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Improving the Physical Exam with Technology - Point of Care Ultrasound

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Background

The Carnegie Foundation published a report calling for reforms in medical education, including the addition of more clinical experiences during the initial years of undergraduate medical education (Cooke, Irby, & O'Brien, 2010).

One potential response to this call is the inclusion of training in point-of-care ultrasound during the preclinical years of undergraduate medical education. The amount of training required to perform a competent ultrasound examination is substantial; therefore, informal instruction in situ is insufficient and formal curricula is required (Solomon & Saldana, 2014). As noted by Bahner et al. (2014), the integration of training in ultrasound in U.S. medical education is limited and extremely varied, as there are no national guidelines available at present. Because of its expansive utility in clinical practice, whether ultrasonography should be included in the standard undergraduate medical curriculum is currently a common question for educators and administrators (Bahner et al., 2014).

According to Bahner et al. (2014), barriers to the implementation of a course in ultrasound include making additions to the already voluminous current medical school curriculum and lack of resources including equipment and faculty. Proponents assert the benefits of ultrasound as a teaching tool as well as a way to instill a diagnostic skill while critics claim the devices distract students from the core principles of physical diagnosis and impose an unnecessary layer of technology between doctor and patient (Solomon & Saldana, 2014).

Point-of-care ultrasonography provides immediate imaging which can be considered in concert with the patient's presenting signs and symptoms during procedures, diagnostic processing, as well as screening applications (Moore & Copel, 2011). According to Solomon and Saldana (2014), ultrasound enables the direct visualization of organs that can be a "powerful adjunct to the traditional teaching of anatomy, physiology, and physical diagnosis" (p. 1084).

The VCU School of Medicine recently implemented an innovative ultrasound course which runs parallel to the doctoring course called the Practice of Clinical Medicine. The purpose of this study is to explore the effects of ultrasound training on students' physical exam skills.

Methods

Real time ultrasound training with clinicians trained in point of care ultrasound use and live models/standardized patients was employed. Flipped classroom approach was utilized with students expected to cover online educational material (SonoSim Ultrasound Training Solution) ahead of the hands on sessions.

Hands on sessions were conducted on the same day students had their PCM workshops with attempts made to correlate the ultrasound training of the body/organ system with that being learned/practiced during the Practice of Clinical Medicine session on the same day.

Statistical analysis with ANOVA was used to assess the scores of student performance on the ultrasound physical exams between the class of 2019 and 2020. The physical exam scores were further compared based on the type of physical exam.

Conclusions

The inclusion of point of care ultrasound did not affect physical exam scores between the VCU School of Medicine Class of 2020 compared to the Class of 2019. Further study needs to be done to see if this is consistent across years or if there is eventually a change. Alternatively, this may not be the best measure of how this technology improves students skills/knowledge and this needs to be further investigated as well to design future studies that can help elucidate the potential benefits of this type of curriculum.

Maintaining this program is feasible at our medical school but requires continued support of funding for small group leaders and standardized patients along with use of our simulation center. Additionally, communication with PCM course and faculty is also key for appropriately coordinating sessions. The general construct of this program could be transferred to other institutions as many have preclinical physical exam courses. However, the availability of ultrasound equipment, qualified teachers, and access to standardized models/patients is certainly a potential barrier.

Results

School of Medicine Class (graduating year)	Number of students	Combined Physical exam score, mean (SD)
2019	218	93.6 (10.5)
2020	215	93.7 (7.1)

School of Medicine Class (graduating year)	Cardiovascular score, mean (SD)	Pulmonary score, mean (SD)
2019	92.5 (10.4)	94.8 (10.4)
2020	93.4 (7.8)	94.1 (6.2)

Physical exam type	Estimate Difference (2020-2019)	SE	Pr > t
Cardiovascular	0.85	1.21	0.483
Pulmonary	-0.74	1.22	0.547

References

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