

The Use of Lightly Embalmed Cadavers in Ultrasound Guided Renal Biopsies: An IPE Activity Between Sonography Students & Nephrology Fellows to Improve Interprofessional Practice

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Abstract

Objectives: The purpose of this interprofessional education (IPE) activity was to improve the practice of ultrasound guided renal biopsies for sonography students and Nephrology fellows. Student perceptions of competence before and after participation in the IPE were evaluated.

Subjects & Methods: IPE activities utilizing lightly embalmed cadavers allowed sonography students and nephrology fellows to practice their ultrasound guided renal biopsy skills together in a controlled environment without compromising patient safety. Lab activities reviewed sterile technique, imaging the kidney, and needle visualization during the procedure. Communication between the students and fellows was stressed. The interprofessional activity took place once each year between 2012 and 2016.

Outcomes: Pre- and post-lab surveys were used to assess the sonography students' perceived competence in performing an ultrasound guided renal biopsy. Based on pre-lab surveys, 0 of 39 students felt competent to perform the procedure, while 30 of the 39 students (77%) felt competent after the IPE. Pre- and post-lab quizzes were used to assess the sonography students' grasp of information related to an ultrasound guided renal biopsy. Pre-lab quiz averages were 78.9%, compared to 98.4% after the IPE.

Conclusion: The IPE activity had multiple benefits. Sonography students were better prepared to assist with renal biopsies. Nephrology fellows were able to practice performing biopsies without risk to patients. Both sonography students and nephrology fellows realized the importance of communication and working as a team to provide a shared service.

Clinical Relevance

Percutaneous renal biopsy is considered the gold standard in diagnosis and management of many kidney diseases.¹ Renal biopsy can cause serious complications, including hematoma with need for blood transfusions, additional surgical procedures including nephrectomy, and rarely death.² Advancements have been made in biopsy technique, including the use of ultrasound guidance, to improve diagnostic yield while minimizing complications.

Ultrasound-guided biopsy is recognized as one of the most important methods of tissue diagnosis in radiology practices worldwide.³ Favorable qualities of ultrasound guidance for invasive procedures include: accuracy, improved patient safety, wide availability, portability, lack of radiation, low cost, and real-time capability. Developing the skills and confidence needed to assist the physician in a successful renal biopsy is stressful for sonography students in the clinical setting and may impact patient outcomes.

Biopsy training is an integral part of the both sonography and Nephrology fellowship education programs. One of the standards that must be met by a CAAHEP accredited sonography program is "to demonstrate knowledge and understanding of the role of the sonographer in performing interventional/invasive procedures".⁴ Performing renal biopsies are also required in Nephrology fellowship programs. Traditionally, both sonography students and Nephrology fellows have been trained to perform renal biopsies through direct supervision on patients in the clinical setting.

Simulation training offers an alternative to the "see one, do one, teach one" method, which carries a potential to cause patient harm or an inadequate biopsy specimen. Although a review of literature found no information related to the use of lightly embalmed cadavers in a sonography program curriculum, research from medical residency programs shows positive outcomes in utilizing lightly embalmed cadavers to hone medical and surgical skills and that the use of lightly embalmed cadavers is an excellent medium to teach procedural competence.⁵ Advantages of using lightly embalmed cadavers to practice renal biopsies include no risk to patients, realistic tissue consistency, multiple students and fellows trained in the same session, and multiple cadavers to acquire technical skills.⁶

Methods

The interprofessional educational (IPE) activity took place in the Advanced Anatomy Lab at the University of Nebraska Medical Center. Participants included Diagnostic Medical Sonography students enrolled between the 2012 and 2016 academic years and Nephrology fellows. The labs were conducted by an experienced sonographer and a Nephrologist. All labs began with a review from the Nephrologist on patient safety, sterile technique, and communication during the procedure. With a lightly embalmed cadaver in the prone position, each sonography student located the inferior pole of the kidney, marked the location with an indelible marker, and then provided ultrasound guidance for the physician to perform the biopsy (Figure 1). The ultrasound equipment and biopsy device used during the IPE was equivalent to what is utilized in the clinical setting. Faculty conducting the lab emphasized the need for image quality, transducer manipulation for optimal needle placement (Figure 2), and the importance of communication between the sonographer and nephrologist. Pre- and post-lab surveys were used to assess the sonography students' prior experience and perceived competence in performing an ultrasound-guided renal biopsy.

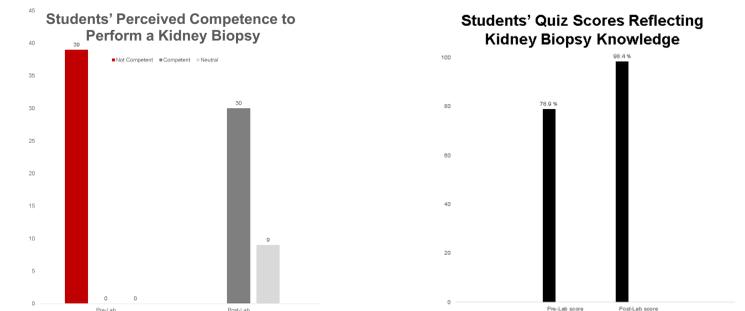


Figure 1. Sonography student assisting a Nephrology fellow with a renal biopsy on a lightly embalmed cadaver under the direction of a Nephrologist.



Figure 2. In addition to practicing technical skills, interdisciplinary simulation training improves communication skills needed for a successful biopsy procedure.

Results



A total of 39 sonography students participated in the IPE activity between 2012-2016. Based on pre-lab surveys, 0 of 39 students had performed the procedure in the clinical setting, and only 12 students had observed the procedure. Before the IPE, 0 of 39 students perceived themselves to be competent to perform the procedure. After the IPE activity, post-lab survey data showed a significant increase in students' perceived competence and skills to perform a kidney biopsy. 30 of 39 students (77%) felt competent to perform the procedure, while 9 students were neutral. Pre- and post-lab quizzes were used to assess the sonography students' grasp of information related to an ultrasound guided renal biopsy. Pre-lab quiz averages were 78.9%, compared to 98.4% after the IPE.

Conclusion

The use of the IPE activity involving lightly embalmed cadavers to teach and practice ultrasound-guided renal biopsy skills had multiple benefits. DMS students performing this procedure improved the skills and confidence. As an accredited sonography program, educators are better able to teach to the standard related to invasive procedures. Nephrology fellows were able to perform renal biopsies without risk to patients. The IPE benefitted both sonography students and Nephrology fellows as they worked together as a team to perform the procedure. Observations by faculty during the activity noted that teamwork and communication between the participants improved. Anecdotally, faculty observed this improved rapport in the clinical setting also.

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Students' Perceived Competence to Perform a Kidney Biopsy

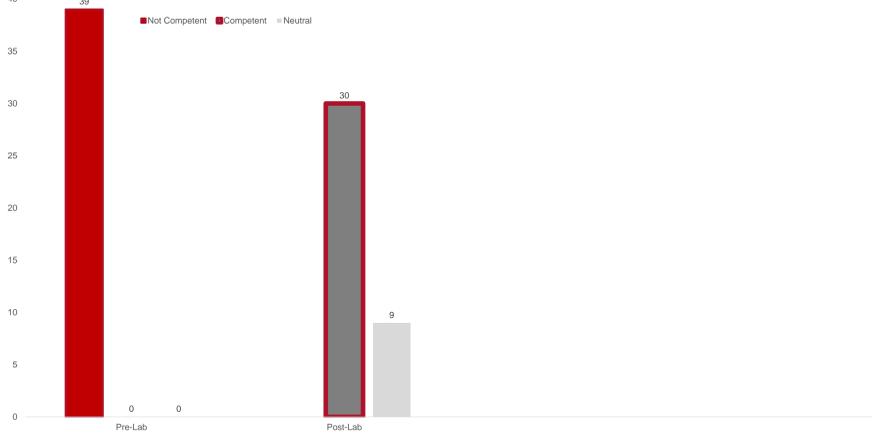


Chart Title

Students' Quiz Scores Reflecting Kidney Biopsy Knowledge

