities needs to be meaningful for students. The use of evaluation tools of students' perceptions is a method to increase meaning, deepen the learning experience, gather more information about student preferences, and plan for quality improvement of the simulation training. Implementation of evidence-based educational practices requires an approach in which current, high-quality, rigorous research evidence is integrated with educator expertise and student preferences (Coalition for Evidence-Based Policy, 2003). Therefore, the evaluation of the simulation training by students is critical in building and designing successful simulation training (or simulation programs).

The evaluation of the simulated training differs from the assessment of students' performance and learning outcomes, which use assessment tools such as the Audiologic Counseling Evaluation (Adamson, Kardong-Edgren, & Willhaus, 2013; English, Naeve-Velguth, Rall, Uyehara-Isono, & Pittman, 2007). Many evaluation tools have been developed that focus on student self-reports of their perception and/or satisfaction with the simulation training (Alanazi et al., 2016; Alinier et al., 2008; Levett-Jones et al., 2011). While verbal debriefing is the more common procedure to facilitate learning following simulation training, Lestander, Lehto, and Engström (2016) suggest that the post-simulation evaluation serve as another opportunity for student reflection. Petranek (2000) suggests a written reflection as an efficient learning strategy, while Baikie and Wilhelm (2005) propose that written words facilitate expression of experiences that are too sensitive to describe face-to-face. The use of open-ended questions is recommended to generate new information that may have otherwise been overlooked (Knudsen et al., 2012). However, reports on the use of these assessment tools and/or the contribution of the results to quality improvement efforts in planning subsequent simulation training are limited.

Alanazi et al. (2017) conducted a systematic review of publications in health professions to identify and evaluate the best available evidence (level and quality) of the use of simulation training to improve clinical skills, knowledge, and self-confidence among healthcare students. The authors reported that only seven of 30 reviewed studies reported students' satisfaction. When all the simulation-training components are put together appropriately, a high level of satisfaction among participants is expected. Student participants' satisfaction is important in clinical education because it may correlate with performance and may help students develop skills and acquire knowledge (Bremner, Aduddell, Bennett, & VanGeest, 2006; Pike, 1991). Thus, the purpose of this study was to explore students' perceptions and satisfaction with the hearing screening and parent counselling simulation training.

Methods

This study was conducted at the University of Arkansas for Medical Sciences (UAMS) Simulation Center and received the UAMS Institutional Review Board approval (#204279). The simulation training consisted of pre-event exposure to knowledge, three case scenarios with specific objectives relevant to newborn hearing screening and parent counselling, and the combined use of Baby Isao with SPs in the role of standardized parents, who are in the position of making informed decisions that will impact their child's future (e.g., parents choose spoken or signed language as a method of communication for their child). The content and format of the simulation case scenarios used in this study are shown in Table 1 and have been previously described in detail by Alanazi and colleagues (2016).

Participants

Seventeen female Doctor of Audiology (Au.D.) students (*M* age = 24.59 years, *SD* = 1.50, range = 22–29 years; Au.D. cohort = second- and third-year students) participated as volunteers in this study. The role of students in the simulation training was either as active or passive (observer) participants. Six students (two students in active roles, one from each year in the program, per scenario) conducted the hearing screening and counselled the parents, whereas the remaining students (passive role) watched the case scenarios unfold on a large screen monitor through the closed-circuit video system. All students participated in the briefing and debriefing sessions.

Table 1. Standardized Parents and Case Scenarios

Standardized Parent	Case Scenario
One ethnically diverse standardized parent	The baby failed the screening. The mother accepted the results and refused the follow-up diagnostic evaluation due to religious and cultural beliefs.
Two standardized parents (culturally deaf in real life and in the scenario)	The baby passed the hearing screening. A certified sign language interpreter was recruited. The parents were unhappy because their baby passed the screening.
Two standardized parents	The baby failed the screening. The father was angry and blamed the mother, who was a musician, because she exposed the child to loud music in utero.

Simulation training

Two types of simulation were used in this study: (a) one manikin, Baby Isao, and (b) five trained standardized parents, and one sign-language interpreter representing three different case scenarios (Table 1). Each scenario consisted of a 10-minute briefing session, a 20-minute simulation experience (i.e., hearing screening and counselling parents), and a 30-minute debriefing session guided by an experienced facilitator.

Materials

A 12-item perception survey (Appendix A: Students' Perception of Simulation Training Components [SPSTC] survey) consisting of 10 statements and two open-ended questions was developed by the UAMS Simulation Center personnel to include the critical components of simulation training as discussed in the literature. This survey was modified by the authors to collect students' perceptions and feedback about this training through three aspects: (a) the simulation environment, (b) the learning experience, and (c) the highlights of the simulation training. Students were asked to rate their level of agreement with the simulation training categories based on a Likert scale, where 1 = strongly disagree (very dissatisfied) and 7 = strongly agree (very satisfied). Participants were instructed to use "not applicable" if a statement did not pertain to the simulation training performed. Statements rated as "not applicable" were not assigned a numeric value and were eliminated from the average ratings. Each participant was given an opportunity to provide short answers to inquiries about the third category (i.e., the highlights of the simulation training). The two open-ended inquiries designed to elicit additional information were: (a) "Describe any part of the simulation training that was exceptional" and (b) "Describe any part of the simulation training that did not meet your expectations".

Procedures

Student participants completed a pre-training curriculum about newborn hearing screening training on the National Center for Hearing Assessment and Management (2015) website and had observed 10 hours of neonatal hearing screening as part of their clinical rotations at Arkansas Children's Hospital prior to the simulation. In addition, students were given the opportunity to practice conducting hearing screening with Baby Isao on their own before the simulation event. Details about the upcoming simulation training were not provided prior to the event. On the day of the simulation event, two student volunteers were randomly selected by the facilitator prior to each case to perform the hearing screening and break bad news (e.g., a baby has a hearing loss) and counsel the standardized parents about the next steps in the process. The remaining student watched the simulated scenarios via a widescreen video monitor in a separate room. The debriefing sessions were structured using the PEARLS framework and were guided by a trained simulation facilitator familiar with the learning objectives. Tanner's model of clinical judgment was used to facilitate critical thinking and clinical decision-making skills (Lusk & Fater, 2013). Audiology faculty members participated in the briefing and debriefing sessions, and the standardized parents participated in the debriefing session in which they performed. The three case scenarios were completed sequentially in one day. The total simulation training was completed in about three hours. After the final case scenario, the SPSTC survey was distributed and students were asked to complete the evaluation of the simulation training prior to leaving the centre.

Results

Quantitative and qualitative results of the responses to the SPSTC survey are presented for three aspects of training: (a) simulation environment, (b) learning experience, and (c) highlights of the learning experience. Descriptive statistics are presented for items 1–10 and a thematic analysis is presented for items 11 and 12. Items 1–10 were rated using a Likert scale, where 1 = strongly disagree and 7 = strongly agree. Responses rated as not applicable were eliminated from the analysis. Overall, these results suggest that the majority of students agreed or strongly agreed that the simulation training event enhanced their learning experience (*M* = 6.74, *SD* = 0.32, range = 6–7). An additional analysis was conducted to explore specific feedback responses about the simulation environment (items 1–3), the learning experience (items 4–10), and highlights of the learning experience from the students' perspective (items 11–12).

Simulation environment

The overall mean for items 1–3 was 6.51 (range = 1–7, *SD* = 0.77), based on a Likert scale where 1 = strongly disagree and 7 = strongly agree. Figure 1 shows the mean student ratings for items 1 (suitability), 2 (well-equipped), and 3 (safety). Of the total students, two passive students (#1 and #5) strongly disagreed with the following statement: "The orientation to the simulation was suitable" (item 1). One student (#13) rated the statement "The simulation center was well equipped" (item 2) as not applicable. This student's response was eliminated from the analysis.

Learning experience

The overall mean of responses for this category (items 4–10) was 6.93 (range = 1–7, *SD* = 0.11). Student perceptions of the following items were elicited: item 4 = case scenario, 5 = debriefing, 6 = reflection, 7 = facilitator, 8 = standardized parents, 9 = feedback, and 10 = application. The statement "The learning experience will help me in my clinical practice" (item 10) was the only item rated with "strongly agree" by all students. Five passive student participants (#8, #10, #12, #13, and #16) rated "The debriefing sessions helped me reflect on my practice" statement (item 6) as not applicable.

Highlights of the simulation training

Although the amount of qualitative data (i.e., responses

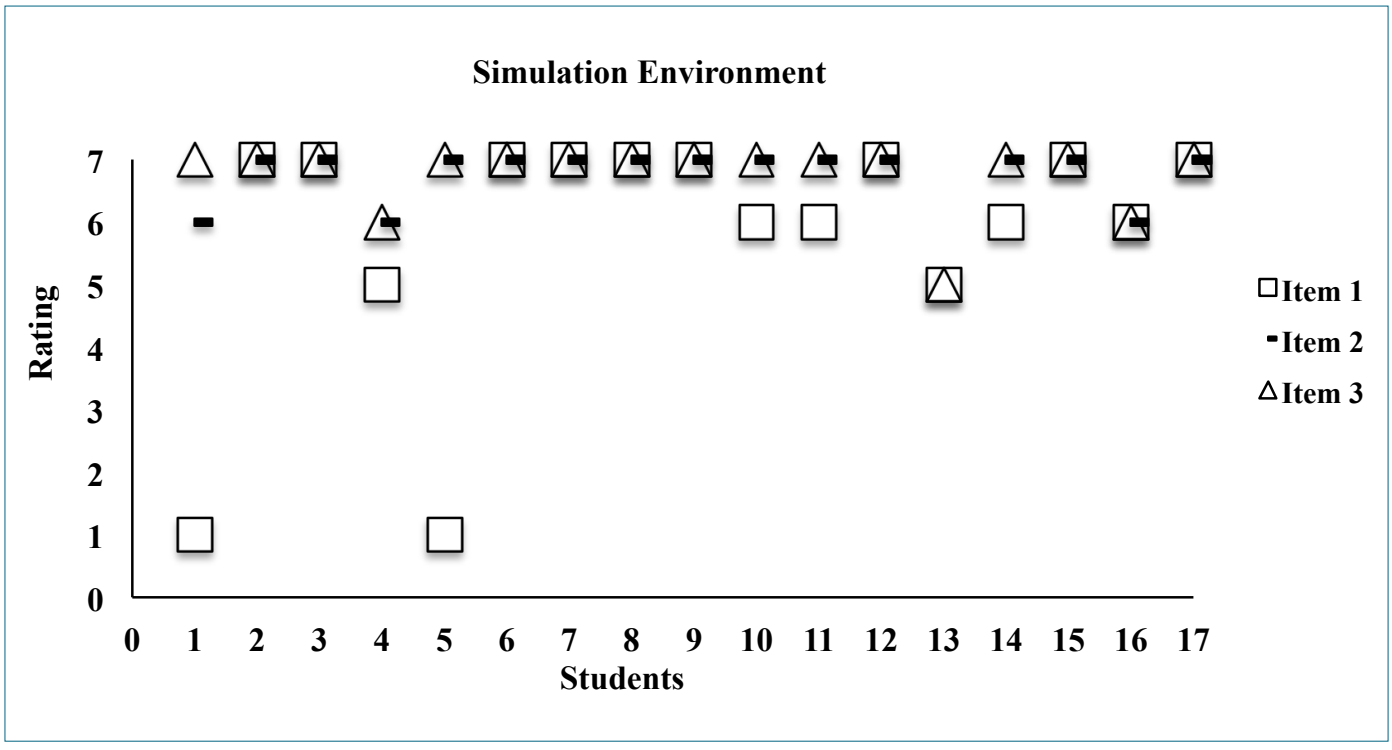

Figure 1. Simulation environment ratings for items 1–3 on the perception survey are shown by participant (*N* = 17). Simulation training ratings were 1 = strongly disagree to 7 = strongly agree. *Note*. Student #13 rated item 2 as not applicable, so there are only two responses. Item 1 = "The orientation to simulation was suitable"; item 2 = "The simulation center was well equipped"; item 3 = "The simulation environment felt safe for participation".

to open-ended statements: items 11 and 12) was not huge, these responses were imported into NVivo qualitative data analysis software (QSR International Pty Ltd., 2015). The frequency of thematic concepts was identified. The deductive qualitative content analysis (i.e., themes [simulation components] in this approach are already known from the survey) was used to explore these responses generated from the open-ended statements (Burnard, Gill, Stewart, Treasure, & Chadwick, 2008). An open coding procedure was performed by reading each response to these statements and making notes next to key words of the responses. The five most frequently presented themes are shown in Figure 2. The brackets within quotations are used to clarify meaning and provide a brief explanation.

More than half of student participants (53%) reported that all of the training components were exceptional, without referring to an individual component. For example, student #3 said, "Everything was wonderful. I really did not realize how valuable of an experience this would be." Student #7 said, "I loved this experience. It would be great to have the opportunity to have a rotation here for all of us in the future. If not this, more events like this would be great!" The remaining students reported individual components as the highlights of the simulation training. Six percent of the students indicated safety of the environment as the most exceptional component of the simulation training. For example, student #1 described the exceptional component of the simulation training as "Practice with counseling without affecting real patients." Of the total students, 17% identified the use of the standardized parents, 12% the case scenarios, and 12% the debriefing component as the highlights of the simulation training. For instance, student #11 stated, "The actors were exceptional." Student #2 reported, "The case scenarios were so realistic." Moreover, student #8 described the case scenarios as "Such realistic scenarios- ones that we do not see often and could use some hands on with!" Student #6 commented on debriefing with, "The debriefing helped a lot. I learned so much to take into my daily practice." Six percent of the students suggested that more structured briefing during the orientation session would be helpful to be familiarized with the simulation environment. One student noted that briefing did not meet her expectations: "We [students] need to know more before setting, what is expected of us [to do in the simulation environment]?"

Discussion

To evaluate the simulation training from the students' perspectives, a post-event evaluation survey was used to elicit feedback about three major components of the simulation training: (a) simulation environment, (b) learning experience, and (c) highlights of the simulation training. Results and findings from the current study suggest that the simulation training enhanced students' perception of the learning experience. These results are consistent with previous studies that reported students' satisfaction (Alanazi et al., 2016; Dearmon et al., 2013; Ohtake et al., 2013).

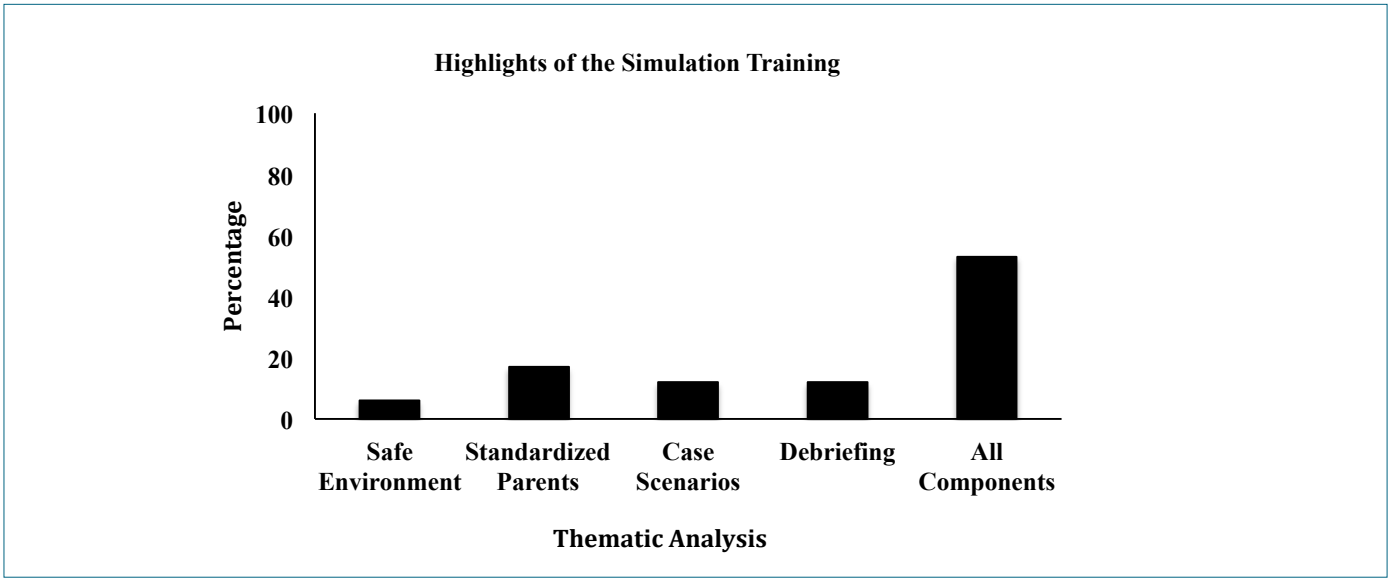

Figure 2. Simulation training components that were exceptional according to the students' descriptions and the number of participants who referred to each of the themes ($N = 17$). *Note.* "All Components" indicates the responses demonstrating that everything was exceptional about the simulation environment and learning experience.

Simulation environment

Orientation. The vast majority of simulation activities take place in simulation centres, teaching hospitals, and medical schools (Passiment, Sacks, & Huang, 2011). Orientation to the simulation environment before a simulation activity is necessary, because it allows students to become familiar with simulators, roles, objectives, and time allocation (Meakim et al., 2013). Lack of introduction may contribute to a feeling of anxiety and may leave students feeling underprepared and unable to apply the knowledge and practice the skills. In the current study, two students strongly disagreed with the statement, "The orientation to the simulation was suitable" (item 1). Although all students had completed the newborn hearing screening training module before the actual simulation training, no additional details about the upcoming event were given to students. Instructions were limited in that students knew they would be participating in an event at the UAMS Simulation Center with no further details about the event. Giving learners detailed information in advance about the patient's condition and what was going to happen in the encounter stage would (a) reduce the benefits of the simulation training because learners would lose the ability to understand the learning objectives by themselves, and (b) remove the element of surprise (Alinier, 2011). However, it is recommended that facilitators provide general learning objectives from which learners cannot predict exactly what will happen in the scenarios. Students' feedback presents faculty and facilitators with an opportunity for quality improvement in execution of the case scenarios in subsequent simulation training. In addition, lessons learned point toward the need to offer better general descriptions of the tasks that the students are expected to complete during future training sessions.

Equipment. Sixteen student participants in our study agreed or strongly agreed with the statement "The simulation center was well equipped" (item 2). One reason for the high rating of this component may be the fact that the current study was conducted in the UAMS Simulation Center. The Simulation Center contains seven simulation theatres fully equipped with high-fidelity manikins, overhead viewing cameras, panoramic wall-mounted units, and five debriefing classrooms. The use of Baby Isao, involving various patient states and background noise conditions for demonstration and simulation purposes to teach hearing screening, was unique. One student rated this item (item 2) as not applicable. The authors explored why this student might not have understood the relevance of this item, inappropriately marking it as not applicable. Since audiology is an equipment-intensive field, and this was the audiology student's first time participating in simulation training at the Simulation Center, it may be that the student misunderstood the statement and thought it referred to audiology equipment as opposed to the Simulation Center equipment or facility. One quality improvement modification may be to restate this item as "The simulation center facility was well-equipped". This rewording may help clarify the intent of this item.

Safety. The simulation training is a learning environment and should be physically comfortable (i.e., feeling safe and relaxed expressing oneself and emphasizing trust). Meakim et al. (2013) defined the safe training environment as "the emotional climate that facilitators create by the interaction between facilitators and participants. In this positive emotional climate, participants feel at ease taking risks, making mistakes, or extending themselves beyond their comfort zone" (p. S9). Without such an environment, the simulation training may be restricted to achieve its goals. All students in the current study rated the statement "The simulation environment felt safe for participation" (item 3) with "agree" or "strongly agree", indicating that they felt that it was a safe setting to practice and learn through action and interaction with the standardized parents.

Learning experience

Standardized patients. SPs are not intended to replace experience with real patients, but they are used to teach and evaluate clinical skills and knowledge in a safe environment (Barrows, 1993; Stroud, Smith, Edlund, & Erkel, 1999). Because of the numerous advantages of the use of SPs, many health professions have used SPs as a standard teaching approach; therefore, audiology programs are encouraged to use SPs as standard practice for their students. In the present study, the standardized parents, who were professional actors with prior paid experience, were included to train students on how to deliver bad news and counsel parents. Therefore, the standardized parents were reliable in imitating the case scenarios and provided participants with helpful advice. Patient feedback is important in terms of pointing out strengths and weaknesses of students' skills, and SPs offer this feedback from the patients' perspective (Howley & Martindale, 2004). This feedback is typically not available with real patients. Therefore, the standardized parents in our study participated in the debriefing session in which they performed. One of the standardized parents commented on active student participants, "There were a lot of points where you all definitely did things that put us at ease. Your tones of voice were very calming. And you all made really good eye contact." All student participants in

our study rated statements relevant to the standardized parents' performance (items 8 and 9) with "agree" or "strongly agree".

It is generally recognized that the use of SPs limits the number of active student participants that can be efficiently accommodated at a time (Bearnson & Wiker, 2005). In this study, the role of six students was active (i.e., they performed the hearing screening and encountered the standardized parents), while the role of the remaining students was passive (i.e., observation of the encounters with the standardized parents). Active students may have recognized more areas for improvement through active participation in the simulation sessions as opposed to passive participation. However, regardless of the role in the simulation training, all student participants strongly agreed that the learning experience was beneficial and would help them in their clinical practice (item 10). Comments provided in response to the open-ended questions indicated that some students believed that assignment to the active role would be a beneficial learning experience for all students. Quality improvement efforts will focus on implementation of this suggestion in future training.

Case scenarios. The case scenarios must reflect reality as much as possible. In the current study, all three stages of the use of the standardized parents in the simulation training (i.e., the pre-encounter, encounter, and post-encounter stages) were implemented. Moreover, three scenarios were designed to represent diverse cultural and socioeconomic backgrounds and incorporate a variety of emotional responses: an angry parent, parents from deaf culture experiencing grief, and a parent from a minority population displaying acceptance of hearing loss for cultural and religious beliefs. These scenarios required clinical judgment "in action" to quickly make a decision about the best way to respond to the situation. Following completion of the case, students were given an opportunity to use reflection "on action" about their choices and to discuss what went well, what did not go well, and what could have gone better. All students agreed or strongly agreed that the case scenarios seemed realistic (item 4). The detailed preparation, practice, and implementation of scripts contributed to the high satisfaction levels.

Debriefing. The structure of debriefing sessions is very important and can be achieved by using any of the debriefing models. Accrediting organizations such as the Council for Academic Accreditation (CAA), an organization under the American Speech-Language-Hearing Association (ASHA), require Au.D. programs to provide evidence that their students are able to demonstrate knowledge and skill (and professional competencies generally) in specific content areas (Council for Academic Accreditation, American Speech-Language-Hearing Association, 2016). Although ASHA may not consider debriefing hours as direct patient contact hours, this activity is equivalent to a "case conference" or review of a case following a clinical encounter, and can be recorded as hours for the "other" category. Decisions about how to count the time invested in debriefing activities following simulation are left to the interpretation and discretion of each accredited program.

In our study, the facilitator used the PEARLS model that helped to understand how and where students (a) expressed their feelings and thoughts, (b) described the learning experience, (c) followed a guided reflection, and (d) reviewed all the objectives through the facilitator guidance. The analysis phase of this model included a plus-delta analysis (+/Δ), in which the participants, observers, and the standardized parents reflected on the performance, including positive aspects (the +) as well as aspects they would change in the future (the Δ). Student participants in our study either agreed or strongly agreed with the statement "The debriefing sessions were well prepared" (item 5). Debriefing was rated by student participants as an exceptional component of their simulation training (item 5). Although simulation training research always refers to debriefing, attention to the systematic analysis of debriefing data is rare (Neill & Wotton, 2011; Wotton et al., 2010).

Furthermore, the reflection component has been used effectively as part of a pedagogical approach in audiology and communication sciences and disorders, and benefited students (Chabon & Lee-Wilkerson, 2006; Goldberg, Richburg, & Wood, 2006; Munoz & Jeris, 2005; Ng, Bartlett, & Lucy, 2012). The majority of student participants in our study rated the statement "The debriefing sessions helped me reflect on my practice" (item 6) with "agree" or "strongly agree". However, five students rated the same item as not applicable. Authors examined the student's roles as active or passive participants and found that the students rating the item as not applicable were passive participants.

Facilitator. An experienced debriefing facilitator may apply different techniques to guide the conversation and provide beneficial feedback. Moreover, the facilitator may create a friendly learning atmosphere, focus on the learning objectives, and manage time (Fanning & Gaba, 2007; Lederman, 1992; Rall et al., 2000). The perception of the simulation training is connected to the facilitator's skills (Fanning & Gaba, 2007). In high debriefing, the facilitator assists only if needed and the participants debrief themselves; in contrast, participants depend totally on the

facilitator in low debriefing. Intermediate debriefing requires less facilitator involvement than low debriefing. Our study required a high facilitation level because of the challenging scenarios incorporated in our simulation event. Student participants in our study either agreed or strongly agreed with the statement "The facilitator was supportive" (item 7).

Simulation training highlights

Repetitive practice is recognized as one of the best methods to facilitate learning (Bradley, 2006; Morey et al., 2003). Therefore, assessment of student satisfaction in simulation is important in terms of guiding quality improvement efforts for future training. Satisfaction does not equal increased knowledge and skill; however, correlation of students' perceptions and performance suggests that simulation may build self-confidence, which in turn helps students develop skills and acquire knowledge (Bremner et al., 2006). Alanazi and colleagues (2016) assessed Au.D. students' satisfaction after simulation training on hearing screening and parental counselling via a 23-item satisfaction survey. The authors reported that all participants rated their satisfaction level as "satisfied" or "very satisfied" after the educational simulation activity.

Open-ended statements were used in this survey as a mixed-method strategy to elicit qualitative student perception data about the exceptional features of this simulation training that may have been overlooked. This method provides immediate feedback and elicits relatively short immediate responses due primarily to the time constraints. However, this method fails to elicit the rich, thoughtful responses that are acquired without time constraints. Written reflections serve to facilitate critical thinking by providing students with the opportunity to connect previous experience with future actions based on lessons learned in the present (Petranek, 2000). Use of Tanner's model in a structured written reflection assignment could further enhance student learning by providing students with the opportunity to record their observations, interpret actions and decisions, analyze responses, and reflect upon outcomes and alternative scenarios (Lusk & Fater, 2013).

Addition of a written reflection assignment will be considered as a vital component in future simulation training to provide students with an opportunity to generalize and apply clinical judgment while at the same time providing a rich source of supplemental data from which to draw upon for quality improvement initiatives. Ng and colleagues (2012) provide an excellent tutorial on conducting qualitative research in audiology. Coupled with the use of a written reflection structured according to Tanner's model to assess clinical decision-making development and judgment in simulation, a qualitative study has the potential to generate new knowledge that may have been unnoticed with the time-constrained, open-ended feedback approach used in this study.

Limitations and future research

One limitation of this study is the small sample size. The convenience sample was composed of students enrolled in one Au.D. program. No attempt was made to control for participant ethnicity, gender, or age. The evaluation process was limited to the students' perspectives on the simulation training components and did not measure professional competencies in any specific area. Additional comparative information could have been gained by including faculty, facilitators, and the standardized parents in the assessment. Finally, the topic of this simulation training was broad enough that it could have easily been expanded in an academic health centre as an interprofessional training opportunity to include speech-language pathology, nursing, and other health profession students.

Conclusion

Assessment of the simulation training components in this study indicates that students viewed the use of the standardized parents, case scenarios, and debriefing using the PEARLS framework as a novel and effective approach in audiology education. Debriefing allows audiology students to reflect on their performance and feelings including positive aspects as well as aspects they would change in the future. In addition, evaluation was instrumental in identifying quality improvement opportunities for future simulation training, thus contributing to satisfaction with this training. The evaluation of participants' perceptions about simulation training is one way to achieve higher satisfaction (or agreement) levels when the same simulation training is repeated. Additional research on students' perceptions of simulation training components will provide evidence to inform future simulation training efforts, as well as facilitate the development and refinement of the perception survey used in this study.

References

Adamson, K. A., Kardong-Edgren, S., & Willhaus, J. (2013). An updated review of published simulation evaluation instruments. *Clinical Simulation in Nursing, 9*, e393–e400. doi: 10.1016/j.ecns.2012.09.004

Alanazi, A. A., Nicholson, N., Atcherson, S. R., Franklin, C., Anders, M., Nagaraj, N., ... Highley, P. (2016). Use of Baby Isao simulator and standardized parents in hearing screening and parent counseling education. *American Journal of Audiology, 25*, 211–223. doi: 10.1044/2016_AJA-16-0029

Alanazi, A. A., Nicholson, N., & Thomas, T. (2017). Use of simulation training to improve knowledge, skills, and confidence among healthcare students: A

systematic review. *The Internet Journal of Allied Health Sciences and Practice, 15*(3), 1–24.

Alinier, G. C. (2011). Developing high-fidelity health care simulation scenarios: A guide for educators and professionals. *Simulation & Gaming, 42*(1), 9–26. doi: 10.1177/1046878109355683

Alinier, G. C., Harwood, C., Harwood, P., Montague, S., Huish, E., & Ruparelia, K. (2008). *Development of a program to facilitate interprofessional simulation-based training for final year undergraduate health care students.* York, UK: Higher Education Academy. Retrieved from http://uhra.herts.ac.uk/handle/2299/4573

Baek, Y. (2009). Digital simulation in teaching and learning. In D. Gibson & Y. Baek (Eds.), *Digital simulations for improving education: learning through artificial teaching environments* (pp. 25–51). Hershey, PA: Information Science Reference.

Baikie, K. A., & Wilhelm, K. (2005). Emotional and physical health benefits of expressive writing. *Advances in Psychiatric Treatment, 11*(5), 338–346. doi: 10.1192/apt.11.5.338

Baile, W. F., Buckman, R., Lenzi, R., Glober, G., Beale, E. A., & Kudelka, A. P. (2000). SPIKES—A six-step protocol for delivering bad news: Application to the patient with cancer. *The Oncologist, 5*, 302–311. doi: 10.1634/theoncologist.5-4-302

Barrows, H. S. (1993). An overview of the uses of standardized patients for teaching and evaluating clinical skills. *Academic Medicine, 68*, 443–451.

Bearnson, C. S., & Wiker, K. M. (2005). Human patient simulators: A new face in baccalaureate nursing education at Brigham Young University. *Journal of Nursing Education, 44*, 421–425.

Blackstock, F. C., & Jull, G. A. (2007). High-fidelity patient simulation in physiotherapy education. *Australian Journal of Physiotherapy, 53*(1), 3–5. doi: 10.1016/S0004-9514(07)70056-9

Bradley, P. (2006). The history of simulation in medical education and possible future directions. *Medical Education, 40*, 254–262.

Bremner, M., Aduddell, K., Bennett, F., & VanGeest, J. (2006). The use of human patient simulators: Best practices with novice nursing students. *Nurse Educator, 31*(4), 170–174.

Burnard, P., Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Analyzing and presenting qualitative data. *British Dental Journal, 204*(8), 429–432. doi: 10.1038/sj.bdj.2008.292

Cahill, M. S. (2015). Perspectives on the use of standardized parents to teach collaboration to graduate occupational therapy students. *American Journal of Occupational Therapy, 69*(2), 1–7. doi: 10.5014/ajot.2015.017103

Coalition for Evidence-Based Policy. (2003). *Identifying and implementing educational practices supported by rigorous evidence: A user-friendly guide.* Retrieved from https://www2.ed.gov/rschstat/research/pubs/rigorousevid/rigorousevid.pdf

Cook, D. A. (2014). How much evidence does it take? A cumulative meta-analysis of outcomes of simulation-based education. *Medical Education, 48*, 750–760. doi: 10.1111/medu.12473

Council for Academic Accreditation, American Speech-Language-Hearing Association. (2016). *Standards for accreditation of graduate education programs in audiology and speech-language pathology* (pp. 1–42). Retrieved from http://caa.asha.org/wp-content/uploads/Accreditation-Standards-2017.pdf

Chabon, S. S., & Lee-Wilkerson, D. (2006). Use of journal writing in the assessment of CSD students' learning about diversity: A method worthy of reflection. *Communication Disorders Quarterly, 27*(3), 146–158. doi: 10.1177/15257401060270030301

Dearmon, V., Graves, R. J., Hayden, S., Mulekar, M. S., Lawrence, S. M., Jones, L., … Farmer J. E. (2013). Effectiveness of simulation-based orientation of baccalaureate nursing students preparing for their first clinical experience. *Journal of Nursing Education, 52*(1), 29–38. doi: 10.3928/01484834-20121212-02

Dinsmore, B. F., Bohnert, C. & Preminger, J. E. (2013). Standardized patients in audiology: A proposal for a new method of evaluating clinical competence. *Journal of American Academy of Audiology, 24*, 372–392. doi: 10.3766/jaaa.24.5.5

Dufrene, C., & Young, A. (2013). Successful debriefing—Best methods to achieve positive learning outcomes: A literature review. *Nurse Education Today, 34*(3), 372–376. doi: 10.1016/j.nedt.2013.06.026

English, K. M., Naeve-Velguth, S., Rall, E., Uyehara-Isono, J., & Pittman, A. (2007). Development of an instrument to evaluate audiologic counseling skills. *Journal of the American Academy of Audiology, 18*(8), 675–687. doi: 10.3766/jaaa.18.8.5

Eppich, W., & Cheng, A. (2015). Promoting excellence and reflective learning in simulation (PEARLS): Development and rationale for a blended approach to health care simulation debriefing. *Simulation in Healthcare, 10*(2), 106–115. doi: 10.1097/SIH.0000000000000072

Epps, C., White, M. L., & Tofil, N. (2014). Mannequin based simulators. In A. I. Levine, S. DeMaria, A. D. Schwartz, & A. J. Sim (Eds.), *The comprehensive textbook of healthcare simulation* (pp. 209–232). New York, NY: Springer.

Epstein, R. M., & Hundert, E. M. (2002). Defining and assessing professional competence. *Journal of the American Medical Association, 287*(2), 226–235. doi: 10.1001/jama.287.2.226

Fanning, R. M., & Gaba, D. M. (2007). The role of debriefing in simulation-based learning. *Simulation in Healthcare, 2*(2), 115–125. doi: 10.1097/SIH.0b013e3180315539

Gaba, D. (2007). The future vision of simulation in healthcare. *Simulation in Healthcare, 2*(2), 126–135. doi: 10.1136/qhc.13.suppl_1.i2

Gaba, D. (2006). What does simulation add to teamwork training? *Agency for Healthcare Research and Quality*. Retrieved from https://psnet.ahrq.gov/perspectives/perspective/20

Goldberg, L. R., Richburg, M. C., & Wood, L. A. (2006). Active learning through service-learning. *Communication Disorders Quarterly, 27*(3), 131–145. doi: 10.1177/15257401060270030201

Grober, E. D., Hamstra, S. J., Wanzel, K. R., Reznick, R. K., Matsumoto, E. D., Sidhu, R. S., & Jarvi, K. A. (2004). The educational impact of bench model fidelity on the acquisition of technical skill: The use of clinically relevant outcome measures. *Annals of Surgery, 240*(2), 374–381. doi: 10.1097/01.sla.0000133346.07434.30

Halm, B. M., Lee, M. T., & Franke, A. A. (2011). Improving toxicology knowledge in preclinical medical students using high-fidelity patient simulators. *Hawaii Medical Journal, 7*, 122–115.

Howley, L. D. (2013). Standardized patients. In A. I. Levine, S. DeMaria, A. D. Schwartz, & A. J. Sim (Eds.), *The comprehensive textbook of healthcare simulation* (pp. 173–190). New York, NY: Springer.

Howley, L. D., & Martindale, J. (2004). The efficacy of standardized patient feedback in clinical teaching: A mixed methods analysis. *Medical Education, 9*(18), 1–10. doi: 10.3402/meo.v9i.4356

Intelligent Hearing Systems. (2016). I*ntroducing Baby Isao: The intelligent simulator for AEP and OAE* [Brochure]. Retrieved from http://www.ihsys.com/Brochures/BROCHURE_Simulator-Isao.pdf

Interprofessional Education Collaborative Expert Panel. (2011). *Core competencies for interprofessional collaborative practice: Report of an expert panel.* Washington, DC: Interprofessional Education Collaborative. Retrieved from http://www.aacn.nche.edu/education-resources/ipecreport.pdf

Issenberg, S. B., & Scalese, R. J. (2008). Simulation in health care education. *Perspectives in Biology and Medicine, 51*(1), 31–46. doi: 10.3109/0142159X.2013.818632

Kaf, W. A., Masterson, C. G., Dion, N., Berg, S. L., & Abdelhakiem, M. K. (2013). Optimizing otoscopy competency in audiology students through supplementary otoscopy training. *Journal of American Academy of Audiology, 24*, 859–866. doi: 10.3766/jaaa.24.9.9

Karakus, A., Duran, L., Yavuz, Y., Altintop, L., & Caliskan F. (2014). Computer based simulation training in emergency medicine designed in the light of malpractice cases. *BMC Medical Education, 14*, 155. doi: 10.1186/1472-6920-14-155

Kim, S., Phillips, W. R., Pinsky, L., Brock, D., Phillips, K., & Keary, J. (2006). A conceptual framework for developing teaching cases: A review and synthesis of the literature across disciplines. *Medical Education, 40*(9), 867–876. doi: 10.1111/j.1365-2929.2006.02544.x

Knudsen, L., Laplante-Levesque, A., Jones, L., Preminger, J. E., Nielsen, C., Lunner, T., ... Kramer, S. E. (2012). Conducting qualitative research in audiology: A tutorial. *International Journal of Audiology, 51*, 83–92. doi: 10.3109/14992027.2011.606283

Lapkin, S., & Levett-Jones, T. (2011). A cost-utility analysis of medium vs. high-fidelity human patient simulation manikins in nursing education. *Journal of Clinical Nursing, 20*, 3543–3552. doi: 10.1111/j.1365-2702.2011.03843.x

Lederman L. C. (1992). Debriefing: Toward a systematic assessment of theory and practice. *Simulation and Gaming, 23*(2), 145–160. doi: 10.1177/1046878192232003

Lestander, Ö., Lehto, N., & Engström, Å. (2016). Nursing students' perceptions of learning after high fidelity simulation: Effects of a three-step post-simulation reflection model. *Nurse Education Today, 40*, 219–224. doi: 10.1016/j.nedt.2016.03.011

Levett-Jones, T., McCoy, M., Lapkin, S., Noble, D., Hoffman, K., Dempsey, J., ... Roche, J. (2011). The development and psychometric testing of the Satisfaction with Simulation Experience Scale. *Nurse Education Today, 31*(7), 705–710. doi: 10.1016/j.nedt.2011.01.004

Lusk, J. M., & Fater, K. (2013). Postsimulation debriefing to maximize clinical judgment development. *Nurse Educator, 38*(1), 16–19. doi: 10.1097/NNE.0b013e318276df8b

Maran, N. J., & Glavin, R. J. (2003). Low- to high-fidelity simulation - A continuum of medical education? *Medical Education, 37*, 22–28. doi: 10.1046/j.1365-2923.37.s1.9.x

Meakim, C., Boese, T., Decker, S., Franklin, A. E., Gloe, D., Lioce, L., ... Borum, J. C. (2013). Standards of best practice: Simulation standard I: Terminology. *Clinical Simulation in Nursing, 9*, S3–S11. doi: 10.1016/j.ecns.2013.04.001

Morey J. C., Simon, R., Jay, G. D., Wears, R. L., Salisbury, M., & Dukes, K. A. (2003). Error reduction and performance improvement in the emergency department through formal teamwork training: Evaluation results of the Med Teams project. *Health Services Research, 37*, 1553–1581. doi: 10.1111/1475-6773.01104

Morgan, P. J., Tarshis, J., LeBlanc, V., Cleave-Hogg, D., DeSousa, S., Haley, M. F., ... Law, J. A. (2009). Efficacy of high-fidelity simulation debriefing on the performance of practicing anaesthetists in simulated scenarios. *British Journal of Anaesthesia, 103*(4), 531–537. doi: 10.1093/bja/aep222

Munoz, K., & Jeris, L. (2005). Learning to be interdisciplinary: An action research approach to boundary spanning. *Health Education Journal, 64*(5), 5–12. doi: 10.1177/001789690506400102

National Center for Hearing Assessment and Management. (2015). *Newborn hearing screening training curriculum (NHSTC): Interactive web based newborn hearing screening training curriculum*. Retreived from http://www.infanthearing.org/nhstc/index.html

Neill, M. A., & Wotton, K. (2011). High-fidelity simulation debriefing in nursing education: A literature review. *Clinical Simulation in Nursing, 7*(5), 161–168. doi: 10.1016/j.ecns.2011.02.001

Ng, S. L., Bartlett, D., & Lucy, S. D. (2012). Reflection as a tool for audiology student and novice practitioner learning, development and self-care. *Seminars in Hearing, 33*(2), 163–176. doi: 10.1055/s-0032-1311676

Ohtake, P. J., Marchilene, L., Schillo, R., & Rosen, M. (2013). Simulation experience enhances physical therapist student confidence in managing a patient in the critical care environment. *Physical Therapy, 93*(2), 216–228. doi: 10.2522/ptj.20110463

Owen, H., & Follows, V. (2006). GREAT simulation debriefing. *Medical Education, 40*, 488–489. doi: 10.1111/j.1365-2929.2006.02421.x

Passiment, M., Sacks, H., & Huang, G. (2011). *Medical simulation in medical education: Results of an AAMC survey*. Washington, DC: Association of American Medical Colleges. Retrieved from https://www.aamc.org/download/259760/data

Petranek, C. F. (2000). Written debriefing: The next vital step in learning with simulations. *Simulation & Gaming, 31*(1), 108–118. doi: 10.1177/104687810003100111

Pike, G. (1991). The effects of background, coursework, and involvement on students' grades and satisfaction. *Research in Higher Education, 32*(1), 15–31.

QSR International Pty Ltd. (2015). *NVivo qualitative data analysis software (Version 11)*. Retrieved from http://www.qsrinternational.com/nvivo-product

Rall, M., Manser, T., & Howard, S. (2000). Key elements of debriefing for simulator training. *European Journal of Anaesthesiology, 17*, 516–517. doi: 10.1046/j.1365-2346.2000.00724-1.x

Ryoo, E. N., & Ha, E-H. (2015). The importance of debriefing in simulation-based learning: Comparison between debriefing and no debriefing. *Computers, Informatics, Nursing, 33*(12), 538–545. doi: 10.1097/CIN.0000000000000194

Seropian, M. A. (2003). General concepts in full scale simulation: Getting started. *Anesthesia & Analgesia, 97*, 1695–1705. doi: 10.1213/01.ANE.0000090152.91261.D9

Shinnick, M. A., Woo, M., Horwich, T. B., & Steadman R. (2011). Debriefing: The most important component in simulation. *Clinical Simulation in Nursing, 7*(3), 105–111. doi: 10.1016/j.ecns.2010.11.005

Stillman, P. L., Swanson, D. B., Smee, S., Stillman, A. E., Ebert, T. H., Emmel, V. S., ... Willms, J. (1986). Assessing clinical skills of residents with standardized patients. *Annals of Internal Medicine, 105*(5), 762–771. doi: 10.7326/0003-4819-105-5-762

Stroud, S. D., Smith, C.A., Edlund, B. J., & Erkel, E. A. (1999). Evaluating clinical decision-making skills of nurse practitioner students. *Clinical Excellence for Nurse Practitioners, 3*, 230–237.

Wotton, K., Davis, J., Button, D., & Kelton, M. (2010). Third-year undergraduate nursing students' perceptions of high-fidelity simulation. *Journal of Nursing Education, 49*(11), 632–639. doi: 10.3928/01484834-20100831-01

Wu, R., & Shea, C. (2009). Using simulations to prepare OT students for ICU practice. *Education Special Interest Section Quarterly, 19*(4), 1–4.

Yule, S., Flin, R., Paterson-Brown, S., & Maran, N. (2006). Non-technical skills for surgeons in the operating room: A review of the literature. *Surgery, 139*(2), 140–149. doi: 10.1016/j.surg.2005.06.017.

Acknowledgements

The authors would like to thank the UAMS Simulation Center personnel, audiology faculty, standardized parents, and student participants for their time and cooperation.

Conflicts of Interest

The authors declare no potential conflicts of interest.

Authors' Note

Correspondence concerning this article should be addressed to Ahmad A. Alanazi, Department of Audiology and Speech Pathology, College of Applied Medical Sciences, King Saud bin Abdulaziz University for Health Sciences (KSAU-HS), Riyadh, Saudi Arabia. Email: alanaziahm@ksau-hs.edu.sa.

Appendix A
Students' Perception of Simulation Training Components (SPSTC) Survey

Event: _____ Student's Number _____ Date: _____

Please indicate your level of agreement (satisfaction) with each statement

The Simulation Training		Strongly Disagree (Very Dissatisfied)	Disagree	Mostly Disagree	Somewhat Agree	Mostly Agree	Agree	Strongly Agree (Very Satisfied)	Not Applicable
		1	2	3	4	5	6	7	N/A
Simulation Environment	1. The orientation to simulation was suitable								
	2. The simulation center was well equipped								
	3. The simulation environment felt safe for participation								
Learning Experience	4. The case scenarios were realistic								
	5. The debriefing sessions were well prepared								
	6. The debriefing sessions helped me reflect on my practice								
	7. The facilitator was supportive								
	8. Standardized parents acted as real parents								
	9. Standardized parents provided useful feedback								
	10. The learning experience will help me in my clinical practice								
Please respond to the following statements									
Simulation Training Highlights	11. Describe any part of the simulation training that was exceptional								
	12. Describe any part of the simulation training that did not meet your expectations								