Online Modules as an Alternative to Hands-On Point-of-Care Ultrasound Curriculum at Resource-Limited Physician Assistant Programs: A Pilot Study

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- Funding of this project does not necessarily constitute an endorsement of the findings of this research presentation by the Physician Assistant Education Association.
- There are no references to off-label/unapproved uses of products in this presentation.

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Brief Overview

Point-of-care ultrasonography (POCUS) is an essential skill for physician assistants (PAs). Lack of experienced faculty and finances are common barriers to PA program implementation. This study evaluates an online-only curriculum in comparison to hands-on POCUS training to overcome these barriers.

Learning Objectives

Upon conclusion of this Research in Action presentation, learners should be able to:

- Identify commonly cited barriers to implementing point-of-care ultrasound (POCUS) curriculum into physician assistant (PA) education.
- Describe POCUS curriculum and assessment methods utilized in undergraduate and graduate medical school learners' education.
- Justify, through the use of pilot data analysis, the use of online-only modules as an alternative to blended hands-on training to teach PA students at ultrasound resource-limited institutions a POCUS application.

Introduction

Background

- Physician Assistants (PAs) can perform Point-of-Care Ultrasonography (POCUS)
  - Multiple specialties and primary care
  - At the bedside, fast, reliable, reproducible, inexpensive, & no ionizing radiation
- PA POCUS curriculum not currently modeling undergraduate/graduate medical education POCUS curriculum
  - No formal educational guidelines & lack of literature
  - Major Hurdles[1]:
    - Cost/Access to US machines
    - Lack of trained faculty
    - Time

Introduction

Current POCUS Learning Models

- POCUS integrated into curriculum in multiple different ways[1,2,3,4]
  - Anatomy/physiology; physical exam; procedural skills lab
  - Blended methods of didactics, videos, hands-on simulators/task-trainers, hands-on SPs/volunteers practice
- POCUS assessed in multiple different ways[2]
  - Self assessments; skill assessment on SP/volunteer; multiple-choice exams; skill assessment on simulator model
- But what about those barriers?
  - Can we replace the hands-on learning sessions at resource-rich institutions with online modules for resource-limited institutions?
  - Online/"e-Learning" successful in teaching other procedures[5]

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Introduction

Study Aims

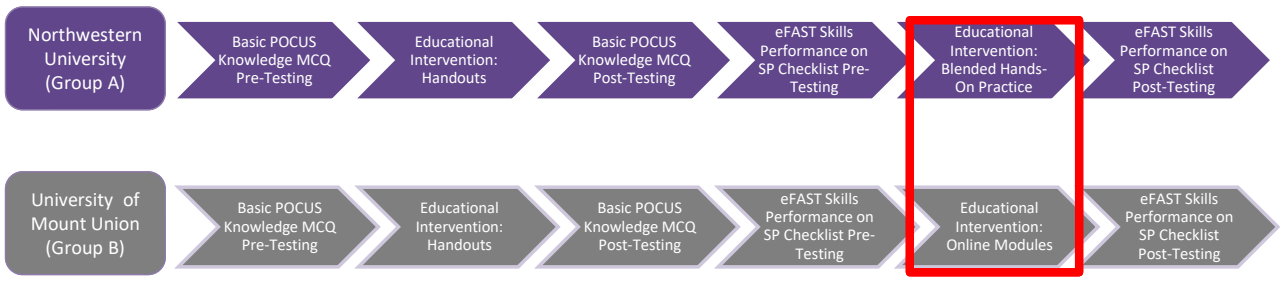
- This study aims to:

  1. Determine if PA students can achieve mastery in performing the Extended Focused Assessment with Sonography for Trauma (eFAST) after using only online modules for learning

  2. Determine if there is a statistically significant difference in the knowledge and/or skill performance scores between the traditional hands-on learning cohort and the online-only cohort

  3. Determine if students who learn the eFAST online have similar confidence in performing the eFAST as students who learn eFAST in a hands-on environment

Methods



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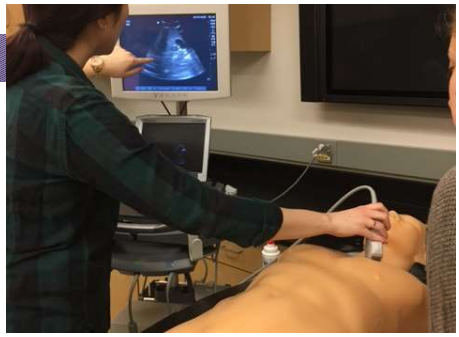

Image from https://sonosim.com/

Blended Hands-On Educational Interventions (NU/"Group A")

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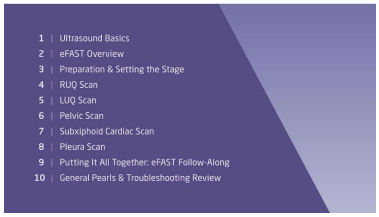

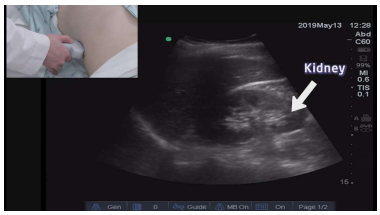

Online-Only Educational Interventions (UMU/“Group B")

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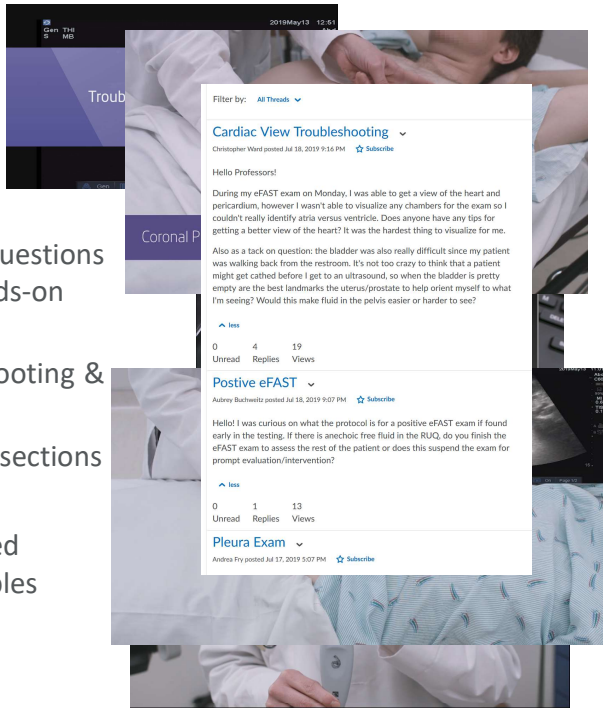
Online Modules

- Content broken down with detailed instruction of maneuvers and landmarks
- Modeled to address answers to frequently asked questions and difficulties encountered by PA students in hands-on sessions
- Emphasis on deliberate practice points, trouble-shooting & clinical pearls
- “Putting it all together” & “Student Follow-Along” sections
- Review as many times as needed
- Online Discussion Board available for “individualized feedback” with references back to video for examples



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Results: Student Demographics

Characteristic	Northwestern University (n=34)	University of Mount Union (n=36)
Female, n (%)	26 (76.5%)	26 (72.2%)
Male, n (%)	8 (23.5%)	10 (27.8%)
Age in years at matriculation, mean (median)	25.2 (24)	25.4 (24)
Hours of patient care hours experience prior to PA school matriculation, mean (SD)	4725.5 (2995.6)	960.2 (1163.2)
Average science GPA prior to PA school matriculation, mean (SD)	3.58 (0.31)	3.54 (0.24)
Hours of previous formal ultrasound training prior to PA school matriculation, mean (# of students)	0.029 (1)	0.028 (1)

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Results

Basic Knowledge Multiple Choice Examination & eFAST Skills Checklist Scores

Basic Knowledge Multiple Choice Examination Scores	PRE-TEST Out of 20 points Mean (SD)	MASTERY POST-TEST Out of 20 points Mean (SD)	PRE-TEST to POST-TEST IMPROVEMENT Mean (SD)
Northwestern University (n=34)	12.21 (2.20)	19.24 (0.78)	7.03 (2.40)
University of Mount Union (n=36)	10.78 (2.38)	18.53 (0.60)	7.75 (2.31)
p-value	p= 0.011	p= 0.000	p= 0.187

eFAST Skills Checklist Scores	PRE-TEST Out of 35 points Mean (SD)	MASTERY POST-TEST Out of 35 points Mean (SD)	PRE-TEST to POST-TEST IMPROVEMENT Mean
Northwestern University (n=34)	24.53 (5.63)	33.67 (1.12)	9.15 (5.64)
University of Mount Union (n=36)	20.11 (5.37)	33.11 (1.49)	13 (5.38)
p-value	p= 0.001	p= 0.078	p= 0.005

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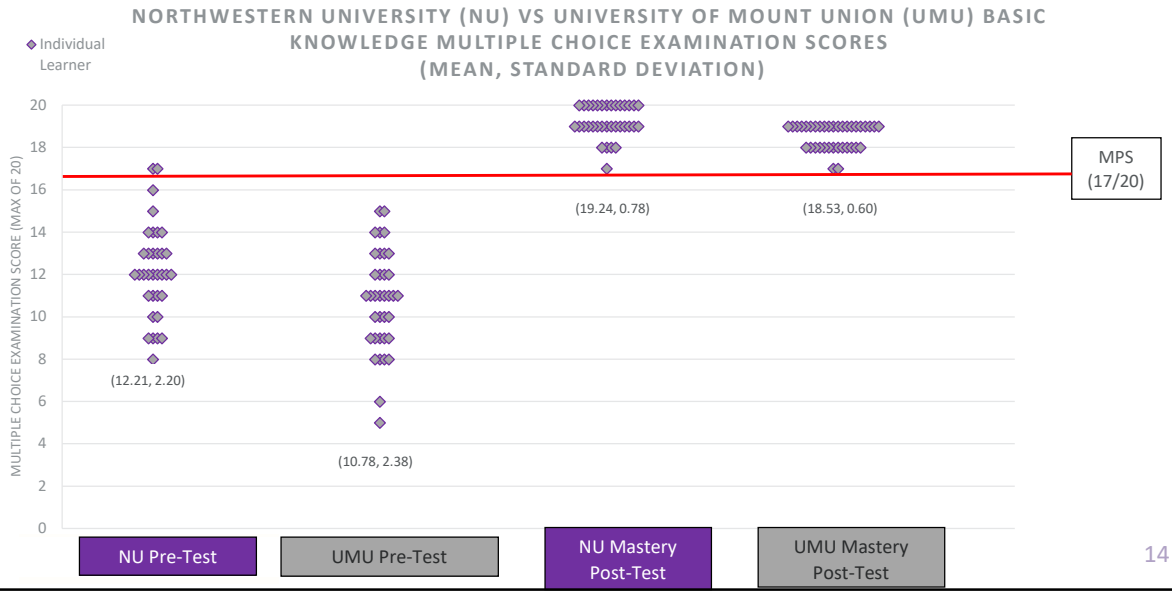
Basic POCUS Knowledge MCQ Pre-Testing → Educational Intervention: Handouts → Basic POCUS Knowledge MCQ Post-Testing → eFAST Skills Performance on SP Checklist Pre-Testing → Educational Intervention: Online Modules → eFAST Skills Performance on SP Checklist Post-Testing

Results: Basic Knowledge Pre-Test to Post-Test Examination Scores



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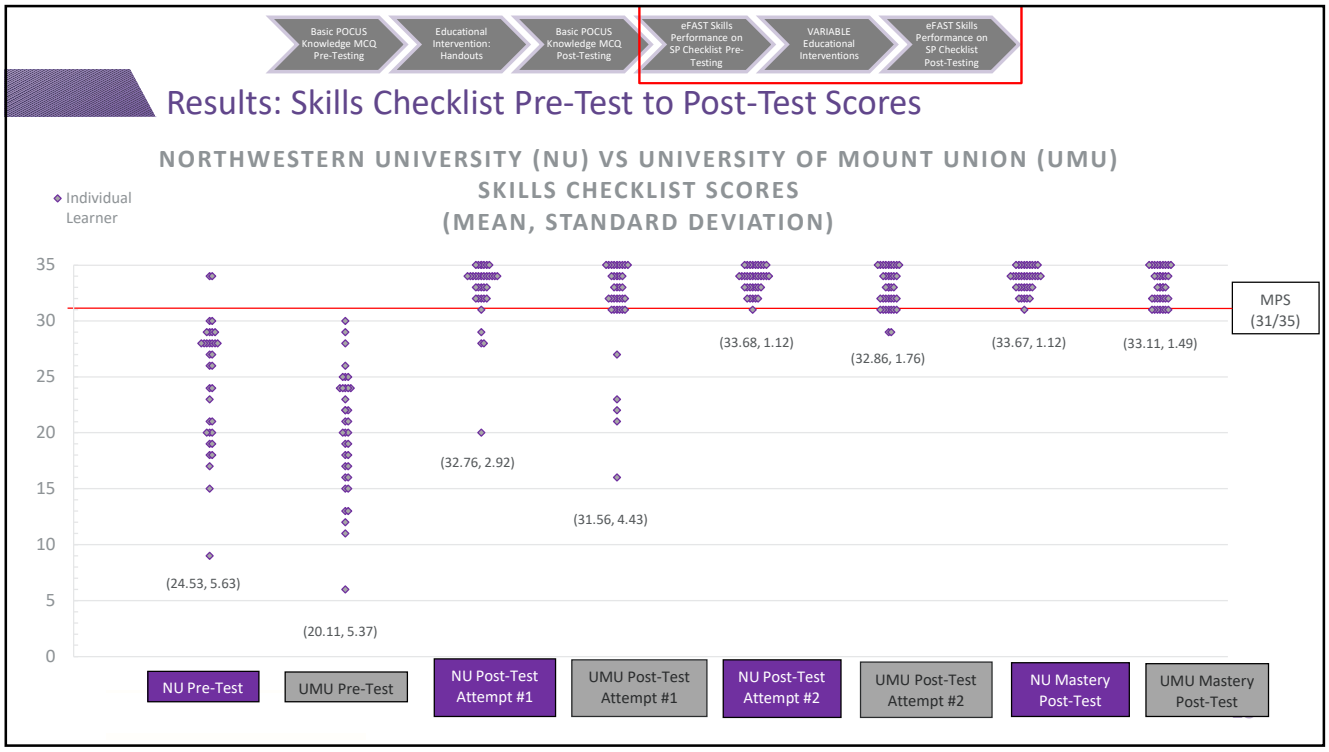
Basic POCUS Knowledge MCQ Pre-Testing
Educational Intervention: Handouts
Basic POCUS Knowledge MCQ Post-Testing
eFAST Skills Performance on SP Checklist Pre-Testing
VARIABLE Educational Interventions
eFAST Skills Performance on SP Checklist Post-Testing
Results: Skills Checklist Pre-Test to Post-Test Scores
NORTHWESTERN UNIVERSITY (NU) VS UNIVERSITY OF MOUNT UNION (UMU)
SKILLS CHECKLIST SCORES
(MEAN, STANDARD DEVIATION)
Individual Learner
35
30
25
20
15
10
5
0
(24.53, 5.63)
(20.11, 5.37)
(32.76, 2.92)
(31.56, 4.43)
(33.68, 1.12)
(32.86, 1.76)
(33.67, 1.12)
(33.11, 1.49)
MPS (31/35)
NU Pre-Test
UMU Pre-Test
NU Post-Test Attempt #1
UMU Post-Test Attempt #1
NU Post-Test Attempt #2
UMU Post-Test Attempt #2
NU Mastery Post-Test
UMU Mastery Post-Test

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Results

Student Confidence Surveys

Statement	Northwestern University		University of Mount Union	
	Pre-Test # agree-strongly agree (%) (n=34)	Post-Test # agree-strongly agree (%) (n=24)	Pre-Test # agree-strongly agree (%) (n=36)	Post-Test # agree-strongly agree (%) (n=28)
I feel confident to observe an eFAST examination being performed on a patient by a preceptor, understanding verbiage, landmarks, and components of the examination	31 (88.57%)	24 (100%)	24 (66.67%)	28 (100%)
I feel confident to perform an eFAST examination on a patient with guidance from a preceptor	16 (47.06%)	24 (100%) ★	15 (41.67%)	28 (100%) ★
I feel confident to perform an eFAST examination on a patient independently	3 (8.82%)	23 (95.83%)	0 (0%)	14 (50%)
I feel confident to observe additional POCUS examinations being performed on a patient by a preceptor, understanding verbiage and landmarks	25 (73.53%)	24 (100%)	23 (63.89%)	27 (96%)
I feel confident to try a new POCUS examination on a patient while being taught by a preceptor	21 (61.76%)	24 (100%)	21 (58.33%)	27 (96%)

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Conclusions

What Does This Mean?

- Students feel confident! (Kirkpatrick Level 1[5])
- Both hands-on and online-only PA students can achieve mastery in POCUS knowledge and eFAST performance, without statistically significantly different scores in skill performance! (Kirkpatrick Level 2)
- Acceptable alternative to teach PA Students POCUS at resource-limited institutions
  - Eliminates cost
  - Eliminates in-house trained faculty
  - +/- eliminates time
- Poses a potential opportunity to train practicing clinicians who cannot attend in-person CME training workshops/bootcamps?

Conclusions

Limitations

- Pilot study/small sample size
- Assessment reliability?
  - Graders underwent rater training
  - Checklist tool previously determined to have high inter-rater reliability & multiple-choice examination with KR-20 demonstrating homogeneity
  - Constraint of resource-limited institutions
- Timing of integration of education into PA curriculum?

Conclusions

Future Research

- Additional data analysis for correlations
- Will the skills last?
- Does the training lead to PA students performing POCUS on clinical rotations?
- Does the training lead to PA students performing POCUS as practicing clinicians?
- Would this translate to other POCUS applications?
- Larger-sized study/multi-institutional data analysis needed!
- Applicable to other clinicians who utilize POCUS within their scope of practice?

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Thank You!

Questions, comments, collaborative interest?

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