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# Enhancing Communication Between Sonographers and Patients in Diverse Cultural Settings via Digital Human Role-Playing

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**ABSTRACT**

Effective communication skills are essential for sonographers to build trust, to explain examination procedures to the patient in non-technical terms, to alleviate anxiety and gain patient consent and collaboration, and to provide information at a pace suitable for the patient. In order to communicate effectively, the sonographer needs to be able to communicate empathetically, adjusting their communication style to meet the needs of different audiences. This is particularly challenging when working with a diverse and multicultural group of patients where the risk of misinterpretation is higher. Students are provided with the opportunity to practice dialogues with virtual patients that are able to interact as real human beings, communicating concerns, emotions, and moods both at a verbal and non-verbal level. Coaching through digital humans accelerates learning from experience without the risks associated with learning in the field.

## 1 INTRODUCTION

Sonographers play a critical role in the healthcare industry, especially in diagnostic imaging. They use ultrasound equipment to create images of internal organs and tissues for medical diagnoses. Sonographer-patient communication is essential for a successful ultrasound examination, as the sonographer needs to obtain accurate information from the patient about their medical history, symptoms, and other relevant details. In a diverse and multicultural environment, communication barriers may exist, affecting the accuracy and quality of the ultrasound examination. This article explores the potential of using role-plays with digital humans to improve sonographer-patient communication in a diverse and multicultural environment.

## 2 EFFECTIVE COMMUNICATION SKILLS FOR SONOGRAPHERS: THE DIGITAL HUMANS AS A KEY COMPONENT OF THE TRAINING

Effective communication skills are essential for sonographers to build trust, to explain examination procedures to the patient in non-technical terms, to alleviate anxiety and gain patient consent and collaboration, and to provide information at a pace suitable for the patient. In order to communicate effectively, the sonographer needs to be able to communicate empathetically, adjusting their communication style to meet the needs of different audiences. This is particularly challenging when working with a diverse and multicultural group of patients where the risk of misinterpretation is higher [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14].

At Montgomery College in Takoma Park, MD, we developed a bespoke module of training that aims to boost the sonographer's communication skills. This module is a component of the Diagnostic Medical Sonography program that connects educational technology with face-to-face instruction/scanning to enhance and personalize an innovative curriculum.

Diagnostic medical sonography is one of the fastest growing professions in the health care industry, and it is one of the most challenging and rewarding fields in the digital age, requiring professional judgment and problem solving skills [15]. Students are provided with the opportunity to practice dialogues with virtual patients that are able to interact as real human beings, communicating concerns, emotions, and moods both at a verbal and non-verbal level. We are using a solution known as e-REAL® [16], [17] to deliver immersive, glasses-free experiences, both online and in a "phygital" classroom setting, that allow students to deal with different situations and different patients. Each student is trained to communicate in a realistic scenario, with patients of different ages, gender, culture, and ethnicity.
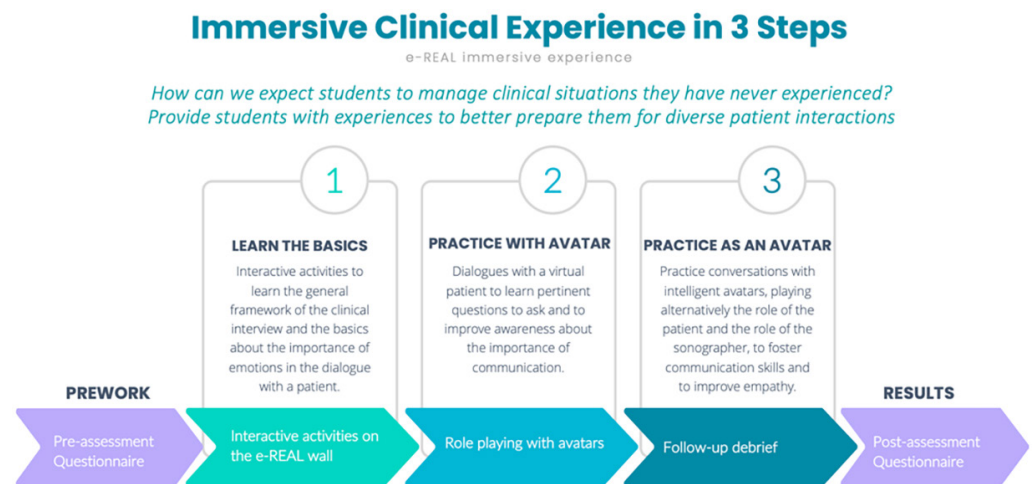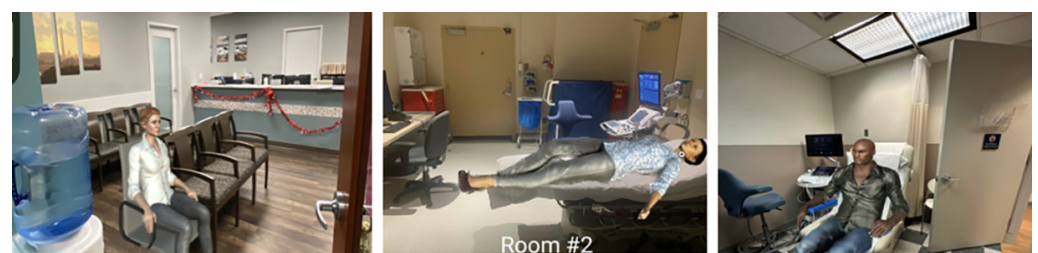


Fig. 1. The program's structure



Fig. 2. Representative avatars or digital humans

Communication barriers in a diverse and multicultural environment can affect the accuracy and quality of the ultrasound examination. These barriers can include language differences, cultural beliefs, and misunderstandings. For example, a patient may not understand the instructions provided by the sonographer due to a language barrier, leading to inaccurate information being collected and potentially inaccurate diagnoses.

Misunderstandings may also arise due to cultural differences, such as the interpretation of pain, which may differ depending on cultural background. These barriers can lead to miscommunication, mistrust, and a lack of patient engagement, ultimately affecting the quality of the ultrasound examination.

Role-plays with digital humans are an effective solution to overcome communication barriers in a diverse and multicultural environment. Digital humans are computer-generated characters that can simulate human behavior and interactions. They allow sonographers to interact with patients in a culturally sensitive manner and provide feedback to sonographers [18]. By using digital humans, sonographers can practice communication skills in a safe and controlled environment, allowing them to develop the most appropriate skills to communicate effectively with patients.

Digital humans can also simulate diverse patient populations, including those with different cultural backgrounds and languages. This allows sonographers to practice communication with patients who may have different beliefs, values, and languages.

The benefits of using role-plays with digital humans to improve sonographer-patient communication in a diverse and multicultural environment are significant. The use of digital humans can help sonographers overcome communication barriers, promote cultural sensitivity, and increase patient engagement. Improved communication can lead to more accurate information being collected, resulting in more accurate diagnoses and improved patient outcomes [19].

Digital humans can also provide immediate feedback to sonographers, allowing them to adjust their communication style and approach to better suit the patient's needs. This can help to build trust and rapport between the sonographer and patient, leading to improved patient satisfaction.

At the end of each interview, timely feedback is provided highlighting the communication style, the quality of the listening, and possible hidden biases in conversations.

Coaching through digital humans accelerates learning from experience without the risks associated with learning in the field.

## 3 THE ROLE OF DIGITAL HUMANS IN ENHANCING SONOGRAPHER-PATIENT COMMUNICATION

In the pursuit of improving sonographer-patient communication, the incorporation of digital humans emerges as a pivotal component in our innovative training module. Effective communication skills hold paramount importance for sonographers, extending beyond mere technical expertise. These skills encompass building trust, articulating examination procedures in non-technical terms, alleviating patient anxiety, obtaining informed consent, and tailoring information delivery to meet individual patient needs. Such communication finesse becomes particularly challenging within diverse and multicultural patient populations, where the potential for misinterpretation looms large.

Communication barriers inherent in diverse and multicultural environments can significantly impact the accuracy and quality of ultrasound examinations. Such barriers often manifest as language differences, cultural nuances, and misunderstandings. For instance, language barriers can impede patient comprehension of instructions, potentially leading to the collection of inaccurate information and, consequently, misdiagnoses. Moreover, cultural disparities may influence the interpretation of pain and other medical aspects, further complicating effective communication and trust-building.

In this context, role-plays with digital humans offer a potent solution. These computer-generated characters facilitate culturally sensitive interactions and furnish invaluable feedback to sonographers. By immersing themselves in these simulated encounters, sonographers gain the experience necessary to navigate intricate communication scenarios. Furthermore, digital humans can represent a wide spectrum of patient demographics, allowing sonographers to refine their communication skills for patients with varying beliefs, values, and languages.

The benefits of employing role-plays with digital humans to enhance sonographer-patient communication in diverse and multicultural settings are manifold. Notably, digital humans serve as effective allies in dismantling communication barriers, fostering cultural sensitivity, and bolstering patient engagement. Improved communication, in turn, yields more accurate patient information, enhancing diagnostic precision and ultimately improving patient outcomes.

Moreover, digital humans offer immediate feedback, enabling sonographers to adapt their communication styles and approaches to align with the specific needs of each patient. This ability to build trust and rapport contributes to heightened patient satisfaction and further underscores the value of this innovative approach.

At the conclusion of each virtual interaction, students receive timely feedback that highlights their communication style, listening quality, and potential biases in their conversations. This coaching mechanism accelerates experiential learning while mitigating the risks associated with field-based learning.

In sum, the integration of digital human role-plays into sonographer training represents a promising avenue for transcending communication barriers in diverse and multicultural healthcare settings. By enhancing communication skills and cultural sensitivity, this approach not only holds the potential to revolutionize ultrasound examinations but also underscores the crucial role of technology in modern healthcare education.

## 4    CONCLUSION

Early findings show that the program enhanced communication skills and self-awareness regarding their own relational styles depending on the diversity of their patients. Students showed a strong involvement in the training, appreciating the availability to practice at their own pace, and the opportunity to deal with very different patients while learning how to adapt their communication style.

Sonographer-patient communication is essential for a successful ultrasound examination. Communication barriers in a diverse and multicultural environment can affect the accuracy and quality of the ultrasound examination. Role-plays with digital humans are a potential solution to overcome these communication barriers. Digital humans can simulate diverse patient populations and provide feedback to sonographers, promoting cultural sensitivity and improving communication. The use of digital humans can lead to more accurate diagnoses, better patient outcomes,

and improved patient satisfaction. Further research is needed to explore the potential of role-plays with digital humans in improving sonographer-patient communication in a diverse and multicultural environment.

In the realm of ultrasound examinations, effective sonographer-patient communication emerges as a linchpin for success. Communication barriers prevalent in diverse and multicultural environments can significantly impact the accuracy and quality of these examinations. Through the utilization of role-plays with digital humans, we have unveiled a promising solution. Digital humans facilitate culturally attuned interactions, offer valuable feedback, and contribute to more accurate diagnoses, improved patient outcomes, and heightened satisfaction levels.

Nonetheless, further research is imperative to unlock the full potential of role-plays with digital humans in enhancing sonographer-patient communication within diverse and multicultural contexts. The dynamic interplay between technology and healthcare education remains an area ripe for exploration and innovation.

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