

The Public's Perception of Medical Ultrasound

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INTRODUCTION

Diagnostic Medical Ultrasound (sonography) is a primary imaging modality used for diagnosis of internal pathological conditions. Sonography has been used for medical diagnosis since the early 1970's; however, in comparison to other imaging modalities, it is considered to be young with continuing evolution. The bulk of sonographic examinations continue to be conducted in departments that fall under the direction of Medical Imaging or Diagnostic Radiology creating a strong association between the two fields of imaging. Over the past 15-20 years, significant growth has occurred in Maternal and Fetal Medicine as well as an explosion in the use of non-medical obstetrical imaging, better known as keepsake or entertainment ultrasound.

Ultrasound's historical and progressive development of use, slow development of formal education, lack of requirement of national certification, and minimal research to support any bioeffects when used for medical purposes created stereotypes of what the role of ultrasound is, and the role of the sonographer is.

Stereotype is defined as a set idea that people have about what someone or something is like, especially an idea that is wrong (Cambridge University). The most frequent stereotype in ultrasound is mostly about babies. The origin of the role of sonography for obstetrics was derived by Ian Donald back in the late 1950's when he used ultrasound to detect abdominal tumors, cysts, and later became the father of OB-GYN ultrasound ("History of Ultrasound", 2014). His work has undergone such a fast and thriving elevation in a short period of time making sonography an irreplaceable clinical tool in obstetrics (Varsou, 2019). Unlike all other imaging examinations, in obstetrics, family members accompany the patient for viewing and the sonographer provides narrative on the fetal anatomic structures. The oversimplification of ultrasound imaging in the media and the use of imaging for entertainment purposes "has jeopardized the integrity of the sonography profession, creating unrealistic expectations of quick and conclusive procedure" (Starcevic et al, 2020). The Sonographer's Scope of Practice and Clinical Standards state "the sonographer functions as a delegated agent of the physician" meaning the sonographer does not interpret or make the diagnosis of the case, therefore does not render the final diagnosis and does not share any results with the patient (SDMS, n.d).

Sonography education primitive roots of learning occurred via learn as you go or internal cross-training. Since many sonographers were trained within the workplace and the technology limited the types of examinations, the national credentialing examinations were developed to assess the sonographer's knowledge and tactile skills per examination type, beginning with abdominal and obstetrics/gynecology. This model continues to exist within the American Registry of Diagnostic Medical Sonography (ARDMS) offering nine specialty examinations and Cardiovascular Credentialing International (CCI) offers four. Ultrasound is one of the few healthcare fields that does not have a national or state mandate to possess a credential to perform a diagnostic examination. While the majority of employers require a credential, many do not require the sonographer to be credentialed in all specialties they perform in their clinical employment.

The aim of this research is to determine the public's understanding and stereotype of the role of sonography, as well as the role of the sonographer. As the researchers of this study are enrolled in a CAAHEP accredited program, it is expected that respondents who have frequent communication with the researchers may possess a greater understanding, as well as those who have experienced an ultrasound examination themselves. Those who have no connection or experience are hypothesized to have stereotypes or less knowledge.

METHOD

A survey using Google Forms was designed to assess the participant's knowledge and perception of diagnostic medical ultrasound and the role of the sonographer. Demographic questions were designed to be able to sort responses based on personal connection to the researchers or a sonographer and for determination if the respondent had any experience with sonography, either through having an ultrasound performed on themselves or observed an exam.

The first draft of the survey was developed and provided to two college students for review and feedback on any ambiguity of questions. In conjunction with a research mentor, revision of survey questions occurred and reformatting the design using matrix style would reduce the number of items. The questions regarding knowledge of ultrasound exams were asked in a true, false, or unsure format, and questions pertaining to the role of a sonographer were given answers of agree, disagree, or unsure. At the end of the survey participants were provided three reputable websites relating to sonography.

The survey was sent out via email to a random population consisting of high school and college students, family members, and acquaintances. The 30 recipients were encouraged to share the email with one other to increase the number of responses, yielding around 50 responses. After seven days the survey was closed, and results were exported into an Excel spreadsheet for analysis.

This was an informal research study and due to time limitations, the necessary steps were not performed to test the survey for reliability and validity. The lack of research specific to stereotypes of perceptions of sonography limited background information and a survey model. The age range and occupations varied with a greater number related to health sciences which may have caused a bias to the perceptions of the overall public. The limited distribution may not be a true reflection of the public's knowledge.

RESULTS/ANALYSIS

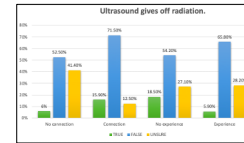
Population demographics:

A total of 214 responses were received given that only 30 emails were sent out by the researchers. Out of the participants 50.7% fell between the age range of 18-24. Upon reviewing the 214 responses, 27 completed surveys were omitted due to respondents choosing more than one response for the survey items; therefore, 187 responses were analyzed. Responses were divided and analyzed into two different categories. The first category was separating respondents by connection, 52.9% (99/187), to someone who performs ultrasound from the respondents who did not have any connection comprising 47.1% (88/187) of the responses. The second analysis was separating the respondents by their experience with ultrasound; either having had an ultrasound examination or observation experience, 62.6% (117/187), and from the respondents who had no direct ultrasound experience, yielding 37.4% (70/187) of the responses. The hypothesis was people who have a connection to a sonographer or had an experience with ultrasound would have a greater knowledge and less stereotypes.

RESULTS/FINDINGS

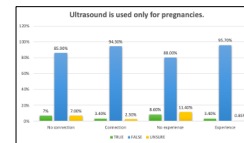
Ultrasound gives off radiation.

With ultrasound being performed in the Diagnostic Radiology department, patients may associate it with giving off radiation and assume that it uses the same technology as other medical imaging modalities. Overall, there is a strong awareness, however 14 out of the 88 (16%) with a connection believe ultrasound gives off radiation.



Ultrasound is used only for pregnancies.

Primitive ultrasound was used in obstetrics and the technology for fetal examinations has significantly grown since then. The responses indicated, most individuals representing the public are no longer stereotyping ultrasound being exclusive to obstetrics. Only 3 out of the 117 individuals who had an experience continued the stereotype.



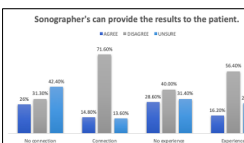
A sonographer must be certified in the specialty they are performing.

Unfortunately, 46 states do not require a national or state mandate for certification in order to perform diagnostic medical ultrasounds. Out of those who had a connection, 78 out of 88 individuals agreed that a sonographer must be certified in order to be employed in the specialty performing. 93 out of the 117 who had an experience agreed that the sonographer holds credentials for their specialty.



Sonographer's can provide the results to the patient.

According to the national sonographers' scope of practice, sonographers cannot provide results to the patient, but patients often persist in asking. There is a significant difference of the awareness of the scope of practice between those who either had a connection and/or an experience, representing the knowledge to provide correct results. Responses from those with no connection and/or no experience indicated greater ambiguity of knowledge.



DISCUSSION

With there being minimal research on members of the public's stereotypes or perceptions of medical ultrasound, the researchers' hypothesis were not supported indicating public awareness and knowledge is greater than anticipated. For the statement "Ultrasound gives off radiation" the majority of the participants answered false, however, there were still individuals who responded as true or unsure. There is still a misunderstanding of the safety of ultrasound and its radiation-free nature which may be due to the fact that it is in the same department as other imaging modalities that use ionizing radiation. There is no evidence to date that ultrasound has a harmful outcome in humans, but there continues to be research on animal tissue showing adverse bioeffects such as tissue heating and cavitation (Starcevic et al, 2020). With sonographers being educated in potential bioeffects, it is important to perform ultrasound for diagnostic purposes, especially when performing ultrasounds for pregnancies or neonates. When participants were asked if ultrasound is only used for pregnancies, surprisingly between 80% and 95.7% of the participants answered false to that statement disproving the stereotype. With ultrasound continuing to grow and the increase of doctors recommending the patient to get a diagnostic ultrasound in multiple other specialty areas, such as abdominal, cardiac and vascular likely explains the decrease in the stereotype.

During a diagnostic ultrasound examination, doctors rely on the sonographer to be their eyes and ears, which is why it is important that a sonographer is highly educated in the area they are performing. One of the statements in the survey that respondents had to agree, disagree or respond as unsure was "a sonographer must be certified in the specialty they are performing." Almost all respondents agreed with that statement, and the others were mostly unsure with a few disagreeing. As a patient going in to get a diagnostic exam, it would be assuring if the sonographer was required to be credentialed in each specialty. The current status is most all employers require the sonographer to be credentialed but may not require them to be credentialed in each specialty for the examinations performed in their departments.

This study had also asked if the sonographer can provide the results to the patient. An Australian study asked the same question and 40.1% of their participants thought the person performing their examination could provide them with a diagnosis (Starcevic et al, 2020). With this study, many participants were unsure or disagreed with the statement. However, 28.6% of those with no experience did agree that a sonographer can provide results. To avoid patients from assuming this, sonographers could preface their examinations using the opportunity to raise professional awareness by introducing themselves by title, as well as ensure the patient is aware who will provide the results and when (Starcevic et al, 2020).

CONCLUSION

In summary, the aim of this research was to determine the public's knowledge and stereotypes of medical sonography and the role of the sonographer. This study comprehensively surveyed a random population consisting of age range from 18 years of age and older. When analyzing the data, the responses contradicted the researchers' hypothesis; however, results indicate opportunity continues to exist to improve the public's knowledge. In a utopian society, a way to help enhance public awareness and understanding may be to educate individuals on the sonographer's scope of practice, importance of certification and the role of sonography for medical diagnostic purposes.



(Suarez, 2020)