



FOURTH WORLD CONGRESS

ULTRASOUND IN MEDICAL EDUCATION



TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER

LUBBOCK  TEXAS



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FOURTH WORLD CONGRESS ULTRASOUND IN MEDICAL EDUCATION

SEPTEMBER 22 - 25, LUBBOCK, TX

Texas Tech University Health Sciences Center is pleased to host the Fourth World Congress on Ultrasound in Medical Education (WCUME), co-sponsored by the Society of Ultrasound in Medical Education (SUSME) and World Interactive Network Focused on Critical UltraSound (WINFOCUS). We are delighted that you are participating in the exciting event, which brings together point-of-care ultrasound (POCUS) experts from across the globe. The conference planning committee hopes that you will find this year's congress to be enriching, informative and fun.

At this year's WCUME, you will find a wealth of thought-provoking plenary session presentations, workshops, and poster sessions which together may well change the way you deliver care and educate healthcare learners. The Ultrasound World Cup scheduled for Saturday pairs medical students with world leaders in ultrasound in a sono-competition. Lubbock offers a plethora of rich cultural background which will be highlighted during Friday evening's reception at the National Ranching Heritage Center where you will discover the history of West Texas. Please come early to this reception to walk the grounds as you will find historic homes relocated from across the Llano Estacado.

Again, a warm welcome to this year's WCUME. We value your participation and look forward to learning more about - and expanding - your experience with POCUS.



WCUME 2016: AT A GLANCE

THURSDAY | SEPTEMBER 22

OVERTON HOTEL

11 A.M. - 5 P.M.	SET-UP FOR EXHIBITORS & WORKSHOPS
1 P.M. - 3 P.M.	OPTIONAL PRE- CONFERENCE TOUR
1 P.M. - 7 P.M.	EARLY REGISTRATION
5 P.M. - 7 P.M.	WELCOME RECEPTION

FRIDAY | SEPTEMBER 23

TTU SUB & ALUMNI CENTER

7 A.M. - 4 P.M.	REGISTRATION
7 A.M. - 8 A.M.	BREAKFAST
8 A.M. - 8:30 A.M.	WELCOME & CHAMBER OF COMMERCE RIBBON CUTTING
8:30 A.M. - 10 A.M.	PLENARY SESSION I
10 A.M. - 10:30 A.M.	COFFEE BREAK
10:30 A.M. - 12 P.M.	PLENARY SESSION II
12 P.M. - 1 P.M.	LUNCH
1 P.M. - 2:30 P.M.	CONCURRENT SESSION A
2:30 P.M. - 3 P.M.	COFFEE BREAK
3 P.M. - 4:30 P.M.	CONCURRENT SESSION B/ WORKSHOP SESSION A
4:30 P.M. - 5 P.M.	POSTER PRESENTATION SESSION A #1 - 33
6 P.M. - 10 P.M.	BOOTS COOTIN' UNDER THE WEST TEXAS SKY NATIONAL RANCHING HERITAGE CENTER



SATURDAY

SEPTEMBER 24

TTU SUB & ALUMNI CENTER

7 A.M. - 4 P.M.	REGISTRATION
7 A.M. - 8 A.M.	BREAKFAST
8 A.M. - 8:30 A.M.	WELCOME & ANNOUNCEMENT
8:30 A.M. - 10 A.M.	PLENARY SESSION III ULTRASOUND WORLD CUP
10 A.M. - 10:30 A.M.	COFFEE BREAK
10:30 A.M. - 12 P.M.	PLENARY SESSION IV
12 P.M. - 1 P.M.	LUNCH
1 P.M. - 2:30 P.M.	CONCURRENT SESSION C/ WORKSHOP SESSION B
2:30 P.M. - 3 P.M.	COFFEE BREAK
3 P.M. - 4:30 P.M.	CONCURRENT SESSION D/ WORKSHOP SESSION C
4:30 P.M. - 5 P.M.	POSTER PRESENTATION SESSION B #34 - 58
6 P.M. - 10 P.M.	TTUHSC OPEN HOUSE & FINAL RECEPTION

SUNDAY

SEPTEMBER 25

OVERTON HOTEL

7 A.M. - 8 A.M.	BREAKFAST
8 A.M. - 9:30 A.M.	PLENARY SESSION V
9:30 A.M. - 10 A.M.	AWARD PRESENTATIONS
10 A.M. - 11:30 A.M.	PLENARY SESSION VI



CONTINUING MEDICAL EDUCATION

CONFERENCE THEME: Disruptive Technology with a Human Touch to Save Lives

OBJECTIVES:

1. Highlight the historical context surrounding ultrasound use at the bedside and future directions
2. Outline core clinical uses for Point-of-Care ultrasound
3. Describe the utility of Point-of-Care ultrasound in resource challenged settings
4. Provide hands-on application sessions for participants to practice ultrasound skills
5. Share examples of ultrasound application in medical education
6. Discuss widespread adoption of ultrasound: benefits and barriers

ACCREDITATION: Texas Tech University Health Sciences Center is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

PHYSICIAN CREDIT DESIGNATION: Texas Tech University Health Sciences Center designates this live activity for a maximum of *15 AMA PRA Category 1 Credits™*. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

**Please see the red folder in your welcome packet for more information and to obtain CME credit for this activity. **



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GOVERNOR'S LETTER

Greetings:

As Governor of Texas, I am pleased to welcome you all to the 2016 World Congress on Ultrasound in Medical Education at the Texas Tech University Health Sciences Center.

We all owe an overwhelming debt of gratitude to the health care professionals who provide us with invaluable services in times of need, and ultrasound technology plays a vital role in the practice of medicine today. Whether it's capturing images during pregnancy, diagnosing conditions in certain parts of the body or assisting in medical procedures, ultrasound techniques continue to expand and improve the field of health care. As you all gather to learn from national and international industry professionals and leading physicians, I commend you for your dedication to your field.

To those from out of town, I hope you will enjoy all that Lubbock has to offer. Renowned for its Texas hospitality, historical landmarks and exciting community events, there is something here for everyone.

First Lady Cecilia Abbott joins me in sending best wishes for a successful event.

SINCERELY

Greg Abbott
Governor



MAYOR'S LETTER

Dear World Congress Attendees:

Great things are always happening in Lubbock!

On behalf of the City Council and the citizens of Lubbock, it is my pleasure to welcome you to the Fourth Annual World Congress on Ultrasound in Medical Education. Lubbock is a unique city, and we are proud of our history, heritage and culture. This is the first time your conference has been held in Texas, and we appreciate Texas Tech University Health Sciences Center for sponsoring this event that brings together top national and international ultrasound practitioners and educators. We are glad you are here, and we hope you have a successful conference and an enjoyable stay in the Hub City.

Please enjoy the Overton Hotel, which is part of Overton Park, the largest and most extensive privately funded neighborhood redevelopment in the United States. Also enjoy your activities at the National Ranching Heritage Center, and its authentic ranch buildings and artifacts of the Old West that date from the late 18th Century. Lubbock also has numerous museums, wineries, art galleries, sporting events, recreational opportunities, golf, live music, great restaurants, retail shopping and an average 262 days of sunshine a year to enjoy these amenities. Buddy Holly is Lubbock's favorite son, and the Buddy Holly Center preserves the legacy of this legendary rock and roll pioneer while providing cultural programs and exhibitions for the public. We hope you have the opportunity to visit these, and many more of our places of interest, during your stay in our city.

Lubbock residents are among the friendliest in the world, and we are proud of our West Texas hospitality. If there is anything we can do to make your visit more enjoyable, please let us know. Again, welcome to Lubbock.

SINCERELY

Daniel M. Pope
Mayor



WCUME 2016: COMMITTEES

HOST INSTITUTIONAL LEADERSHIP

TEDD L. MITCHELL, M.D.

STEVEN L. BERK, M.D.

JOHN C. DETOLEDO, M.D.

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DIXON SANTANA, M.D. - SURGERY

RAED ALALAWI, M.D. - INTERNAL MEDICINE

ALIAKBAR ARVANDI, M.D. - INTERNAL MEDICINE

JENNIFER MITCHELL, M.D. - FAMILY MEDICINE

CYNTHIA SMITH, M.D. - UROLOGY

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SANDRA CABALLERO - F. MARIE HALL SIMLIFE CENTER

PAUL TULLAR, M.D. - OB/GYN, AMARILLO

JOHNNIE FAIRCLOTH, M.D. - PEDIATRICS, AMARILLO

SAJU JOSEPH, M.D. - SURGERY, ODESSA

JAMES MAHER, M.D. - OB/GYN, ODESSA



ULTRASOUND WORLD CUP

STUDENT TEAMS

UNIVERSITY OF CALIFORNIA IRVINE

THE OHIO STATE UNIVERSITY

UNIVERSITY OF SOUTH CAROLINA

TEXAS TECH UNIVERSITY HEALTH SCIENCES CENTER

FACULTY AND LEADERS

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JENNIFER MITCHELL

DIXON SANTANA

CYNTHIA SMITH

TOM TENNER

FELICIA TORENO

PAUL TULLAR

SIMON WILLIAMS



THURSDAY

SEPTEMBER 22

11 A.M. - 5 P.M.	SET-UP FOR EXHIBITORS & WORKSHOPS	TTU STUDENT UNION BUILDING & ALUMNI CENTER
1 P.M. - 3 P.M.	OPTIONAL PRE-CONFERENCE TOUR	BUDDY HOLLY CENTER & MCPHERSON WINERY
1 P.M. - 7 P.M.	EARLY REGISTRATION	OVERTON HOTEL / PRE-FUNCTION AREA
5 P.M. - 7 P.M.	WELCOME RECEPTION	OVERTON HOTEL / PRE-FUNCTION AREA

FRIDAY

SEPTEMBER 23

7 A.M. - 4 P.M.	REGISTRATION	TTU SUB / EAST SIDE
7 A.M. - 8 A.M.	BREAKFAST	TTU SUB / RED RAIDER LOUNGE & BALLROOM
8 A.M. - 8:30 A.M.	WELCOME & CHAMBER OF COMMERCE RIBBON CUTTING	TTU SUB / ALLEN THEATER

TEDD L. MITCHELL, President, *Texas Tech University Health Sciences Center***ROBERT L. DUNCAN**, Chancellor, *Texas Tech University System***CHARLES PERRY**, Texas State Senator**DAN POPE**, Mayor, *Lubbock***JOHN OSBORNE**, President & CEO, *Lubbock Economic Development Alliance***JEANETTE MLADENOVIC**, President, *Society of Ultrasound in Medical Education*

8:30 A.M. – 10 A.M.	PLENARY SESSION I: DISRUPTIVE INNOVATION FOR MEDICAL EDUCATION AND HEALTHCARE MODERATOR: JONGYEOL KIM	TTU SUB / ALLEN THEATER
8:30 A.M. – 9 A.M.	Disruptive Innovation: The State of Ultrasound JEANETTE MLADENOVIC , <i>Oregon Health and Science University</i>	
9 A.M. – 9:30 A.M.	Lung Ultrasound: Challenging Old Paradigms GIOVANNI VOLPICELLI , <i>San Luigi Gonzaga University Hospital</i>	
9:30 A.M. – 10 A.M.	The Future of Echocardiography: Disruptor of Disrupted? NEIL WEISSMAN , <i>Georgetown University School of Medicine</i>	
10 A.M. – 10:30 A.M.	COFFEE BREAK	TTU SUB / RED RAIDER LOUNGE & BALLROOM
10:30 A.M. – 12 P.M.	PLENARY SESSION II: HISTORY AND NEW TECHNOLOGY OF ULTRASOUND MODERATOR: MIGUEL MONTORFANO	TTU SUB / ALLEN THEATER
10:30 A.M. – 11 A.M.	History of Ultrasound ERIC BLACKWELL , <i>Texas Tech University Health Sciences Center School of Medicine</i>	
11 A.M. – 11:30 A.M.	New Technology FREDERICK KREMKAU , <i>Wake Forest University School of Medicine</i>	
11:30 A.M. – 12 P.M.	Advancing Ultrasound Education RICHARD HOPPMANN , <i>University of South Carolina School of Medicine</i>	
12 P.M. – 1 P.M.	LUNCH	TTU SUB / RED RAIDER LOUNGE & BALLROOM
1 P.M. – 2:30 P.M.	CONCURRENT SESSION A	TTU STUDENT UNION BUILDING
	A1: ROLE OF ULTRASONOGRAPHERS OSCAR BARAHONA, ROBERT HADDAD* FELICIA TORENO, CONNIE WILLIS	TTU SUB / PLAYA
	A2: ULTRASOUND AND SIMULATION SCOTT GOLDBERG*, BEATRICE HOFFMANN	TTU SUB / CANYON
	A3: ETHICS AND THE HUMAN TOUCH IN ULTRASOUND CHERYL ERWIN*, TRACY GUNTER	TTU SUB / SENATE

* = SESSION LEADER(S)



FRIDAY

SEPTEMBER 23

1 P.M. – 2:30 P.M.

CONCURRENT SESSION A

TTU STUDENT UNION BUILDING

A4: HOW TO START ULTRASOUND CURRICULUM: DEVELOPMENT OF FACULTY AND RESOURCES

MARCUS BASTOS, JONGYEOL KIM, PETER STEINMETZ*

TTU SUB / MESA

A5: ULTRASOUND IN PHYSICAL EXAMINATION

KEITH BARRON, CHRIS FOX*, JOHN KENDALL*, MICHAEL WAGNER

TTU SUB / TRADITIONS

A6: ORAL PRESENTATION 1: ULTRASOUND IN UNDERGRADUATE MEDICAL EDUCATION

MODERATORS: TOM TENNER, SUSAN WIEGERS

TTU SUB / SOAPSUDS

1 P.M. – 1:10 P.M.

1. Creating A Vertical Ultrasound Curriculum at EVMS.

FELICIA TORENO, *Eastern Virginia Medical School*

1:10 P.M. – 1:20 P.M.

2. Building an Ultrasound Education Center: Key Considerations for Success.

CRAIG SISSON, *University of Texas Health Science Center San Antonio*

1:20 P.M. – 1:30 P.M.

3. Integrated Thyroid Ultrasound Education for Second Year Medical Students.

DAVID BAHNER, *The Ohio State University Wexner Medical Center*

1:30 P.M. – 1:40 P.M.

4. Internal Medicine clerkship with ultrasound: Integrating Cardiac Ultrasound Training into Undergraduate Medical Education.

DAVID BAHNER, *The Ohio State University Wexner Medical Center*

1:40 P.M. – 1:50 P.M.

5. Family Medicine Ultrasound (FAMUS): Prevalence in the academic family medicine office.

NICOLAS TASSE, *Université Laval*

1:50 P.M. – 2 P.M.

6. 4th Year Ultrasound Elective at WVU: Methods and Impact.

KRISTINE ROBINSON, *West Virginia University School of Medicine*

2 P.M. – 2:10 P.M.

7. Awareness and Use of Clinician-Performed Ultrasound among Clinical Clerkship Faculty.

WILMA CHAN, *University of Pennsylvania, Perelman School of Medicine*

2:10 P.M. – 2:20 P.M.

8. Lessons learned from an end-of-year OSCE assessment of freshman medical student skills following the inaugural year of a limited ultrasound curriculum.

KEVIN D. PHELAN, *University of Arkansas for Medical Sciences*

2:20 P.M. – 2:30 P.M.

9. Videocast lesson is equally effective as traditional classroom lecture in teaching point-of-care ultrasonography to novice medical students.

MARCUS BASTOS, *Universidade Federal de Juiz de Fora*

1 P.M. – 2:30 P.M.

CONCURRENT SESSION A

TTU STUDENT UNION BUILDING

**A7: ORAL PRESENTATION 2: ULTRASOUND IN GRADUATE AND
CONTINUING MEDICAL EDUCATION AND TECHNOLOGY**
 MODERATORS: JIM TSUNG, MAHMOUD ELBARBARY

TTU SUB / ARROYO

1 P.M. – 1:10 P.M.

 10. Assessment of Bedside Ultrasound Skills in Novice Internal Medicine Resident Learners:
Importance of Removing Potential for Bias from Framing Effect.

MILLA KVIATKOVSKY, *Oregon Health and Science University*

1:10 P.M. – 1:20 P.M.

11. The Addition of an Ultrasound Simulator to Improve Image Interpretation.

ABIGAIL BRACKNEY, *Beaumont Health – Royal Oak*

1:20 P.M. – 1:30 P.M.

 12. Canadian National Survey on Point-of-Care Ultrasound Training in Family Medicine
Residency Programs.

DAVID BRAGANZA, *McGill University*

1:30 P.M. – 1:40 P.M.

13. Distance Education in Medical Ultrasound in Brazil.

RAUL MOREIRA NETO, *Ecomoinhos – School of Medical Ultrasound*

1:40 P.M. – 1:50 P.M.

 14. What learners want: Qualitative analysis of learner interviews in developing a
longitudinal point-of-care ultrasound curriculum for internal medicine faculty.

CHRISTOPHER SMITH, *University of Nebraska Medical Center*

1:50 P.M. – 2 P.M.

 15. Emergency Physicians as Interdisciplinary Educators in Point of Care Ultrasound
for Paracentesis.

CODY SOYK, *University of Michigan/Saint Joseph Mercy Hospital*

2 P.M. – 2:10 P.M.

 16. The effect of ultrasound findings on the risk of aneuploidy with a positive cell
free DNA screen.

JAMES MAHER, *Texas Tech University Health Sciences Center*

2:10 P.M. – 2:20 P.M.

17. Preparing Family Medicine Faculty for POCUS Training.

BRIAN SHIAN, *University of Iowa Carver College of Medicine*

2:20 P.M. – 2:30 P.M.

 18. Survey of participants and near-peer instructors in an integrated bedside ultrasound
course for family medicine residency program.

SHUO PENG, *McGill University*


FRIDAY

SEPTEMBER 23

1 P.M. - 2:30 P.M.

CONCURRENT SESSION A

TTU STUDENT UNION BUILDING

A8: ORAL PRESENTATION 3: POINT-OF-CARE ULTRASOUND IN UNDERSERVED AND GENERAL CLINICAL PRACTICE

MODERATORS: ANJALI BHAGRA, JOHNNIE FAIRCLOTH

TTU SUB / CAPROCK

1 P.M. - 1:10 P.M.

19. Training Pre-Hospital First Responders on Point of Care Ultrasound to Improve Trauma Outcomes in Rural Settings: A Pilot Study.

PHILIP MAMMEN, *Texas Tech University Health Sciences Center*

1:10 P.M. - 1:20 P.M.

20. Expanding Interprofessional Education Between Healthcare Professionals and First Responders Using Disruptive Technology.

THEA MURRAY, *Texas Tech University Health Sciences Center*

1:20 P.M. - 1:30 P.M.

21. Comparison of ultrasound-measured properties of the common carotid artery to tobacco smoke exposure in a cohort of Indonesian patients.

ALLEN YU, *University of California, Irvine School of Medicine;*

1:30 P.M. - 1:40 P.M.

22. Conservative Treatment of a Cesarean Scar Pregnancy Diagnosed and Treated via Transvaginal Ultrasonography.

SARAH BURKE, *Texas Tech University Health Sciences Center*

1:40 P.M. - 1:50 P.M.

23. Point of Care Ultrasound Use by EMS Personnel to Perform the FAST Exam During Trauma Incidents.

GREGG RICE, *Texas Tech University Health Sciences Center*

1:50 P.M. - 2 P.M.

24. Lung Ultrasound in the Evaluation of the Medical and Trauma Patient.

ANDREA KAELEN, *United States Air Force Medical Corps*

2 P.M. - 2:10 P.M.

25. Novel Water Bath Method for Ultrasound Imaging of Distal Extremities.

JENNIFER COTTON, *The Ohio State University Wexner Medical Center*

2:10 P.M. - 2:20 P.M.

26. Importance of transthoracic echocardiography practised in emergency departments by the emergency physician in the management of patients and their referral to specialised departments.

MEHDI BEN LASSOUED, *Emergency department - Military Hospital of Tunis*

2:20 P.M. - 2:30 P.M.

27. Race Does Not Affect Ultrasound Cross-Sectional Area of Upper Extremity Nerves.

LELAND FINLEY, *Texas Tech University Health Sciences Center*

2:30 P.M. – 3 P.M.	COFFEE BREAK	TTU SUB / RED RAIDER LOUNGE & BALLROOM
3 P.M. – 4:30 P.M.	CONCURRENT SESSION B	TTU STUDENT UNION BUILDING
	B1: ETHICS AND THE HUMAN TOUCH IN ULTRASOUND CHERYL ERWIN*, TRACY GUNTER	TTU SUB / SENATE
	B2: PANEL DISCUSSION: ULTRASOUND CURRICULUM IN MEDICAL SCHOOLS MODERATOR: CRAIG GOODMURPHY	TTU SUB / PLAYA
	B3: PANEL DISCUSSION: STUDENTS' PERSPECTIVE: ULTRASOUND EDUCATION MODERATORS: RICHARD HOPPMANN, SIMON WILLIAMS	TTU SUB / MESA
	B4: POINT-OF-CARE ULTRASOUND FOR FIRST RESPONDERS: HOW TO START & POTENTIAL APPLICATIONS SAJU JOSEPH*, GREGOR PROSEN, DAVE SPEAR	TTU SUB / TRADITIONS
	B5: ORAL PRESENTATION 4: ULTRASOUND IN UNDERGRADUATE MEDICAL EDUCATION MODERATORS: HARVEY NISENBAUM, TOM TENNER	TTU SUB / SOAPSUDS
3 P.M. – 3:10 P.M.	28. Performance of a simplified wall motion score index method for emergency physicians to assess left ventricular ejection fraction: prospective study about 65 cases. MEHDI BEN LASSOUED , <i>Emergency department - Military Hospital of Tunis</i>	
3:10 P.M. – 3:20 P.M.	29. Integration of Ultrasound skills in the training of new age Medical students. RAMESH GOPALAKRISHNAN , <i>Independent Consultant</i>	
3:20 P.M. – 3:30 P.M.	30. Tiered Longitudinal Ultrasound Curriculum for Undergraduate Medical Education. MICHELLE CORRADO , <i>The Ohio State University College of Medicine</i>	
3:30 P.M. – 3:40 P.M.	31. A Randomized Study of Training with Large Versus Small Vessel Size On Successful Ultrasound Guided Peripheral Venous Access. JOSH DAVIS , <i>Thomas Jefferson University</i>	
3:40 P.M. – 3:50 P.M.	32. Is Undergraduate Ultrasound Training Valuable? An Ongoing Evaluation of the Opinions of Residents and their Directors. JULIAN GREER , <i>University of South Carolina School of Medicine</i>	

FRIDAY

SEPTEMBER 23

3 P.M. - 4:30 P.M.

CONCURRENT SESSION B

TTU STUDENT UNION BUILDING

B5: ORAL PRESENTATION 4: ULTRASOUND IN UNDERGRADUATE MEDICAL EDUCATION

MODERATORS: HARVEY NISENBAUM, TOM TENNER

TTU SUB / SOAPSUDS

3:50 P.M. - 4 P.M.

33. Evaluation of Sophomore Medical Students' Competencies in Image Recognition and Interpretation of Ultrasound Pathology: An Innovative Ultrasound Curriculum Developed at the Wayne State University School of Medicine.

DAVID AMPONSAH, *Wayne State University School of Medicine*

4 P.M. - 4:10 P.M.

34. A Case-based Approach to Teaching Clinical Ultrasound Applications to Junior Medical Students at the Wayne State University School of Medicine (WSUSOM).

DAVID AMPONSAH, *Wayne State University School of Medicine*

4:10 P.M. - 4:20 P.M.

35. Using and Assessing Ultrasound to Teach Physical Examination and Diagnosis: A Self-Directed Learning Activity in the Family Medicine Accelerated Track (FMAT).

BETSY JONES, *Texas Tech University Health Sciences Center*

4:20 P.M. - 4:30 P.M.

36. Integrating Ultrasound with 3D-CT in Assessing Tibula-Fibula Fractures on Donor Cadavers and Healthy Volunteers.

BRION BENNINGER, *Oregon Health & Science University*

B6: ORAL PRESENTATION 5: ULTRASOUND IN GRADUATE AND CONTINUING MEDICAL EDUCATION AND TECHNOLOGY

MODERATORS: CHARLES TEGELER, TOM PRESSLEY

TTU SUB / CAPROCK

3 P.M. - 3:10 P.M.

37. Efficacy of Ultrasound Education for Foreign Physicians Taught by First Year Medical Students.

JONATHAN LEE, *University of California, Irvine School of Medicine;*

3:10 P.M. - 3:20 P.M.

38. Experience with a Longitudinal Ultrasound Curriculum in Internal Medicine GME: resident perceptions before and after implementation.

ELIZABETH BAKER, *University of South Carolina School of Medicine*

3:20 P.M. - 3:30 P.M.

39. Focusing on safety: Quality of widely available video instructional materials for point-of-care ultrasound guided procedures in Internal Medicine.

ADITI KHADELWAL, *University of Toronto*



3 P.M. – 4:30 P.M.

CONCURRENT SESSION B

TTU STUDENT UNION BUILDING

B6: ORAL PRESENTATION 5: ULTRASOUND IN GRADUATE AND CONTINUING MEDICAL EDUCATION AND TECHNOLOGY
 MODERATORS: CHARLES TEGELER, TOM PRESSLEY

TTU SUB / CAPROCK

3:30 P.M. – 3:40 P.M.

 40. Ultrasound Evaluation of Soft Tissue Foreign Bodies by US Army Medics.
JONATHAN MONTI, *Madigan Army Medical Center*

3:40 P.M. – 3:50 P.M.

 41. The Interrater Reliability of Optic Nerve Sheath Diameter Measurements Performed by Non-Ultrasound Fellowship Trained Emergency Medicine Physicians and Emergency Medicine Residents Using Bedside Ultrasound.
CRAIG SISSON, *University of Texas Health Science Center San Antonio*

3:50 P.M. – 4 P.M.

 42. Assessment of an Internal Medicine Residency Point-of-Care Ultrasound Elective.
NIMA AFSHAR, *University of California, San Francisco*

4 P.M. – 4:10 P.M.

 43. Integrating graduated didactics into training reduces the time required to build skill in focused cardiac ultrasound.
SHANNON MCCONNAUGHEY, *University of Washington Medical Center*

4:10 P.M. – 4:20 P.M.

 44. Use of a simulator to teach focused cardiac ultrasound.
ROB MORGAN, *Legacy Internal Medicine Residency*

4:20 P.M. – 4:30 P.M.

 45. 3D Power Doppler Ultrasound in Early Diagnosis of Preeclampsia.
RAUL MOREIRA NETO, *Ecominhos – School of Medical Ultrasound*
B7: ORAL PRESENTATION 6: PANEL DISCUSSION
 MODERATORS: CHRISTOPHER HUERTA, DIXON SANTANA

TTU SUB / CANYON

3 P.M. – 3:45 P.M.

 46. Standardized Patients, Image Evaluation, Hands-On Scanning Labs, and Student Feedback Within the Ultrasound Curriculum at Eastern Virginia Medical School.
FELICIA TORENO, *Eastern Virginia Medical School*;
LORRAINE LYMAN, *Eastern Virginia Medical School*

3:45 P.M. – 4:30 P.M.

 47. Planning a Successful Ultrafest: A Regional Symposium for Teaching Ultrasound to Medical Students.
JOSH DAVIS, *Thomas Jefferson University*

FRIDAY

SEPTEMBER 23

3 P.M. - 4:30 P.M.

WORKSHOP SESSION A

TTU ALUMNI CENTER

WA1: INTRODUCTION TO ULTRASOUND FOR TEACHING ANATOMY AND PHYSIOLOGY WITH PHYSICS & KNOBOLOGY

DAVID BAHNER, JOHN BENNETT, GREG BROWER*
VAUGHAN LEE*, MAXIME VALOIS, SUSAN WIEGERS

TTU ALUMNI CENTER / ROOM CURRIE

WA2: ABDOMINAL ULTRASOUND

OSCAR BARAHONA, ANJALI BHAGRA, MARCUS BASTOS,
SAMUEL CAMPBELL*, PETER STEINMETZ,
DAVID TIERNEY*, CONNIE WILLIS

TTU ALUMNI CENTER / ROOM RAYLEIGH

WA3: ULTRASOUND PHANTOM: MAKING YOUR OWN

JAMES MAHER, DUSTIN MORROW*

TTU ALUMNI CENTER / ROOM COLLADON

WA4: ULTRASOUND FOR PHYSICAL EXAMINATION

KEITH BARRON, RACHEL BENGTZEN, CHRIS FOX
JOHN KENDALL*, IRENE MA, MIKE WAGNER*

TTU ALUMNI CENTER / ROOM DOPPLER

WA5: INTRODUCTION TO ECHOCARDIOGRAPHY

ALIAKBAR ARVANDI*, MICHAEL BLAIVAS, KEVIN DARVILLE
RENEE DVERSDAL, LAWAYNE HARTFIELD, KALYN MIDDLEBROOK
RAGESH PANIKKATH, ROGER RODRIGUEZ, BECKY SAMANIEGO

TTU ALUMNI CENTER / ROOM GALTON

WA6: POINT-OF-CARE ULTRASOUND FOR PEDIATRICS

STEPHANIE DONIGER, MAHMOUD ELBARBARY*
DANIEL HUBBARD, JIM TSUNG*

TTU ALUMNI CENTER / ROOM LIPPMAN

4:30 P.M. - 5 P.M.

POSTER PRESENTATION SESSION A #1 - 33

TTU SUB / MATADOR

PA1 POSTER PRESENTATION LED BY PROFESSORS

MODERATOR: MARCUS BASTOS

TTU SUB / MATADOR

Teaching the FAST algorithm with the Reacts (Remote Education, Augmented Communication, Training and Supervision) platform - a pilot study.

ANNE-MARIE BRISSON, *McGill University*

Implementation of a USIG research initiative to improve productivity of student involvement in research.

NICHOLAS KELLY, *The Ohio State University College of Medicine*



4:30 P.M. - 5 P.M.

**POSTER PRESENTATION
SESSION A #1 - 33**

TTU SUB / MATADOR

PA1 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: MARCUS BASTOS

TTU SUB / MATADOR

"Near-Peer" Teaching of Bedside Ultrasound in a Canadian Undergraduate Medical Program.

LEANNA Y. CHEN, *McGill University*

Continued optimization of a long-term clinical ultrasound education program in Mwanza, Tanzania.

SEAN DENNY, *University of California, Irvine School of Medicine*

Beginner Ultrasound, an innovative one year introducing course for medical students.

DAVID BAHNER, *The Ohio State University Wexner Medical Center*

PA2 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: MICHAEL BLAIVAS

TTU SUB / MATADOR

Intermediate Ultrasound: Going beyond the basics of ultrasound in medical student education.

NICHOLAS SCOVILLE, *The Ohio State University College of Medicine*

Ultrasound Interest Group Communication Strategies at Ohio State University.

DAVID BAHNER, *The Ohio State University Wexner Medical Center*

Evaluating the Effectiveness of Ultrasound Education.

CONNOR BYRNE, *University of California, Irvine School of Medicine*

Hospital Wide Point of Care Ultrasound Committee as an Instructional Resource for the Medical Student Curriculum.

CASEY GLASS, *Wake Forest School of Medicine*

Gallstone Ultrasound Screening in the Ngobe Population of Rural Panama.

EZEQUIEL ANDRADE, *University of California, Irvine School of Medicine;*

NATHAN JASPERSE, *University of California, Irvine School of Medicine;*

JODIE RAFFI, *University of California, Irvine School of Medicine*



FRIDAY

SEPTEMBER 23

4:30 P.M. - 5 P.M.

**POSTER PRESENTATION
SESSION A #1 - 33**

TTU SUB / MATADOR

PA3 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: CHRISTOPHER HUERTA

TTU SUB / MATADOR

Assessing the Accuracy of Delivery Date Estimation in Rural Panama.

NICOLE ZAWADA, *University of California, Irvine School of Medicine;***ISAURE HOSTETTER**, *University of California, Irvine School of Medicine;***VICTORIA OPPENHEIM**, *University of California, Irvine School of Medicine*

Identifying Barriers to Prenatal Healthcare in Rural Panama.

TARA ZAND, *University of California, Irvine School of Medicine;***LAUREN WITCHEY**, *University of California, Irvine School of Medicine*

Advanced Competency in Bedside Ultrasound for Medical Students.

CREAGH BOULGER, *The Ohio State University Wexner Medical Center*

Sustainability of teaching the Rural Obstetric Ultrasound Triage Exam (ROUTE) to healthcare workers in low-resource settings in rural Panama.

VICTORIA OPPENHEIM, *University of California, Irvine School of Medicine;***ISAURE HOSTETTER**, *University of California, Irvine School of Medicine;***NICOLE ZAWADA**, *University of California, Irvine School of Medicine*

Weber B Distal Fibular Fracture Diagnosed by Point of Care Ultrasound in the Emergency Department.

JESSICA KOEHLER, *Wayne State University School of Medicine;***JAMES MAKINEN**, *Wayne State University School of Medicine***PA4 POSTER PRESENTATION LED BY PROFESSORS**
MODERATOR: IRENE MA

TTU SUB / MATADOR

Preceptor and medical students' perception of medical students' comfort with ultrasonography.

JEFFREY PAPAIZIAN, *Virginia Tech-Carilion Emergency Medicine Residency*

Effect of a Single Focused Cardiac Ultrasound Session on Cardiovascular Exam Confidence of First-Year Physician Assistant Students.

PATRICIA O'BRIEN, *Oregon Health and Science University;***RENEE DVERSDAL**, *Oregon Health and Science University*

4:30 P.M. - 5 P.M.

**POSTER PRESENTATION
SESSION A #1 - 33**

TTU SUB / MATADOR

PA4 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: IRENE MA

TTU SUB / MATADOR

A Limited First Year Medical Student Ultrasound Exposure Program Designed to Emphasize Standardized Patient Interactions: Student Assessment of Program Success.

KEVIN D. PHELAN, *University of Arkansas for Medical Sciences*

A One-week Intensive Ultrasound Special Topics Course for Rising 2nd year Medical Students.

DAVID RESUEHR, *UABSOM*

Can Proximal Fibular Fractures Be Identified With Ultrasound By Novice Users In the Anatomy Lab.

BRION BENNINGER, *Western University*

Ultrasound Use during Anatomy Dissection Lab with Multiple Probes Identifying Ulnar Collateral Ligament from Cadavers and Healthy Volunteers.

BRION BENNINGER, *Western University*

PA5 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: NILAM SONI

TTU SUB / MATADOR

Can High Resolution Ultrasound probes (5-12, 18, 22 MHz) performed by Medical Students Identify the Median Nerve In the Wrist and Hand Region from Donor Cadavers and Healthy Individuals.

BRION BENNINGER, *Western University*

Ultrasound Training in a Medical Anatomy Lab of Nasal Bone Fractures while comparing Finger vs Classic Linear Probes.

BRION BENNINGER, *Western University*

Ultrasound Integrated into Anatomy Dissection Lab Identifying Temporal Bone Region Fractures Comparing SonicEye Finger versus Classic Linear Probes.

BRION BENNINGER, *Western University*

Comparing Ultrasound: Finger Versus Classic Linear Probes to Identify Zygomatic Fractures in Medical Anatomy Lab.

BRION BENNINGER, *Western University*

Developing a Training Tool for Novice Ultrasound Users. Identifying Skull and Facial Fractures with Unembalmed Cadaveric Tissue Using Multiple Probes.

BRION BENNINGER, *Western University*



FRIDAY

SEPTEMBER 23

4:30 P.M. - 5 P.M.

**POSTER PRESENTATION
SESSION A #1 - 33**

TTU SUB / MATADOR

PA5 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: NILAM SONI

TTU SUB / MATADOR

Visualization of Volar Plate of the First Metatarsophalangeal Joint In Donor Cadavers and Healthy Volunteers using High-Resolution Musculoskeletal Probe.

BRION BENNINGER, *Western University*

PA6 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: DAVID TIERNEY

TTU SUB / MATADOR

Innovation, Engineering and Anatomy: Paradigm Shift, Using Ultrasound to Assess Implant Positioning, thus Restoring Function To the Hand "Organ".

BRION BENNINGER, *Western University*

Integration of 3D/4D Ultrasound Technology into an Anatomy Dissection Laboratory with 3D Visualization of the Thyroid Gland.

BRION BENNINGER, *Western University*

Integrating 3D/4D Ultrasound Skills to Facilitate Stereostructural Anatomy of the Abdominal and Pelvic Regions During a Medical Anatomy Dissection Based Course.

BRION BENNINGER, *Western University*

Integrating Virtual-reality based Ultrasound Tutorials for Developing Point-of-Care Skill Sets and Spatial Anatomy during a Medical Anatomy Course with OPUS Mini Haptic Ultrasound Simulator.

BRION BENNINGER, *Western University*

Ultrasound as a diagnostic tool for Distal Radial Fractures.

BRION BENNINGER, *Western University*

Teaching Ultrasound Of Three Clinically Important Upper Limb Structures During Anatomy Dissection Lab Using the 7D Interactive Software Program.

BRION BENNINGER, *Western University*

6 P.M. - 10 P.M.

**BOOTS COOTIN' UNDER THE
WEST TEXAS SKY**

NATIONAL RANCHING HERITAGE CENTER



SATURDAY

SEPTEMBER 24

7 A.M. - 4 P.M.	REGISTRATION	TTU SUB / EAST SIDE
7 A.M. - 8 A.M.	BREAKFAST	TTU SUB / RED RAIDER LOUNGE & BALLROOM
8 A.M. - 8:30 A.M.	WELCOME & ANNOUNCEMENT	TTU SUB / ALLEN THEATER
	Welcome STEVEN L. BERK, <i>TTUHSC Executive Vice President and Provost & Dean, Texas Tech University Health Science Center, School of Medicine</i> General Announcements LOGISTIC CHAIR, <i>Texas Tech University Health Science Center, School of Medicine</i> Welcome SUSME & WINFOCUS	
8:30 A.M. - 10 A.M.	PLENARY SESSION III: ULTRASOUND LEADERSHIP PANEL MODERATOR: RICHARD HOPPMANN	TTU SUB / ALLEN THEATER
	DAVID BAHNER, <i>Third Vice President, American Institute of Ultrasound in Medicine</i> SUSAN WIEGERS, <i>Immediate Past President, American Society of Echocardiography</i> JEANETTE MLADENOVIC, <i>President Society of Ultrasound in Medical Education</i> HARVEY NISENBAUM, <i>President World Federation of Ultrasound in Medicine and Biology</i> MIGUEL MONTORFANO, <i>President World Interactive Network Focused on Critical Ultrasound</i>	
8:30 A.M. - 12 P.M.	ULTRASOUND WORLD CUP CHAIRS: RAED ALALAWI & SAMUEL CAMPBELL HOST: BRYCE MCGREGOR	TTU SUB / LUBBOCK ROOM
10 A.M. - 10:30 A.M.	COFFEE BREAK	TTU SUB / RED RAIDER LOUNGE



SATURDAY

SEPTEMBER 24

10:30 A.M. - 12 P.M.	PLENARY SESSION IV: ULTRASOUND IN MEDICAL EDUCATION MODERATOR: VAUGHAN LEE	TTU SUB / ALLEN THEATER
10:30 A.M. - 11 A.M.	Ultrasound in Undergraduate Medical Education CHRIS FOX	
11 A.M. - 11:30 A.M.	Ultrasound in Graduate Medical Education DAVID BAHNER & DAVID TIERNEY	
11:30 A.M. - 12 P.M.	Ultrasound in Continuing Medical Education JOHN KENDALL & NILAM SONI	
12 P.M. - 1 P.M.	LUNCH	TTU SUB / RED RAIDER LOUNGE & BALLROOM
1 P.M. - 2:30 P.M.	CONCURRENT SESSION C	TTU STUDENT UNION BUILDING
	C1: ULTRASOUND IN OTHER SPECIALTIES: SPEECH & PHYSICAL THERAPY SUZANNE BOYCE, TROY HOOPER, SUE ANN LEE*, DOUGLAS WHITE*	TTU SUB / PLAYA
	C2: PANEL DISCUSSION: POINT-OF-CARE ULTRASOUND IN GRADUATE MEDICAL EDUCATION DAVID BAHNER*, CHRIS FOX, CRAIG GOODMURPHY, VAUGHAN LEE	TTU SUB / CANYON
	C3: PANEL DISCUSSION: POINT-OF-CARE ULTRASOUND IN CONTINUING MEDICAL EDUCATION NIMA AFSHAR, ANJALI BHAGRA, CREAGH BOULGER*, DAVID TIERNEY	TTU SUB / SENATE
	C4: PANEL DISCUSSION: POINT-OF-CARE ULTRASOUND IN UNDERGRADUATE MEDICAL EDUCATION RENEE DVERSDAL, RICARDO FRANCO SADUD, NILAM SONI*, MICHAEL WAGNER	TTU SUB / MESA
	C5: OB/GYN ULTRASOUND FOR PRIMARY CARE JAMES MAHER, PAUL TULLAR*	TTU SUB / TRADITIONS

1 P.M. – 2:30 P.M.

CONCURRENT SESSION C

TTU STUDENT UNION BUILDING

C6: ULTRASOUND FOR FIRST RESPONDERS: HOW TO START & DEVELOP
SAJU JOSEPH*, GREG PROSEN

TTU SUB / ESCONDIDO

C7: RENAL ULTRASOUND: BASIC TO CLINICAL APPLICATION
MARCUS BASTOS*

TTU SUB / ARROYO

**C8: ORAL PRESENTATION 7: ULTRASOUND IN UNDERGRADUATE
MEDICAL EDUCATION**
MODERATORS: HARVEY NISENBAUM, SIMON WILLIAMS

TTU SUB / SOAPSUDS

1:00 P.M. – 1:10 P.M.

48. A New Model for Determining Competency in Ultrasound Education Using an Outcome-Based Determination of Comprehension, Confidence and Insight: A Four Year Study of an Emergency Ultrasound Elective and Medical Student Performance

CRAIG SISSON, *University of Texas Health Science Center San Antonio*

1:10 P.M. – 1:20 P.M.

49. The Inaugural Year of an Ultrasound Curriculum for First Year Medical Students: The Standardized Patient Perspective.

ALISA KANFI, *University of Arkansas for Medical Sciences*

1:20 P.M. – 1:30 P.M.

50. Procedural simulation: medical student preference and value of three task trainers for ultrasound guided regional anesthesia.

AMANDA PURDY, *University of California, Irvine School of Medicine*

1:30 P.M. – 1:40 P.M.

51. Is There More To Wrist Extension Using SonicEye Finger Probe versus Classic Linear Probe Ultrasound to Assess Radial Artery Movement Prior To Cannulation and Blood Draw?

BRION BENNINGER, *Western University*

1:40 P.M. – 1:50 P.M.

52. Ulnar Collateral Ligament Ultrasound of the First MCP with High Resolution Probes on Cadavers and Healthy Subjects.

BRION BENNINGER, *Western University*

1:50 P.M. – 2 P.M.

53. Implementing Newly Designed Anatomical Protocol Providing an Ultrasound Footplate to Identify Anterolateral Ligament.

BRION BENNINGER, *Western University*



SATURDAY

SEPTEMBER 24

1 P.M. – 2:30 P.M.

CONCURRENT SESSION C

TTU STUDENT UNION BUILDING

C8: ORAL PRESENTATION 7: ULTRASOUND IN UNDERGRADUATE MEDICAL EDUCATION

MODERATORS: HARVEY NISENBAUM, SIMON WILLIAMS

TTU SUB / SOAPSUDS

2 P.M. – 2:10 P.M.

54. Innovative Wearable Miniaturized Wireless Wrist-Worn Ultrasound System Developed for Extended Fast Exam with Integrated Dual-Plane Finger Probe.

BRION BENNINGER, *Western University*

2:10 P.M. – 2:20 P.M.

55. Using triple stimulation provides a powerful learning tool integrating surface anatomy landmarks with ultrasound imaging to augment medical students' physical examination skills.

BRION BENNINGER, *Oregon Health & Science University*

2:20 P.M. – 2:30 P.M.

56. Sustainable Medical Student Directed International Ultrasound Projects.

AMANDA PURDY, *University of California, Irvine School of Medicine*

1 P.M. – 2:30 P.M.

WORKSHOP SESSION B

TTU ALUMNI CENTER

WB1: CAROTID AND TRANSCRANIAL DOPPLERJOHN BENNETT*, KEVIN DARVILLE, RANDALL HUFF
LAWYNE HARTFIELD, CHARLES TEGELER, CONNIE WILLIS

TTU ALUMNI CENTER / GALTON

WB2: INTRODUCTORY MUSCULOSKELETAL ULTRASOUND FOR PRIMARY CARERACHEL BENG TZEN, DAVID EDWARDS, JOHNNIE FAIRCLOTH*
ANTHONY HEWETSON, BYUNGHWAN HWANG, JENNIFER MITCHELL*

TTU ALUMNI CENTER / COLLADON

WB3: POINT-OF-CARE ULTRASOUND: OCULAR, AIRWAY, AORTA & SPINE

MICHAEL BLAIVAS*, CHRISTOPHER HUERTA

TTU ALUMNI CENTER / LIPPMAN

WB4: POINT-OF-CARE ULTRASOUND FOR CRITICALLY ILL PATIENTS

STEPHANIE DONIGER, RAED ALALAWI*, GIOVANNI VOLPICELLI

TTU ALUMNI CENTER / DOPPLER



1 P.M. – 2:30 P.M.	WORKSHOP SESSION B	TTU ALUMNI CENTER
	WB5: FOCUSED ASSESSMENT WITH SONOGRAPHY FOR TRAUMA (FAST) SAMUEL CAMPBELL*, IRENE MA*, DUSTIN MORROW PETER STEINMETZ, JIM TSUNG	TTU ALUMNI CENTER / CURRIE
	WB6: PROCEDURE WITH ULTRASOUND: BASIC AND ADVANCED KEITH BARRON, RAKHSHANDA RAHMAN, DIXON SANTANA*	TTU ALUMNI CENTER / RAYLEIGH
2:30 P.M. – 3 P.M.	COFFEE BREAK	TTU SUB / RED RAIDER LOUNGE & BALLROOM
3 P.M. – 4:30 P.M.	CONCURRENT SESSION D	TTU STUDENT UNION BUILDING
	D1: POINT-OF-CARE ULTRASOUND FOR CRITICALLY ILL PATIENTS RAED ALALAWI*, DANIEL HUBBARD, DAVID TIERNEY	TTU SUB / CANYON
	D2: ULTRASOUND FOR NURSING EDUCATION: HOW TO START & DEVELOP SANDRA CABALLERO, SHARON DECKER*	TTU SUB / SENATE
	D3: COMMON ULTRASOUND-GUIDED PROCEDURES MICHAEL BLAIVAS, DIXON SANTANA* RAKSHANDA RAHMAN, GIOVANNI VOLPICELLI	TTU SUB / MESA
3 P.M. – 4:30 P.M.	WORKSHOP SESSION C	TTU ALUMNI CENTER
	WC1: RENAL /BLADDER ULTRASOUND NIMA AFSHAR, KEITH BARRON, IRENE MA CYNTHIA SMITH*, MAXIME VALOIS	TTU ALUMNI CENTER / CURRIE
	WC2: ULTRASOUND FOR SPEECH THERAPY: HANDS-ON PRACTICE SUZANNE BOYCE, SUE ANN LEE*	TTU ALUMNI CENTER / GALTON
	WC3: ULTRASOUND FOR PHYSICAL THERAPY AND KINESIOLOGY TROY HOOPER, DOUGLAS WHITE*	TTU ALUMNI CENTER / LIPPMAN
	WC4: OB/GYN ULTRASOUND FOR PRIMARY CARE OSCAR BARAHONA, CHRISTOPHER HUERTA, JAMES MAHER* JIM TSUNG, PAUL TULLAR	TTU ALUMNI CENTER / COLLADON

SATURDAY

SEPTEMBER 24

3 P.M. - 4:30 P.M.

WORKSHOP SESSION C

TTU ALUMNI CENTER

WC5: CAROTID AND TRANSCRANIAL DOPPLERJOHN BENNETT*, SAMUEL CAMPBELL, KEVIN DARVILLE
LAWYNE HARTFIELD, RANDALL HUFF, CHARLES TEGELER

TTU ALUMNI CENTER / DOPPLER

WC6: ULTRASOUND FOR FIRST RESPONDERSMAHMOUD ELBARBARY, SAJU JOSEPH*, DUSTIN MORROW
GREGOR PROSEN, MICHAEL WAGNER, SUSAN WIEGERS

TTU ALUMNI CENTER / RAYLEIGH

3 P.M. - 6 P.M.

INTERNATIONAL CONSENSUS MEETING
BY INVITATION ONLY

TTU SUB / LLANO ESTACADO

4:30 P.M. - 5 P.M.

POSTER PRESENTATION
SESSION B #34 - 58

TTU SUB / MATADOR

PB1 POSTER PRESENTATION LED BY PROFESSORS

MODERATOR: GREG BROWER

TTU SUB / MATADOR

A Fatal Traid: Eisenmenger's Syndrome, Pregnancy, and Severe Preeclampsia.

LUKE WENDT, *Texas Tech University Health Sciences Center*

Paradoxical Orthostatic Intracranial Hypertension with Joint Hypermobility.

JOHNNIE FAIRCLOTH, *Texas Tech University Health Sciences Center*

ECHOCARDIOGRAPHY AND ULTRASOUND TRAINING IN CRITICAL CARE.

ABBAS ALI, *Gisinger Medical Center*

Medical Ultrasound Education in Brazil.

RAUL MOREIRA NETO, *Ecomoinhos - School of Medical Ultrasound*

Pilot study to develop an ultrasound-based approach for the placement of central venous catheters at a teaching hospital in Guatemala.

TANYA DEVNANI, *Washington University School of Medicine/Barnes-Jewish Hospital*

4:30 P.M. – 5 P.M.

**POSTER PRESENTATION
SESSION B #34 – 58**

TTU SUB / MATADOR

PB2 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: LARRY MELNIKER

TTU SUB / MATADOR

Multidisciplinary approach to the perinatal care of families affected by fetal anomalies.

JAMES MAHER, *Texas Tech University Health Sciences Center;***HANNA KODEIH**, *Texas Tech University Health Sciences Center*

PULSE: An Objective Programmatic Ultrasound Metric Tool.

TYLER DSCHAAK, *The Ohio State University College of Medicine;***SCOTT CARDONE**, *The Ohio State University College of Medicine*

Prenatal diagnosis of urinoma and dilated azygous vein.

MAMIE GAO, *Texas Tech University Health Sciences Center*

Ultrasound Detection of Soft Tissue Abscesses Performed by Non-Physician US Army

Medical Providers Naïve to Diagnostic Sonography.

JONATHAN MONTI, *Madigan Army Medical Center*

Point of Care Evaluation of Diaphragm Muscle using Ultrasound.

AARTI SARWAL, *Wake Forest School of Medicine***PB3 POSTER PRESENTATION LED BY PROFESSORS**
MODERATOR: VAUGHAN LEE

TTU SUB / MATADOR

Appropriateness of the elderly neoplastic patient's hospitalization: role of ultrasound examination.

VITO CARRIERI, *Department of Geriatrics Hospital "A.Perrino" Brindisi Italy*

The practical teaching of ultrasound in the hospital with a teaching method based on learning with real clinical problems.

VITO CARRIERI, *Department of Geriatrics Hospital "A.Perrino" Brindisi Italy*

Point of Care Ultrasound in General Surgery Residency Training: A Proposal for Milestones in Graduate Medical Education Ultrasound.

SAMANTHA LAHEY, *The Ohio State University Wexner Medical Center*

Home geriatric care and role of ultrasound in improving the effectiveness and efficiency of health services.

VITO CARRIERI, *Department of Geriatrics Hospital "A.Perrino" Brindisi Italy*

SATURDAY

SEPTEMBER 24

4:30 P.M. - 5 P.M.

**POSTER PRESENTATION
SESSION B #34 - 58**

TTU SUB / MATADOR

PB4 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: SAJU JOSEPH

TTU SUB / MATADOR

Recent Results of the Clinical Application of KANET Test.

RAUL MOREIRA NETO, *Ecomoinhos - School of Medical Ultrasound*

Kanet In Brazil: First Experience.

RAUL MOREIRA NETO, *Ecomoinhos - School of Medical Ultrasound*

Ultrasound Evaluation of Successful Rescue Cerclage.

JAMES MAHER, *Texas Tech University Health Sciences Center*

A Novel Ultrasound Transmission Gel Alternative for Resource-Constrained Environments.

JONATHAN MONTI, *Madigan Army Medical Center*

Evaluation of access to adrenaline in different non-operative clinical areas-A Blind Study.

HAIDER ABBAS, *King George's Medical University, Lucknow, India***PB5 POSTER PRESENTATION LED BY PROFESSORS**
MODERATOR: CYNTHIA SMITH

TTU SUB / MATADOR

Just Another "UTI"? A Case of Renal Obstruction Diagnosed by
Point-of-Care Ultrasonography.**SAMUEL SCOMA**, *University of South Carolina*

Detection of Extensive Inferior Vena Cava Filter Thrombus with Bedside Ultrasound.

RIAN SHAH, *Stony Brook University Hospital*Transthoracic echocardiography performed at the patient's bedside by the emergency
physician versus the cardiologist: A concordance study about 44 cases.**MEHDI BEN LASSOUED**, *Military Hospital of Tunis*Assessment of left ventricular ejection fraction by the emergency physician versus the
cardiologist: A concordance study about 52 cases.**MEHDI BEN LASSOUED**, *Military Hospital of Tunis*

4:30 P.M. - 5 P.M.

**POSTER PRESENTATION
SESSION B #34 - 58**

TTU SUB / MATADOR

PB5 POSTER PRESENTATION LED BY PROFESSORS
MODERATOR: CYNTHIA SMITH

TTU SUB / MATADOR

Importance of the left ventricular ejection fraction and of subaortic integral time velocity assessment in the management of hemodynamic shock in emergency patients.

MEHDI BEN LASSOUED, *Military Hospital of Tunis*

Echocardiographic and therapeutic profile of chronic insufficient cardiac patients in acute decompensation treated in emergency department.

MEHDI BEN LASSOUED, *Military Hospital of Tunis*

6 P.M. - 10 P.M.

**TUHSC OPEN HOUSE
& FINAL RECEPTION**
HOSTED BY TEDD L. MITCHELL, President

TEXAS TECH UNIVERSITY
HEALTH SCIENCES CENTER

DINNER

FINAL ROUND OF WORLD CUP

TOURS OF SIMLIFE CENTER



SUNDAY

SEPTEMBER 25

7 A.M. - 8 A.M. **BREAKFAST** OVERTON / PRE-FUNCTION AREA

8 A.M. - 9:30 A.M. **PLENARY SESSION V: CURRENT CHALLENGES & FUTURE IMPLICATIONS** OVERTON / SUNSET A-C
MODERATOR: MICHAEL BLAIVAS

8 A.M. - 8:30 A.M. Ultrasound in Pediatrics
JIM TSUNG, *Icahn School of Medicine at Mount Sinai*

8:30 A.M. - 9 A.M. Ultrasound in Global Healthcare
LUCA NERI, *Niguarda Ca' Granda Hospital*

9 A.M. - 9:30 A.M. Impact of Automation and Artificial Intelligence in Ultrasound
MICHAEL BLAIVAS, *University of South Carolina School of Medicine*

9:30 A.M. - 10 A.M. **AWARD PRESENTATIONS** OVERTON / SUNSET A-C

LEGACY AWARD PRESENTED BY SUSME, *SUSME Leadership*

ANNOUNCEMENT OF 2017 WORLD CONGRESS, *Peter Steinmetz*

10 A.M. - 11:30 A.M. **PLENARY SESSION VI: CURRENT CHALLENGES & FUTURE IMPLICATIONS** OVERTON / SUNSET A-C
MODERATOR: SAMUEL CAMPBELL

10 A.M. - 10:30 A.M. Evidence-Based Medicine for Ultrasound in Medical Education and Point-of-Care Ultrasound
MAHMOUD ELBARBARY, *King Saud Ben Abdulaziz University for Health Sciences, Saudi Arabia*

10:30 A.M. - 11 A.M. Ultrasound in Rural & Underserved Areas
BILLY PHILIPS, *Texas Tech University Health Sciences Center*

11 A.M. - 11:30 A.M. Impact of Ultrasound in Simulation in Medical Education
SHARON DECKER, *Texas Tech University Health Sciences Center*



1. Creating A Vertical Ultrasound Curriculum at EVMS

At Eastern Virginia Medical School (EVMS) a goal has been set to create a vertical Ultrasound curriculum involving all four years of medical students. Various mechanisms and methodologies have become part of this curriculum.

In the M1 year students are exposed to Ultrasound from week one as part of their Anatomy course. This includes less formal scanning labs and more formal lecture/proctored lab scenarios. In the second semester of M1 and M2 years the students are exposed to Ultrasound in a similar manner tied to their current module of study. In the M3 year students share hand-held Ultrasound units in their clerkship rotations and are required to submit certain images per rotation. In the M4 year students gain Ultrasound skills in their elective rotations, which includes an Ultrasound elective. During these rotations students are encouraged to teach and become involved in mentoring the underclass students as a mechanism to improve their own scanning.

Across all four years students are periodically exposed to Ultrasound simulators as a means of enhancing their knowledge of Ultrasound anatomy and techniques as well as presenting a means of reviewing Ultrasound pathology

they might not otherwise be exposed to in labs where they either self scan classmates or standardized patients. Students also started a Sonography Club where cases are presented, anatomy reviewed, and where students can get additional hands-on experience.

EVMS has made an institutional and financial decision that Ultrasound is best for student medical education. Towards that end they have hired a full-time Director of Ultrasound Education with a sonography and teaching background to ensure the technical nuances of Ultrasound are discussed. This allows student discussions on topics such as scanning ergonomics that can impact a practitioners career, but are often not discussed in physician training. It has also enhanced the interaction with standardized patients with increased establishment of clear instructions as well as providing an advocate for patients who are scanned.

At the time the Director was hired, a dedicated scanning lab was created. This will create a 10 – 12 bed scanning area that students will use during scheduled labs as well as on their own time if they want to work on scanning skills further. The longterm goal at EVMS is to see students establish a scan portfolio that they can bring with them to their residency interviews and, if desired, help them document exams required to sit for Ultrasound credentialing examinations.

EVMS has also found instructional and equipment support from their local community college sonography program at Tidewater Community College (TCC). Although few medical schools reach out to local sonography programs, they can be a source of both equipment for newly established programs as well as a source for teaching assistants with a good, solid working knowledge of sonography techniques. An added benefit has been the inter-institutional collaboration that has grown between EVMS and TCC. Examples of benefits include an EVMS physician now serving as medical advisor to the TCC sonography program, an increased awareness of sonographers and their advanced skill set by medical students, as well as the increased sense of confidence the TCC students gain by working with the staff physicians, residents, fellows, and medical students.

The graduating class of 2016 is the first class at EVMS to experience an Ultrasound curriculum across all four years of their education at EVMS. Student comments are overwhelmingly positive with more than 90% of students noting that the exposure to Ultrasound helped them feel and perform well in their residency interviews. This process has not been easy or painless. Ultrasound can have a steep learning curve and not everyone will use it in their practice or have the inherent “knack” to scan proficiently themselves. Ultrasound labs require expensive, up-to-date equipment and space.

The implementation into a curriculum require that faculty adapt and change to embrace new technologies in an already crowded curriculum. Ongoing in-house training is required to encourage clinicians to embrace Ultrasound as well. Students can't use a tool if their clinicians don't support it. Physicians may not feel comfortable with Ultrasound and adapting it into their practice.

At EVMS Ultrasound has been embraced by students and indicates that students want exposure to newer medical technologies as they start their careers.

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TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education

SESSION: A6 » Oral Presentation 1: Ultrasound in Undergraduate Medical Education (1:00 - Friday, 23rd September, TTU SUB / Soapsuds)

2. Building an Ultrasound Education Center: Key Considerations for Success

BACKGROUND: Ultrasound education is being rapidly integrated into medical school curricula nationwide. Approximately half of the medical schools in the United States and Canada report teaching point-of-care ultrasound to their medical students. However, several barriers to integrating ultrasound education into medical school curricula still exist. We describe the establishment of a unique multidisciplinary, interprofessional ultrasound education center at the University of Texas Health Science Center San Antonio (UTHSCSA).

INNOVATION: We will describe the planning, construction, initial implementation, and future growth of our clinical ultrasound center over the past 4 years.

Planning (2012-2013)- An interdepartmental group of experts was convened to conceptualize how to establish a dedicated ultrasound that could benefit the entire institution. The keystone of this planning was to develop an ultrasound educational center with institution-wide ownership. A solidified proposal was presented to the School of Medicine (SOM) Dean's Office to secure financial and political support.

Construction (2013-2014)- The Center for Clinical Ultrasound Education (CCUE) was designed to facilitate and coordinate ultrasound

educational activities for diverse learner groups: medical students, residents, fellows, attending physicians, nurses, and advanced practice providers. Several meetings with our institutional ultrasound experts, construction project manager, and information technology representatives were held to optimize the design. The 1,354 sq. ft. Center has a 182 sq.ft. control room, 187 sq. ft. customized equipment storage closet, and a 985 sq. ft. educational space equipped with seven training stations and one instructor station. Each training station includes a padded table, 42" wall mounted flat screen monitor, and a multi-plug AV panel on the wall. A touch screen panel at the instructor station controls the electronics of the entire educational space. The ceiling has four independently mounted cameras that can pan and zoom to any station bed from different angles. Each station monitor can be split to show any combination of 1-4 images from numerous sources.

Initial Implementation (2014-2016) - Concurrent with the construction of the CCUE, a Longitudinal Medical Student Ultrasound (LMSU) curriculum was developed with SOM Curriculum Committee approval. Currently, the preclinical curriculum includes an introduction to bedside ultrasound equipment and physics, and scanning sessions covering the following anatomic areas: pulmonary, cardiac, renal and bladder, female pelvis and first trimester pregnancy, aorta, inferior vena cava, soft tissues and musculoskeletal. Students are

also offered the opportunity to practice their skills during open scanning sessions within the CCUE. The departments of Emergency Medicine, Internal Medicine, and Obstetrics & Gynecology are also currently using the CCUE for student training during their 3rd year core rotations and/or 4th year elective rotations.

An Ultrasound Advisory Council was established with participating faculty from ten different specialty departments, including Anesthesiology, Cardiology, Critical Care, Emergency Medicine, Medicine, Obstetrics and Gynecology, Pediatrics, Radiology, Surgery, and Urology. The participating faculty members serve as liaisons for development of ultrasound training opportunities in their departments. The Advisory Council oversees the operations and administration of the CCUE. This council fosters interdepartmental communication, cooperation and joint educational endeavors, while streamlining expenditure of educational resources.

The SOM has also established a CCUE Administrative Coordinator position, who's duty is to organize the CCUE calendar, set-up each activity, maintain ultrasound equipment and supplies, manage the Center's budget, and coordinate the activities of the Ultrasound Advisory Council, Ultrasound Interdepartmental Grand Rounds and Ultrasound Student Interest Group.

Future Growth (2016-2017) - Recently, a medical student Clinical Ultrasound Interest

Group and faculty Clinical Ultrasound Research Group were established to promote student and faculty involvement in educational and research activities. We are seeking to establish a seamless ultrasound image archiving system between the CCUE and our main hospital to facilitate longitudinal research, quality improvement and educational projects. Future goals include expanding the use of the CCUE for continuing medical education activities and remote off-site training. This would allow the CCUE to have an impact on a local, national, and international ultrasound education.

CONCLUSIONS: Integration of ultrasound training into medical school curricula is feasible using a multidisciplinary, interdepartmental approach but requires substantial institutional financial and political support.

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TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, New Uses

SESSION: A6 » Oral Presentation 1: Ultrasound in Undergraduate Medical Education (1:00 - Friday, 23rd September, TTU SUB / Soapsuds)

3. Integrated Thyroid Ultrasound Education for Second Year Medical Students

BACKGROUND: Ultrasound is being used in the clinical practice of Endocrinology as a point of care tool for thyroid disorders because of low cost, safety, and real time images. However, there are no published articles describing mandatory, hands on ultrasound-based teaching of normal and pathological thyroid anatomy for medical students as part of an Endocrinology curriculum. The goal of this study is to evaluate the educational impact of an integrated point of care thyroid ultrasound module during the Endocrinology curriculum designed to supplement teaching of anatomy, physiology, and pathophysiology of the thyroid gland.

METHODS: Mandatory thyroid ultrasound sessions were held following thyroid anatomy, physiology and pathophysiology didactics as part of the organ-based Endocrinology curriculum block for second year medical students. Prior to the session, students were given a multiple-choice pre-test to assess baseline knowledge. Sessions consisted of a brief introductory didactic followed by small groups of students performing hands-on ultrasound scanning of normal and pathologic thyroids. Proctors provided real-time technique feedback and facilitated interactive learning

about neck anatomy and pathophysiology. Students were administered a post-test following the hands-on teaching session. The results of this test were compared to individual pre-test scores to assess for effect from the intervention. Students were also asked to complete a course evaluation rating the value of each component of the educational session using a five point Likert scale.

RESULTS: A total of 194 second year medical students attended the thyroid ultrasound session. Of those, 137 students (70.6%) completed both the pretest and the post-test. Students scored significantly higher on the post-test compared to pretest ($t=9.12$, $df=136$, $p<0.001$, Cohen's D effect size=.99). This supports a statistically large effect size with an average gain of 12.9 percentage points from pretest to post-test. The majority of students agreed or strongly agreed that the session was a relevant supplement to their course work (98.9%) and was an effective learning experience (97.3%). In addition, they agreed or strongly agreed that as a result of this experience they had a better understanding of thyroid anatomy (95.1%) and a better understanding of the clinical utility of ultrasound (96.8%). Students thought the most valuable components of the experience were the ability to perform hands-on ultrasound and also the presence of patients with known thyroid pathology.

CONCLUSION: This pilot study showed a positive educational impact of incorporating interactive small group, hands-on thyroid ultrasound sessions as part of the Endocrine medical student curriculum. In addition, students felt that this experience improved their learning of both endocrinology and ultrasonography.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

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4. Internal Medicine Clerkship with Ultrasound: Integrating Cardiac Ultrasound Training into Undergraduate Medical Education

OBJECTIVE: Increased utilization of focused ultrasound among physicians has led to new roles for ultrasonography in undergraduate medical education. Although studies have shown various methods of implementation, there is not agreement on the optimal training method. This project describes a method of educating third year medical students in bedside echocardiography in the clinical setting to improve knowledge and performance of ultrasound.

METHODS: Third year medical students volunteered for participation during internal medicine clerkship. They were provided with ultrasound instruction by faculty through formal didactic sessions and bedside teaching. Each student was provided access to a pocket-sized ultrasound device and asked to perform cardiac ultrasounds on patients. Knowledge of cardiac ultrasound was assessed at the beginning of the clerkship and compared to post-test at completion of clerkship.

RESULTS: A total of 43 third year medical students participated and captured 168 movie clips and images. Of these, 162 (96.4%) were of satisfactory quality and amenable to interpretation, and 116 (69.1%) were of good to excellent quality. The majority of students (35/43, 81.4%) correctly identified left ventricular systolic function as severely depressed, moderately depressed, or normal. Mean pretest score of students was 26.66 (SD 4.79; n=112). Mean post-test score was 28.49 (SD 5.57; n=49) with statistically significant difference compared to pretest (P value <0.05).

CONCLUSION: Pocket-sized ultrasound devices carried on an internal medicine rotation is a feasible method of integrating ultrasound into undergraduate medical education. Students were able to advance their knowledge of echocardiography and understanding pathologic conditions of the heart.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

SESSION: A6 » Oral Presentation 1: Ultrasound in Undergraduate Medical Education (1:00 – Friday, 23rd September, TTU SUB / Soapsuds)

5. Family Medicine Ultrasound (FAMUS): Prevalence in the Academic Family Medicine Office

OBJECTIVE: Bedside ultrasound is being increasingly integrated into clinical practice as an adjunct to the physical examination and patient history. The use of bedside ultrasound by family physicians has been termed FAMUS (family medicine ultrasound). The prevalence of FAMUS in Quebec, Canada is unknown. Here we investigate the prevalence of FAMUS in urban versus rural settings, the profile of physicians who use or do not use bedside ultrasound, and the obstacles for using bedside ultrasound in the academic office setting.

DESIGN: We carried out a cross-sectional survey on bedside ultrasound use in primary care offices associated with the Université de Laval in Quebec, Canada. The web-based anonymous survey consisted of 24 multiple-choice questions and was completed over a period of 3 weeks in 2016. The population studied consisted of 200 family physicians from 12 accredited urban and rural family medicine residency sites. Our data was collected using 'Survey Monkey' and data was entered into an electronic database on the survey website.

RESULTS: A response rate 52% was achieved (103 out of 200 physicians). Of physicians who responded to the survey, 21% use bedside ultrasound in their office practice. Bedside ultrasound using physicians: 1) were mostly urban based (82%) vs rural based (18%), 2) use ultrasound on a weekly basis (55%), 3) use ultrasound as an adjunct to the obstetrical and/or gynecological exam (91%), 4) have a mixture of formal and informal training, 5) document their findings in writing without saving images (96%), and 6) do not have a quality control method established to review their scans (0%). Ultrasound-user and non-user physicians were not different in terms of gender, age (greater or lesser than 40), and emergency room practice. The three most common obstacles to non-users were the cost of the ultrasound machine (70%), the time required to train (63%), and the lack of pertinence in current practice (41%). Whether or not they used bedside ultrasound, over 50% of physicians believe bedside ultrasound should be part of family medicine residency training.

CONCLUSION: These findings suggest that there is a greater use of FAMUS in urban than in rural sites by physicians at the Université de Laval in Quebec, Canada. The low overall prevalence of FAMUS relates to cost and time constraints more than to a perceived lack of pertinence to their practice.

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TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice

SESSION: A6 » Oral Presentation 1: Ultrasound in Undergraduate Medical Education (1:00 - Friday, 23rd September, TTU SUB / Soapsuds)

6. 4th Year Ultrasound Elective at WVU: Methods and Impact

BACKGROUND: As bedside ultrasound use grows across medical specialties, it has become an indispensable tool for aspiring physicians and is increasingly integrated into undergraduate medical education. West Virginia University School of Medicine offers intensive two- and four-week ultrasound electives for 4th year students. A review of available literature showed a handful of Emergency Medicine programs describing their 4th year Ultrasound elective. Some have also evaluated their performance using pre- and post-test results and post-elective surveys. In addition to describing our curriculum, we did a more comprehensive analysis reviewing students' performance, overall experience, and the number and types of scans they completed. Brief demographics of the patients were also evaluated.

METHODS: Students in the PoCUS (Point of Care Ultrasound) elective were required to work 28 hours a week conducting scans with ultrasound experts in the emergency department, log the types of scans, and complete four online lectures, assessment quizzes, pre- and post-rotation tests, and a post-rotation evaluation. They attended a weekly image review conference, a procedural session, and received supplemental materials for self-study. Coursework from July 2011 to

June 2015 was retrospectively analyzed for the following: 1) Pre- and post-test scores; 2) Student post-rotation evaluations; and 3) Scan logs.

RESULTS: Fifty-one students (2-week: 39; 4-week: 12) have participated in our curriculum, with enrollment quadrupling in 2015. A total of 3,033 scans were logged, with students averaging 77 scans (64 patients) in two weeks and 135 in four weeks (116 patients). 47% of the patients were males; only 5% were below the age of 18 years. Ultrasound images were classified as either Echo, Focused Assessment with Sonography for Trauma (FAST), Deep Vein Thrombosis (DVT), Lung, Limited Abdomen, Renal, Right Upper Quadrant (RUQ) or Gallbladder (GB), Transabdominal/Transvaginal/Pelvic, Aorta, Medical Shock or Rapid Ultrasound in Shock and Hypotension (RUSH), Ultrasound-guided Procedure, Ocular, Musculoskeletal (MSK), Soft tissue/Abscess, and Testicular. Echo, FAST, and Renal were the most common scans performed, and Testicular the least. The average pre-test score was 71% and post-test was 97% ($p < 0.05$). Post-rotation surveys revealed that the elective was perceived favorably. All students agreed or strongly agreed that they accomplished the objectives for the rotation, believed they were able to perform ultrasound on a variety of organ systems, gained valuable experience, and were better prepared for residency.

CONCLUSION: Our novel ultrasound elective is well perceived by medical students, effectively teaches PoCUS, and has grown in popularity over the years. Early training and exposure of medical students to PoCUS will help enhance and reinforce important clinical concepts and improve patient care and safety.

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TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Point of Care ultrasound in general clinical practice

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7. Awareness and Use of Clinician-Performed Ultrasound among Clinical Clerkship Faculty

OBJECTIVES: Clinician-performed ultrasound (CPU) is an increasingly widely used tool in many specialties. While some medical schools have started to implement ultrasound training programs in the pre-clinical curriculum, capacity for CPU education during the clinical clerkships is unknown. Due to limited numbers of faculty that are formally trained in CPU, clerkship students may lack opportunities to apply and reinforce CPU skills in a clinical practice environment. This study seeks to assess current practice patterns, comfort with image interpretation, and knowledge of CPU indications among clinical clerkship faculty (CCF) involved in undergraduate medical education.

METHODS: This was a web-based, cross-sectional survey assessing the use and awareness of indications for CPU among CCF from five specialties (Internal Medicine, Surgery, Family Medicine, Emergency Medicine (EM), and Pediatric EM) in a single medical school. The target population were CCF with medical education leadership positions, as identified by the School of Medicine's Curriculum Office. The survey examined CCFs' demographics, comfort using and interpreting CPU, frequency of CPU use, and knowledge of 12 widely accepted CPU indications and 3 "false indications" (diseases not known to benefit from CPU: stroke, urinary tract

infection, and acute otitis media). Knowledge of CPU indications was based on a 4-point Likert scale from 0 ("Never use CPU") to 3 ("Always use CPU") to evaluate the given indications. The 22-item survey was developed by content experts with extensive experience in CPU and ultrasound education and was pilot tested prior to being sent to respondents. Results were analysed using standard statistical methods, including a chi-squared analysis for statistical significance.

RESULTS: Forty-six percent (88/192) of invited CCF responded to the survey. Overall, only 32% of faculty considered themselves to be moderately or very comfortable performing CPU; nearly 50% reported feeling uncomfortable with CPU use. Similarly, nearly three-quarters of the respondents were uncomfortable (46%) or only somewhat comfortable (26%) interpreting CPU images.

Comfort performing CPU varied by medical specialty, with the highest comfort level among EM and the lowest comfort level among Internal Medicine physicians. Comfort performing CPU was significantly higher in EM and Pediatric EM physicians ($p=.0002$). Knowledge of CPU indications was also higher among EM and Pediatric EM physicians, with a statistically significant difference for 8 of 12 CPU indications. Awareness of when to use CPU for true indications ranged from an average high of 2.14 (often to always) for diagnosing cardiac tamponade and a low of 0.25 (never to sometimes) for diagnosing elevated

intracranial pressure, based on a 4-point Likert scale. The respondents appropriately avoided CPU for the "false indications", including stroke (0.21), urinary tract infection (0.24), and acute otitis media (0.07).

Both comfort level and knowledge of CPU indications decreased with increasing years since residency. More recent graduates (0-15 years since residency) were significantly more comfortable using CPU than the more senior respondents (15+ years since residency) ($p=.0029$).

CONCLUSION: Half of CCF in educational leadership positions are uncomfortable performing and interpreting clinician-performed ultrasound. CPU comfort and awareness decreases with increasing years since residency and is higher in EM and Pediatric EM physicians. Many time-sensitive conditions with widely recognized utility of CPU (e.g. pulmonary edema, pneumothorax, AAA) were identified as needing CPU only sometimes or rarely by many faculty. These results suggest that educational resources for CPU education may be lacking during the clinical portion of the medical school curriculum.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

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8. Lessons Learned From An End-Of-Year OSCE Assessment Of Freshman Medical Student Skills Following The Inaugural Year Of A Limited Ultrasound Curriculum

INTRODUCTION: Ultrasound education and training is gaining widespread acceptance as a valuable addition to an undergraduate medical curriculum. The University of Arkansas for Medical Sciences just completed the inaugural year of a longitudinal ultrasound curriculum designed for first year medical students. The goal of the ultrasound curriculum was to introduce students to sonographic imaging, reinforce important anatomical relationships, view dynamic physiologic responses, and begin to develop sonographic skills. The curriculum also provided additional opportunities for enhancing standardized patient (SP)

interaction skills. The students utilized hand held GE Vscan dual probe devices to initially scan themselves and then SPs during five separate faculty guided one-hour sessions scheduled throughout the year (5 students/device/SP). An end-of-the-year pass/fail ultrasound objective structured clinical exam (OSCE) was introduced in order to assess student learning and evaluate program effectiveness.

METHODS: Students were asked to prepare for a single station OSCE that would include one of four potential scanning targets: 1) parasternal long axis view of the heart; 2) thyroid gland and carotid sheath contents; 3) right kidney/liver relationship; or 4) popliteal fossa contents. Students were provided 24-hour on campus access to two dual probe devices and offered an optional OSCE review session held in our active learning center during which they could scan multiple SPs for each potential target. Written instructions outlined performance expectations including: greeting the patient, describing the procedure, positioning and draping the patient, properly holding the probe, obtaining and saving an appropriate scan and identification of a list of structures for each scanning target. A silent evaluator in the room during the OSCE used a 10-item grading rubric to evaluate student performance (1 point given for complete/accurate performance, a half point given for incomplete/suboptimal performance and no points given for a failed/missed step).

Anonymous student evaluations included a 14 question pre-OSCE paper survey and an online end-of-year ultrasound curriculum survey.

RESULTS: Although some students took advantage of the ultrasound devices on reserve, more than half of the class attended the optional OSCE review session. The pre-OSCE survey indicated that students generally felt prepared for the OSCE (4.13; LIKERT; n=134/172 students) and were glad it was only pass/fail (4.56). Students felt best prepared to obtain a scan of the popliteal fossa (4.40) and thyroid gland and carotid sheath contents (actual OSCE target) (4.31) versus the heart (4.09) or kidney/liver (3.96) targets. All students finished the OSCE within the required 5-minute time limit with 76% finishing before the one-minute warning. The average score on the OSCE was 90.2 ± 0.6 (mean \pm SEM; n=172) with 40% of the students scoring 100% and only two students falling below 70%. Evaluators indicated that less than 15% of the students appeared tentative or nervous. Evaluators had difficulty confirming students actually saved an image as required and post-OSCE inspection of the devices indicated that 18% of them failed to do so. A quarter of the class held the probe incorrectly, 20% were unable to obtain a proper scan of the thyroid and carotid sheath contents, and nearly 30% failed to correctly identify all five required structures. An analysis of student performance revealed that the inclusion of non-ultrasound related patient interaction items in the OSCE

grading rubric helped a significant portion (~20%) of students pass the OSCE. Preliminary responses from an ongoing end-of-the-year survey indicate students enjoyed the ultrasound OSCE (3.74) and thought it was a good learning experience (4.24).

CONCLUSION: Our results confirm that the use of an end-of-year OSCE is a viable option following a limited exposure ultrasound curriculum. Students viewed the pass/fail examination positively. Performance on the OSCE highlighted deficiencies in the level of student skills that will form the basis for curricular redesign and future educational targets for the evolving inaugural M2 curriculum. An end-of-year OSCE will be included next years curriculum for both the M1 and M2 students.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

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9. Videocast Lesson Is Equally Effective As Traditional Classroom Lecture In Teaching Point-Of-Care Ultrasonography To Novice Medical Students

INTRODUCTION: In a crowded medical curriculum, the training of medical students in new skills through classroom-based teaching has inherent time constraints.

AIM: In this study, we aim to evaluate whether videocast lesson for teaching point-of-care ultrasonography (POCUS) result in similar knowledge improvement compared with the traditional classroom lecture.

METHODS: Undergraduate medical students of the second and third periods of our curriculum (total of 12 periods), without previous knowledge in ultrasonography and anatomy of the topics covered in the course were randomly assigned to 3 groups. All groups attended a 120-minutes hands-on bedside ultrasound training sessions. In first group, students attended a 30-minute classroom lectures (CRL) and a second group watched video prerecorded lectures (VRL). Finally, a third group of students only attended the hands-on sessions (HS). The topics ultrasound physics and knobology, ultrasonography of

the lung, aorta, urinary tract and biliar tract were covered by the same instructor (MGB) in the classroom and videocast lectures. All the groups were subjected to a pre- and post-course assessments (each with 25 multiple-choice questions) and post-course objective structures clinical examination (OSCE) of the 4 specified topics.

RESULTS: Seventy students participated in the study. The scores (0 to 100 points) of the pre-test among the three groups did not differ significantly (CRL= 43.7±12.0; VRL= 45.6±10.5; HS= 45.7±10.4; p>0.05). Comparatively to the pre-test scores, the post-test scores were statistical different in the CRL (43.7±12.0 vs. 83.3±8.8; p <0.001) and VRL (45.6±10.5 vs. 82.2± 7.9) groups, but not in the HS (45.7±10.4 vs. 68.8±9.2; p>0.05) group. Additionally, the post-test scores of the CRL (83.3±8) and VRL (82.2± 7.9) groups were significantly different compared to the HS group (68.8±9.2) (p<0.05). The OSCE scores for the 4 specific topics were similar between the CRL and VRL groups and inferior in the topics lung and urinary tract in the HS group.

CONCLUSION: Our data suggest that video cast lessons are equally effective to traditional classroom lectures in teaching of POCUS and that both methodologies are superior to only hands-on training, with the benefits of being time saving and having greater flexibility for the novice medical students.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

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10. Assessment of Bedside Ultrasound Skills in Novice Internal Medicine Resident Learners: Importance of Removing Potential for Bias from Framing Effect

INTRODUCTION: The use of bedside ultrasound is becoming increasingly frequent amongst providers across specialties (1-4), including internal medicine (IM) (5-9) where some authors have referred to bedside ultrasound as “the stethoscope of the 21st century” (10). The skills required for appropriate use are now being taught at many IM programs globally, however a universal approach to assessing skills is not yet established. The two main components of bedside ultrasound are image acquisition and image interpretation. We aim to assess the effect of framing effect bias in image acquisition and interpretation of novice ultrasound learners, with hopes to determine how much clinical information impacts accurate assessment of image interpretation skill, and to a more limited extent, acquisition. We hope that this information will be useful in the creation of accurate ultrasound competency assessment in learners.

METHODS: Thirty internal medicine resident interns underwent a 1.5 day ultrasound training course at our urban, academic center residency program. Interns were taught basic ultrasound skills including vascular, cardiac, pulmonary

and abdominal exams using both simulation equipment and patient models. These interns were then given a 12-question test using SonoSim® Ultrasound Training equipment, which includes acquiring images on a simulated computer model. After acquiring images interns had recorded their interpretation by answering a short answer question. Half of questions were paired with relevant clinical data, and half were paired with no clinical data at all. One question with clinical data included discordant data, the rest contained concordant data for the demonstrated ultrasound finding. Comparison of performance between questions with clinical data and those without were analyzed. Separate analysis was performed to evaluate affect of discordant data on performance. Statistical analysis was performed using STATA.

RESULTS: A total of 30 internal medicine interns participated in the study, and each intern answered all twelve questions. The average number of questions answered correctly in the clinical data group (history) was 3.6 vs. 1.9 in the group without clinical data (image only): a statistically significant mean difference of 1.7 questions ($p < 0.01$). When questions were analyzed by group, 58.7% of questions in the history group were answered correctly vs. 30.7 in the image only group with a mean difference of 28% ($p = 0.09$). A single question with clinical data was considered discordant. When this question was included in analysis for the image only group, mean difference

between correctly answered questions in the history vs image only group was 41.7% ($p < 0.01$). The lowest proportion of correctly answered questions in the entire group was that with discordant data, of which only 7% of participants answered correctly.

DISCUSSION: Our study suggests that novice ultrasound learners are more likely to correctly interpret ultrasound images when evaluated within clinical context. In our case, this is demonstrated by availability of clinical history, with further evidence that without this information, appropriate ultrasound use may be limited. This suggests that accurate assessment of isolated ultrasound interpretation skills may be limited if clinical information is available during evaluation, allowing participants to compensate for lack of skill via clinical reasoning. Although knowledge of clinical information has utility in a practice setting, true assessment of raw ultrasound skills may require absence of clinical data.

We also demonstrate the susceptibility of novice learners to framing effect, as is represented by highest frequency of error in the discordant data question. Studies suggest that knowledgeable people are less susceptible to bias (in this study, basic anchoring effects)(11), which speaks to importance of continuous training to improve objectivity of image interpretation and removal of bias. Although problem based learning is paramount in medical education, when learning a skill and

assessing competency in this skill, limiting bias provides most accurate information. Once providers are sufficiently skilled at raw image interpretation, these skills should then be considered appropriate for bedside use. We can not extrapolate if the aforementioned is true for more experienced users, thereby future studies should explore these effects on providers with more training in ultrasound, with hopes that bias is less frequent in these cases.

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 - Friday, 23rd September, TTU SUB/ Arroyo)

11. The Addition of an Ultrasound Simulator to Improve Image Interpretation

STUDY OBJECTIVES: There have been multiple new high-fidelity ultrasound simulators that have been developed in recent years. Previous studies have shown simulators to be beneficial for teaching procedures and for sensitive studies such as transvaginal exams or transesophageal echocardiography. Our aim was to test if the addition of an ultrasound simulator to an Emergency Medicine (EM) Ultrasound rotation improved trainees' image interpretation.

METHODS: First and 2nd year EM residents, 1st year Pediatric Emergency Medicine (PEM) Fellows, and 4th year medical students were recruited during their two week ultrasound rotation at a large academic institution with over 125,000 visits per year. Only the second year residents had any previous ultrasound experience. Participants were assigned randomly into control and study groups based on the month of their rotation. Prior to the start and upon completion of the rotation, participants completed a 35 question exam. The exam consisted of multiple choice questions, case scenario and video clips on identification of different views and image interpretation. The study group was asked to use the SonoSim ultrasound simulator during the first week of their ultrasound rotation and required to complete at least 15 pre-designated cases which included pericardial tamponade, free

fluid and various other pathologies determined beneficial for an EM physician to know. They could complete more cases if they chose to do so. The study group scanned on patients in the Emergency Department during the remainder of their rotation. The control group only scanned on patients in the Emergency Department during the two week rotation. Both groups participated in weekly image review during their rotation, where all point-of-care ultrasounds performed within the Emergency Department during that week were reviewed with ultrasound faculty.

RESULTS: Twenty-two participants were enrolled in the study, 14 in the study group and 8 in the control group. Three participants in the control group were excluded because they did not complete the post-test. In the study group there were six 1st year EM residents, six 2nd year EM residents, one 4th year student, and one PEM fellow. The control group had two 1st year EM residents and three 2nd year EM residents. The mean score was 27.2 (± 0.8) for the control and 24.6 (± 3.5) for the study group, p-value 0.14. On the post test, all participants improved their scores with an overall mean of 31.4 (± 1.7) and 28.7 (± 2.3) in the control and study group, respectively, p-value 0.036. However, the mean change between the pre and post-test was 4.2 (± 1.3) in the control and 4.1 (± 2.6) in the study group, which was not significant, p-value 1.0. An implementation of the Fisher-Pitman permutation test (a distribution-free alternative to the t-test) was also used because the control group was small ($n = 5$) and we could not assume

the scores were normally distributed. The control group scored higher, on average, on both the pre-test and the post-test, although only the post-test difference was significant at a 0.05 level. The mean score change from pre to post was essentially the same in both groups.

CONCLUSION: The addition of an ultrasound simulator did not improve image interpretation during an EM Ultrasound rotation. However, given both groups had equal improvement on their test scores, there may be some benefit in specific learners. This study took place a large academic tertiary care hospital with a very high volume of patients with a wide variety of pathology for the resident to ultrasound. The participants in the study where therefore able to see many different types of pathology during their rotation and using a simulator to supply additional cases did not improve their test scores further. The addition of an ultrasound simulator to aid in training at smaller institutions, or for use with medical students lacking access to ample pathology, may be of more benefit than at large centers for ultrasound image interpretation training.

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TOPIC AREA: Use of ultrasound in Graduate Medical and Continuing Education

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 - Friday, 23rd September, TTU SUB/ Arroyo)

12. Canadian National Survey on Point-of-Care Ultrasound Training in Family Medicine Residency Programs

CONTEXT: Point-of-care ultrasound (POCUS) use by family physicians in the office setting has been shown to be accurate and cost effective. In the United States there is now a clear trend towards incorporating POCUS training into postgraduate family medicine residency. Despite this, little is known about the extent of POCUS training in postgraduate family medicine programs in Canada.

OBJECTIVE: In our study we aim to assess the current state of POCUS training in Canadian family medicine residency programs. We also hope to determine the opinions of current leaders in family medicine education (program directors) on the future of POCUS and its relevance in the context of family medicine.

DESIGN: We carried out a cross-sectional survey evaluation of ultrasound education in accredited Canadian family medicine residency programs. The web-based anonymous survey consisted of 27 multiple-choice questions and was completed during the months of March and April 2016.

PARTICIPANTS: The population studied includes the 17 accredited Canadian Family Medicine residency programs represented

by their program director or their proxy. Only one completed survey was accepted per residency program.

INTERVENTION: Our data was collected using “FluidSurveys” and data were entered into an electronic database using Microsoft Excel. Using aggregated data, gap analysis and descriptive statistic were reported.

RESULTS: We received responses from 14 of the 17 program directors for a response rate of 82.3%. 21.4% of respondents reported an established ultrasound curriculum and 35.7% are in the process of establishing or are considering establishing ultrasound training to their core curriculum. 92.9% believed that POCUS teaching should be integrated into family medicine residency. A majority, 57.1% do not consider themselves familiar with the literature on POCUS. Barriers to establish training included: lack of adequate equipment (57.1%), lack of instructors (57.1%), lack of available time in the curriculum (57.1%), and lack of funding available to support training (71.4%). A majority (71.4%) of respondents believe that POCUS can be used in outpatient family medicine to alter clinical decision-making. Some potential benefits associated with POCUS use in primary care include: more rapid diagnosis (85.7%), useful adjunct to physical exam (85.7%), improved patient outcomes (71.4%) and potential to reduce health care cost (71.4%).

CONCLUSIONS: Although few Canadian family medicine residency programs reported an established ultrasound curriculum, the majority of program directors believe that POCUS training should be offered to trainees and that ultrasound use can positively impact primary care practice. A growing number of residency programs are considering incorporating ultrasound training, but resource availability remains a major barrier to implementation.

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TOPIC AREA: Use of ultrasound in Graduate Medical and Continuing Education

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 – Friday, 23rd September, TTU SUB/ Arroyo)

13. Distance Education In Medical Ultrasound In Brazil

OBJECTIVE: This study aimed to assess whether Brazilian doctors demonstrate an interest in participating in ultrasound (US) distance courses. **Methods.** Focused directly on the theoretical part of the course, and estimating that the doctor already has prior knowledge of operating the machine, a closed questionnaire of 22 multiple choice questions was sent to Brazilian physicians by Internet. **Results.** It was found that, among doctors who perform ultrasonography, 98.5% would like to do a training course, either in person or remotely, with 15.1% preferring distance courses. When the question was solely on performing ultrasound distance courses, 79.5% of respondents would like to complete a course administered in this manner.

CONCLUSIONS: This research demonstrated that there is great interest in medical ultrasonographic courses conducted remotely. This method could allow a more appropriate distribution of the schools in this area across the country, facilitating access to knowledge and professional development of physicians residing in remote areas.

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education. Point of Care ultrasound in general clinical practice, Technology

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 – Friday, 23rd September, TTU SUB/ Arroyo)

14. What Learners Want: Qualitative Analysis Of Learner Interviews In Developing A Longitudinal Point-Of-Care Ultrasound Curriculum For Internal Medicine Faculty

BACKGROUND: Point-of-care ultrasound (POCUS) refers to the use of portable ultrasound technology to make diagnostic and therapeutic decisions in real-time at the patient's bedside. In recent years, the use of POCUS by hospitalist and primary care physicians has increased greatly. POCUS training is also expanding in medical schools and internal medicine residency programs. Numerous studies have attempted to determine if brief POCUS training sessions result in improved skills, with mixed results. These training programs are typically one-time events with limited follow-up support. There is relatively little data examining the feasibility, structure, and educational outcomes of longitudinal POCUS curricula. In developing a POCUS training program for general internal medicine clinician-educators, we conducted qualitative interviews with participants with responses being used to inform curricular design and maximize participant engagement.

METHODS: We conducted semi-structured, key-informant interviews with the participants (n=10) of a POCUS curriculum at a large Midwestern academic institution. Participants included volunteer general internal medicine faculty and chief residents who regularly work with residents and students. Interviewees discussed their perceptions regarding various aspects of POCUS training, including facilitators/barriers, clinical applications, and impact on their teaching. Interviews were recorded, transcribed verbatim, and coded for themes. Thematic analysis was conducted to look for similarities between provider perceptions and was used to code, organize, and describe patterns and concepts in the data. The constant comparison method was used to organize themes into categories using inductive category coding to concurrent comparison of relationships as they appear throughout the analysis.

RESULTS: Demographics: The interview response rate was 100% (10/10), with 40% females (4/10). The median interval since participants completed medical school was 5.5 years (range 3–16). Nine of ten participants had no prior POCUS training.

THEMES: Faculty participants were motivated to learn POCUS to improve their clinical and teaching skills. Most felt that a workshop was a good method to introduce key concepts, but that longitudinal support was necessary to achieve competence. Interviewees felt that practicing in peer groups and structured image

review sessions would be the most helpful curricular components. Time limitations was the biggest perceived barrier to learning and teaching POCUS. Participants also expressed concerns about becoming confident enough to apply these skills to real-world patients and to teach others. Perceived facilitating factors included the development of multi-faceted and comprehensive longitudinal training, accountability to peers, and the ongoing support of instructors and administrative leaders.

DISCUSSION: Our study identified learner perceptions that will help inform the development of a POCUS faculty development program. Many training programs rely on one-time workshops, but our data suggests that novice learners feel ongoing longitudinal support is necessary if they are to develop competence. Interviewees felt peer mentoring groups would be particularly helpful, as a means to create accountability and avoid practice attrition and skills decay. They also supported the creation of regular didactic and image review sessions. Unsurprisingly, time limitations was the biggest perceived barrier, suggesting that curriculum designers need to consider ways to optimize training efficiency (e.g. reliable access to machines), allow for flexibility in the training schedule (e.g. online didactic content, real-time supervision at the bedside), and garner support from administrative leadership to support dedicated time for learning and teaching this skill set. As the demand for POCUS training for students, residents, hospitalists, and primary care

physicians continues to grow, this information can help guide curriculum development in other programs and institutions.

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 - Friday, 23rd September, TTU SUB/ Arroyo)



15. Emergency Physicians as Interdisciplinary Educators in Point of Care Ultrasound for Paracentesis

BACKGROUND: There are increasing numbers of hospital-based point of care US divisions led by emergency medicine physicians. Cross specialty training and education are intrinsic to the existence of such interdisciplinary models. Limited data exists regarding the ability of emergency physicians to serve as educators to other physician specialists in the use of bedside US.

OBJECTIVES: To determine the efficacy of emergency medicine physicians in training internists on the use of point of care US for paracentesis.

METHODS: A before and after survey was conducted at a tertiary hospital. Internal medicine faculty and residents who voluntarily attended a training session on bedside US were asked to participate. Three emergency physicians experienced in point of care US led the session, which consisted of didactics and hands on scanning focused on sonoanatomy relevant to a paracentesis. Participants completed surveys before and after the training session. The surveys assessed previous US exposure and also utilized a five-point Likert scale to evaluate participants' self-perceptions of their ability to perform a paracentesis with bedside US.

RESULTS: All internal medicine faculty (n=12) and residents (n=19) who attended the training session completed both surveys. Eleven participants had previously utilized bedside US for paracentesis, and 24 participants had prior exposure to US through other procedures. Paired sample t-tests revealed that following the training session, participants were significantly more confident in their ability to identify intraperitoneal free fluid, relevant intra-abdominal organs, and overlying vasculature ($p < 0.001$). Participants also reported overall greater comfort in utilizing US for a paracentesis and in performing the procedure under real time guidance ($p < 0.001$). Twenty-eight of the 31 subjects felt the training session was useful and increased the likelihood that they would utilize bedside US for identification of ascites in the future.

CONCLUSION: Emergency medicine physicians are capable of training other physician specialists in point of care US for paracentesis.

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 – Friday, 23rd September, TTU SUB/ Arroyo)

16. The Effect Of Ultrasound Findings On The Risk Of Aneuploidy With A Positive Cell Free Dna Screen

The American College of Obstetricians and Gynecologists recommends that genetic counseling and aneuploidy screening be offered to all pregnant women regardless of their age, preferably at their first prenatal visit. The most recent addition to the screening armamentarium is cell free DNA (cfDNA) screening through Next Generation Sequencing (NGS). While there is controversy on whether or not to use cfDNA screening in a low risk population, the arguments for its use include that it is noninvasive, has a superior sensitivity and specificity compared to conventional screening, and can be performed earlier in pregnancy than the prior screening options.

The false positive rate for the NGS is significantly less than one percent. The occurrence of a positive screen in a women who was believed to be at low risk required additional evaluation. When patients with a positive screen are referred for consultation, they are offered targeted ultrasound evaluation and invasive testing for confirmation of diagnosis.

We describe an IRB exempt retrospective review of data from unexpected positive noninvasive prenatal screens (NIPS) and a normal targeted scan, and we compare the karyotype information from this cohort with a high risk cohort where the NIPS was prompted by an abnormal ultrasound finding.

RESULTS: There were 48 NIPS performed for anomaly detected on ultrasound. These patients declined an initial offer of invasive testing. There were 14 abnormal NIPS results in this cohort. All cases had a confirmed abnormal on karyotype by either subsequent amniocentesis, neonatal blood, or placental karyotype evaluation. There was a 29% risk of aneuploidy in the cohort of infants with an anomaly. There was 100% concordance between the NIPS results and the karyotype information and no false negative screens in this group. There were 105 NIPS where the ultrasound failed to demonstrate any anomalies. Indications for screening included age, historical risk factors, soft markers for aneuploidy on ultrasound, maternal anxiety, or positive serum analyte screen. None of these patients had a positive NIPS and no post-natal abnormalities were reported. No post-natal karyotype was performed. A third group of patients (N=7) had NIPS by referring providers and were sent for consultation after the NIPS was reported as positive. (Monosomy X in 3 cases, one case each of partial Monosomy 13, 47 XXY, 47 XXX, and 48 XXY+13). In all 7 cases, the ultrasound was negative for anomalies. Of the

7 cases, all have either an amniocentesis which confirmed a normal karyotype or post-natal karyotype reported as normal. Using Fishers exact test, the probability of an abnormal karyotype following a positive NIPT was lower if the ultrasound fails to demonstrate any anomalies. ($P=0.0035$). Phi coefficient for association = 0.39. ($p=.0001$)

CONCLUSIONS: NIPS is a powerful new screening tool for common aneuploidies. The sensitivity and specificity are fixed test characteristics. The positive predictive value of the test is predicated upon the prevalence of the disease in the population being tested.

The widespread adoption of the NIPS in lower risk populations has presented a clinical challenge in counseling patients with an unexpected positive result. While best practice clearly dictate invasive testing for confirmation of the NIPS results, our findings suggest that a normal ultrasound after a positive NIPS is associated with a significantly reduced prevalence of aneuploidy and this information may be of some comfort to those women who are not prepared to proceed with invasive testing.

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Patient Safety, New Uses

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 - Friday, 23rd September, TTU SUB/ Arroyo)

17. Preparing Family Medicine Faculty for POCUS Training ultrasound curriculum

Even though there are still doubts on whether Point-of-Care Ultrasound (POCUS) will eventually replace the stethoscope completely in the future, evidence is mounting that POCUS is as a disruptive technology, facilitation prompt and accurate diagnosis as well as improving procedural outcomes in all major medical specialties. POCUS has an especially broad array of applications in Family Medicine that include obstetric care, musculoskeletal assessment, critical care, vascular access, pain management, soft tissue infection and mass detection, etc. It is a versatile tool that can expand our capability to detect disease processes beyond the reach of our five senses and the stethoscope.

This presentation shares our experience with the participants on our POCUS journey, and focus on faculty engagement and development for a POCUS program in an academic Family Medicine Department. We will discuss the needs assessment, strategies to enhance faculty engagement, and secure ongoing faculty support as well as our past challenges and present difficulties. The use of POCUS in Family Medicine is just at its infant stage. Medical ultrasonography is less than seventy years old and POCUS is even much younger. Several non-radiology specialties like Obstetrics/

Gynecology, cardiology, surgery, emergency medicine and critical care have taken the lead on this field but Family Medicine has been lagging behind. A 2015 national survey of Family Medicine Residency Program Directors by Dr. Hall and his colleague in 2015 shows only 2.2% of respondents reported an established POCUS curriculum; about nearly 40% indicated no plans for POCUS.

Several obstacles may hinder the POCUS utilization in the Family Medicine setting. These include point of care access to ultrasound machine, reimbursement issue, time availability as well as faculty who lack appropriate training and fear of making errors as they attempt to master this new skill. The shortage of appropriately trained faculty is the major barrier to bringing POCUS programs to Family Medicine residency programs. In this presentation we will share our experiences in mobilizing and engaging Family Medicine faculty to bring a POCUS program to a Family Medicine residency. This presentation will bring educators together who are interested in POCUS in primary care to discuss our roles in ongoing POCUS development.

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 – Friday, 23rd September, TTU SUB/ Arroyo)

18. Survey Of Participants And Near Peer Instructors In An Integrated Bedside Ultrasound Course For Family Medicine Residency Program

INTRODUCTION: Bedside ultrasound has undergone rapid expansion of its application in the last decade. Many have recognized its value in family medicine practice, leading to the integration of ultrasound training in some family medicine post-graduate programs. Due to its relative novelty in primary care, there are limited faculty available or qualified to teach this skill. Near-peer-assisted learning is a teaching strategy in which a fellow trainee more experienced in the subject matter acts as an instructor to their peers. The use of near peer teaching in medical education has been studied and shown to be effective for both a student learner's as well as near peer instructor's acquisition of knowledge in an anatomy course. However, the role of near peer-assisted learning in postgraduate bedside ultrasound education has not been studied.

DESIGN & METHODOLOGY: We carried out a cross-sectional survey comparing resident learner's perceptions on near-peer versus faculty instructors in a bedside ultrasound course in the family medicine postgraduate program of McGill University. Near peer instructors were either residents themselves (11/12), or senior medical students (1/12) with bedside ultrasound experience. One questionnaire was distributed to resident learners, and a different questionnaire for near-peer instructors. The questionnaires mirror each other in their content and are designed to evaluate perceptions on near peer-teaching regards to: 1) knowledge, 2) preparedness, 3) teaching skills, and 4) rapport with learners. Questionnaires were distributed as web-based survey via internal mail list and by paper surveys at the end of the course. Participation for both forms of the survey is anonymous and voluntary.

STUDY POPULATION: The study population were McGill Family Medicine residents who attended the whole-day core teaching in bedside ultrasound (n:146), as well as residents participating as peer-instructors for the course (n:12). Practicing physicians were excluded from this study. Residents who did not attend the course were also excluded from the study.

DATA ANALYSIS: Our data was collected using SurveyMonkey and from written surveys. Data were entered into an electronic database using Microsoft Excel. Likert scale answers were

assigned numerical value and were compared using t-test, p value of less than 0.05 was considered statistically significant.

RESULTS: As of now, 100% of near peer-instructors and 54.8% near peer-learners responded to our survey. The majority of instructors (82%) reported that near-peer teaching as "favourable" or "very favourable". Instructors felt that their role as near-peer teachers lead to significant improvement in knowledge (percent change pre- and post-teaching:15.4, $p < 0.05$) and teaching ability (percent change pre-post teaching:13.2, $p < 0.05$). The survey revealed that 93% of learners found the near-peer experience to be overall "good" or "very good". Learners felt that compared to faculty instructors, near peer instructors were equal in their ability to establish good rapport with learners and make learners feel comfortable to ask questions. Frequent comments highlights that near-peer teachers were "less intimidating" and "made me feel that the material was accessible" and "they remember what it was like to be uncomfortable with ultrasound". Although near-peers instructors are rated to have "good" or "very good" knowledge (94%) and teaching skills (89%), faculty instructors were perceived to have superior knowledge (percent difference:10.7%, $p < 0.05$), teaching skills (percent difference:5.7%, $p < 0.05$), and ability to stimulate interest (percent difference near-peer vs faculty 5.4%, $p < 0.05$).

Common explanations for these findings in the comments section were that near peer instructors had less clinical experience, less specific clinical anecdotes and were less able to answer to more advanced questions.

CONCLUSIONS: Near-peer instructors were valued in their ability to develop rapport with learners and made learners feel comfortable to ask questions. However, they were less able than faculty instructors in their knowledge of the subject matter, teaching skills and ability to stimulate interest. Knowledge and teaching skills are the two areas in which near-peer instructors perceived significant improvement through their teaching experience. In conclusion, we believe that near-peer assisted learning can benefit both near-peer instructors and learners in context of post-graduate medical education ultrasound training.

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice

SESSION: A7 » Oral Presentation 2: Ultrasound in Graduate and Continuing Medical Education and Technology (1:00 - Friday, 23rd September, TTU SUB/ Arroyo)

19. Training Pre-Hospital First Responders On Point Of Care Ultrasound To Improve Trauma Outcomes In Rural Settings: A Pilot Study

INTRODUCTION: Traditionally, trauma in rural settings has worse outcomes for patients and a much higher cost of care. While there are many factors that have been identified for this, access to care and speed of medical decision making has been the hardest to correct. Delays in triage and lack of resources to manage many types of injuries have led to transfers of patients over long distances and multiple changes in management. We sought to train first responders in point of care ultrasound to see if they would find it helpful in evaluating a trauma patient in the field and could be instituted as a technique to reduce triage time.

METHODS: First responders servicing a rural area took a course describing the pathophysiology and associated ultrasound findings of tension pneumothorax, cardiac tamponade, and hypovolemia. Following the didactic session, the participants were given hands on training on models with normal anatomy. Examples of abnormal finding were also provided to educate the students. A post-course survey was then done to assess interest, comfort, and knowledge of ultrasound in the trauma setting. 20 first responders participated in the curriculum. 8 participants were EMTs and

all 20 were firefighters. The curriculum was run by medical students and overseen by a surgeon versed in ultrasound. Total time of training was 2 hours with ½ hour of didactic and the remaining used for hands on training. Post curriculum surveys were scored on a 5 point Likert scale and comments were clustered into categories.

RESULTS: All 20 participants had minimal experience with ultrasound. None had used point of care ultrasound previously.

Post training 90% became comfortable with ultrasound and felt it would be a useful tool in the evaluation of a rural trauma patient. The majority of participants felt it would be useful in saving lives at the scene. 2 participants had difficulty with the ultrasound machine itself including the size of the screen and the image quality. A majority of students wanted more time with the machine to practice further. All participants were interested in further training in ultrasound including FAST exams, fracture evaluation, and line placement.

CONCLUSIONS: In our pilot study 90% of first responders improved their understanding of point of care ultrasound. The majority of participants agree that application in a rural trauma setting will improve outcomes and reduce triage time for trauma victims.

We believe that in large rural areas first responders should be trained in point of care

ultrasound and ultrasound should be employed in the evaluation of the trauma victim. With expanding use, image interpretation can be done by the trauma surgeon at regional centers with direct communication to the field. Our ultimate goal will be to train first responders on the use of point of care ultrasound and connect image capture to the regional trauma service so immediate triage can begin in the field. Will connectivity of vitals and ultrasound to the regional center we believe that significant reduction of triage time and appropriate field transfer can be achieved. This will ultimately reduce mortality and morbidity for trauma victims in rural settings.

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TOPIC AREAS: Point of Care ultrasound in health care delivery to underserved populations, Point of Care ultrasound in general clinical practice, Patient Safety

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 – Friday, 23rd September, TTU SUB/ Caprock)

20. Expanding Interprofessional Education Between Healthcare Professionals and First Responders Using Disruptive Technology

INTRODUCTION: Interprofessional education has been shown to positively impact collaborative learning amongst healthcare professionals. However, studies have not been conducted to analyze whether interprofessional education can translate to positive learning outcomes between healthcare professionals and other members involved in the care of patients. First responders represent a large group of individuals that vary greatly in terms of levels of education and medical knowledge. In most of the United States, EMS, firefighters, and police officers, represent the most common first responders in trauma situations. In many developing countries and rural parts of the US, access to trauma sites by first responders is limited due to distance from the scene and distance to medical professionals. We sought to analyze whether collaborative training in ultrasound techniques amongst healthcare professionals and pre-hospital first responders would result in mutual improvement in learning quality and may help overcome the delays in triage due to distance from medical professionals.

METHODS: Pre-hospital first responders, such as EMTs and firefighters, were recruited along with medical and PA students to participate in a collaborative course on Point of Care Ultrasound in the trauma triage. The didactic sessions were run by qualified trauma physicians. Medical and PA students led a hands-on training session on use of hand held ultrasound. The students and first responders collaborated to identify abnormal findings on ultrasound and discussed changes in management. The course covered pathophysiology and ultrasound findings for cardiac tamponade, tension pneumothorax, and assessment of the Internal Jugular vein for vascular volume. Finally, management of abnormal findings were discussed and techniques were taught by the first responders.

A post-course survey was administered to assess the effectiveness of the training and whether improved care would result. Finally, the educational content and IPE format was assessed with interviews and open questions.

RESULTS: 26 participants were involved in this pilot program. 20 were first responders, 6 were students from the PA school and medical school. 95% of first responders found the training helpful and felt it would reduce mortality in trauma patients. 100% of students found the course helpful and felt ultrasound would be useful in trauma triage. 100% of participants found the educational program enjoyable and felt the mixture of students and first responders allowed each a better understanding of each individual's roles in the care of the patient.

CONCLUSIONS: We have shown that Interprofessional Education is effective when first responders are incorporated in the educational curriculum. Furthermore, we have extended the collaborative learning environment outside of the traditional models of medical personnel. We believe ultrasound based training models can be used to improve teamwork between first responders and the trauma physicians while reducing mortality by decreasing the delay in definitive triage; thus, overcoming the issue of distance in rural settings.

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TOPIC AREAS: Point of Care ultrasound in health care delivery to underserved populations, Technology, Patient Safety

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 - Friday, 23rd September, TTU SUB/ Caprock)

21. Comparison Of Ultrasound-Measured Properties Of The Common Carotid Artery To Tobacco Smoke Exposure In A Cohort Of Indonesian Patients

BACKGROUND: With 72% of Indonesia males over 15 years old who smoke, Indonesia has one of the highest incidences of tobacco use in the world. Smoking is the most significant lifestyle factor that contributes to development of stroke, the leading cause of death in Indonesia. The effects of smoking include alteration of arterial stiffness and carotid intima-media thickness (CIMT), measures that reflect vascular health and stroke risk. Exposure to secondhand smoke (SHS) can also induce unfavorable vascular changes in individuals. We attempted to use ultrasound to relate exposure to tobacco smoke, either primary or secondary, with CIMT and measures of common carotid artery (CCA) stiffness. We also aimed to determine whether first-year medical students could be trained to accurately measure these vascular properties in patients.

METHODS: Patients and employees of multiple clinics associated with Dinas Kesehatan, the public health department of the city of Bandung, West Java, Indonesia, were recruited for the study. Demographic information and health history were obtained via questionnaire. Blood pressure and resting heart rate were

measured before and after the scan. Patients were scanned using the NanoMaxx® ultrasound system (Sonosite, Bothell, Washington, USA) attached to a linear 7.5 mHz probe. CIMT was measured using the NanoMaxx's software with the CCA visualized longitudinally in B-mode. The NanoMaxx was then switched into M-mode and 5 rounds of systole and diastole captured. End-systolic and end-diastolic CCA diameter was measured for each round and averaged. The following equations were used to calculate indices of arterial stiffness:

DISTENSIBILITY COEFFICIENT:

$$DC = 2 \times \Delta d / (\Delta p \times d_s)$$

CROSS-SECTIONAL COMPLIANCE:

$$CC = (\Delta d / d_s) / (2 \times \Delta p) \times \pi \times d_s^2$$

B-STIFFNESS: $\beta = [\ln(SBP/DBP) \times d_d] / \Delta d$

YOUNG'S ELASTIC MODULUS:

$$YEM = K \times d_d \times \Delta p / \Delta d$$

WHERE:

SBP = average systolic blood pressure
 DBP = average diastolic blood pressure
 d_d = average diastolic CCA diameter
 d_s = average systolic CCA diameter
 $\Delta d = d_s - d_d$
 $\Delta p = SBP - DBP$
 K = a constant equalling 133.3

Multiple regression was performed to compare tobacco smoke exposure and other cardiovascular risk factors to CIMT and values

of arterial stiffness. Simple linear regression was performed to correlate CIMT with each measure of stiffness described above. A two-sided t-test was performed to compare CIMT and stiffness of patients with history of myocardial infarction (MI) and/or stroke versus patients with no history.

RESULTS: Tobacco smoke exposure exhibited a weakly negative correlation with indices of stiffness and a weakly positive correlation with CIMT in individuals who smoked. Age seemed to contribute the most for the variation between individuals. Exposure to SHS exhibited a weakly positive correlation with both stiffness indices and CIMT. Age and BMI contributed the most for the variation between individuals. In the smoking group, there was a weakly positive correlation between CIMT and distensibility. In the SHS group, there were weakly positive correlations between CIMT and stiffness, as well as CIMT and YEM. Patients with history of acute cardiovascular event had significantly decreased DC relative to patients without history of cardiovascular event. Patients with history of MI/CVA also trended towards having a higher CIMT than individuals without such history, but the comparison did not reach statistical significance.

DISCUSSION: The weak effect of tobacco smoke exposure on our measured CCA properties was unexpected. Associations between smoking and increased CIMT are well-documented in the literature. Previous attempts to compare

smoking and stiffness have not shown strong correlations. Other studies have also found that smoking is actually associated with decreased arterial stiffness, which may explain why smoking is the largest modifiable risk factor for development of abdominal aortic aneurysm (AAA). We did successfully show that individuals with previous stroke or MI exhibited increased carotid stiffness and CIMT, though a larger sample size may have increased the statistical significance of our comparison further.

One possible reason for the decreased correlation coefficient may have been our limited ability to assess cardiovascular risk. We were also unable to account for white coat hypertension, especially since many participants do not encounter foreigners regularly. Anatomic variation also made accurate CIMT and M-mode measurements difficult at times. We also could not account for possible differences in pollution exposure, which may also play a role in physical properties of the CCA. In conclusion, we demonstrated that medical students could successfully perform various ultrasound measurements of the CCA and match previous findings in the literature.

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TOPIC AREAS: Point of Care ultrasound in health care delivery to underserved populations, Point of Care ultrasound in general clinical practice, New Uses

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 - Friday, 23rd September, TTU SUB/ Caprock)

22. Conservative Treatment of a Cesarean Scar Pregnancy Diagnosed and Treated via Transvaginal Ultrasonography

INTRODUCTION: Cesarean scar pregnancy is a form of ectopic implantation of the gestational sac where a pregnancy implants within the scar niche of a previous cesarean delivery. Prevalence is estimated to be between 1 in 1800 to 1 in 2226 pregnancies and rates are increasing due to overall increase in the number of cesarean deliveries. Cesarean scar ectopic pregnancies cause a number of maternal morbidities and can be potentially fatal. Reported complications include placenta accreta/percreta, uterine rupture, hemorrhage and bladder injury. Hemorrhage is often so severe that it requires hysterectomy. Early diagnosis is the key to reducing maternal morbidity and mortality, as well as preservation of uterus for future fertility.

CASE REPORT: Our patient was a 26 year old obese G3P2002 with two prior uncomplicated cesarean deliveries. She presented to the emergency room complaining of vaginal bleeding and nausea for 5 days. Patient was hemodynamically stable and did not demonstrate any abdominal tenderness on exam. Quantitative β -hcg was 102,819 mIU/mL. The initial ultrasound in the emergency

department did not diagnose the abnormal implantation. Our service was consulted because of her vaginal bleeding. Our subsequent transvaginal ultrasound demonstrated a live gestation measuring 7 weeks and 3 days. The pregnancy was noted to be abnormally located in the lower uterine segment with no overlying myometrium between the gestation and the bladder. Additionally there was increased color Doppler flow surrounding the gestation, vascularized lacunae within the placenta, and an outward bulging of anterior uterine contour. Surgical and medical management of this condition were discussed with the patient. Patient desired future fertility at the time of presentation to our facility.

She received methotrexate injection (50 mg) into the gestational sac via transvaginal ultrasound guidance with real-time confirmation of the injection into the placental bed (25mg) and gestational sac (25 mg). Despite the methotrexate therapy, fetal heart activity on ultrasound was seen at 24, 48, and 72 hours post injection which prompted the decision to administer transvaginal ultrasound guided intracardiac injection of potassium chloride on hospital day 3. She was discharged home shortly after this procedure. She returned the following day for quantitative β -hcg which trended down to 78,675 mIU/mL.

Unfortunately the patient did not continue to follow up as requested and relocated to live with family several hours away. She

presented to an outside facility 15 days after initial treatment. At that time she was clinically stable but had complaints of worsening pelvic pain. Quantitative β -hcg at the outside facility was noted to be less than 1000. There was no fetus identifiable on ultrasound. The patient requested hysterectomy for definitive management of her pain symptoms.

The physician who performed the abdominal hysterectomy noted that there was a large clot in the lower-uterine segment at the time of hysterectomy. There was no identifiable fetus and the placental tissue easily peeled off the bladder with no injury and minimal bleeding.

DISCUSSION: The optimal management and the clinical course following conservative management of cesarean scar ectopic pregnancy are limited to a few case series and case reports. Some case series report that it can take up to 9 weeks to clear β -hcg. Resolution of the gestation sac may take 5 months or more. Single local injection with methotrexate is reported to be successful in 73.9% of cases. However, meta-analyses of known case reports and series seem to indicate that patient's with quantitative β -hcg greater than 100,000 mIU/mL are more likely to require surgical management. Although this patient did eventually require surgery for pain control as per maternal request, this case is not a failure of conservative management as her quantitative B-hcg dramatically decreased and the fetus was not identified.

at the time of surgery. Furthermore, the intraoperative management of the placental extraction from the bladder was rendered much less complicated by the pretreatment with Methotrexate and subsequent involution of the trophoblastic tissue.

CONCLUSIONS: This case demonstrates that conservative management is a reasonable option even in a rural setting, for those patients who desire future fertility even when presenting quantitative B-hcg exceeds 100,000 mIU/mL. It does however, highlight the importance of careful patient selection. Conservative management may not be appropriate in patients who are non-compliant or unreliable.

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TOPIC AREAS: Point of Care ultrasound in health care delivery to underserved populations, Point of Care ultrasound in general clinical practice, Patient Safety

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 – Friday, 23rd September, TTU SUB/ Caprock)

23. Point of Care Ultrasound Use by EMS Personnel to Perform the FAST Exam During Trauma Incidents

Billy U. Philips, Jr., PhD, MPH, and the Texas Tech University Health Sciences Center (TTUHSC) F. Marie Hall Institute for Rural and Community Health (FMHIRCH), along with partners Vaughan Lee, PhD, Assistant Dean, TTUHSC School of Medicine, and Gregg Rice, MD, Adjunct Assistant Professor, TTUHSC Department of Medical Education and Staff Diagnostic Radiologist, VA North Texas Health Care System, would like to educate and train Emergency Medical Services (EMS) personnel to use Point of Care Ultrasound (PoCUS) to perform the Focused Assessment with Sonography for Trauma (FAST) exam, and train Emergency Medicine (EM) Directors and Physicians in the receiving facilities on how best to guide the use of this technology in the field.

Response and transport times for major trauma incidents are longer in rural areas compared with urban areas. Acute trauma patients in West Texas, particularly those who are hemodynamically unstable, are at significant increased risk as compared to urban patients. Medical literature has shown that there is a significant increased relative risk of mortality (up to two-times greater) of rural motor vehicle collision (MVC) drivers as compared to non-rural MCV drivers.

In West Texas, the nearest medical facility can be up to 1.5 hours away by ambulance. Frequently, there is only one EMS service available in a 50-to-100-mile radius, which can mean devastating results for those with time-sensitive, life-threatening injury.

Evidence shows that “FAST may be useful in the evaluation of solid-organ injury and in the triage of multiple or mass casualty incidents” (American Institute of Ultrasound in Medicine [AIUM] Practice Parameters, 2014). It is felt that early prehospital detection of free intraperitoneal fluid in the rural field setting with PoCUS could facilitate more confident decisions to use aeromedical transport over ground transport of trauma victims to a more distant Level I or Level II Trauma facility.

In accordance with the AIUM Practice Parameter for the Performance of the FAST exam, Dr. Philips, et al, propose to educate EMS personnel and EM Directors and Physicians participating in the Next Generation 9-1-1 Telemedicine Medical Services Pilot Project conducted by TTUHSC and the Texas Commission on State Emergency Communications. Education and training will be conducted at a partner institution, the University of Texas Health Science Center San Antonio (UTHSCSA) Center for Clinical Ultrasound Education (CCUE) with ultrasound education experts Nilam Soni, MD, and Craig Sisson, MD, RDMS, FACEP.

Training would include lecture, simulated learning, and competency-based hands-on

training. Faculty at the UTHSCSA CCUE would confirm that EMS personnel can successfully use PoCUS for FAST exams and that EM Directors and Physicians feel comfortable directing this activity remotely, sight unseen of the patient, using radio communication and ultrasound images. Follow-up skills checks, refresher courses, and additional learning would take place at the TTUHSC FMHIRCH Frontiers in Telemedicine Simulation Lab in Lubbock, Texas, to ensure continued competence.

With this technology and advanced training, the FAST exam would then be implemented and performed in the rural field setting throughout the Permian Basin in west Texas during severe acute traumatic incidents by paramedics who are guided by EM Physicians.

THE POTENTIAL OPPORTUNITIES ARE:

1. Improve patient care by bringing patient and physician together sooner, providing the right treatment at the right time, and accessing the need of care at the point of injury.
2. Provide better information and improved care communications by allowing data regarding patients to be seen by the physician, bringing about more effective treatment plans and collaborative practice between EMS and treating hospitals.
3. Improve patient outcomes and decrease cost as patients may be directed to a more appropriate treatment facility without screenings in hospital Emergency Departments before being transferred to a higher level of care.

Outcomes will be measured by the successful adoption of PoCUS by EMS personnel utilizing the FAST exam in the field, the ability to generate diagnostic quality sonographic images that can be transmitted quickly to the distant site provider for image interpretation, adoption of the new process by EM Directors and Physicians in Critical Access Hospitals throughout the Permian Basin, and timely medical decision-making for patient disposition.

The rapid diagnosis of the severity of injury and immediate triage to the optimal health care location can potentially reduce costs, decrease treatment time, and improve patient outcomes.

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TOP AREAS: Point of Care ultrasound in health care delivery to underserved populations, Point of Care ultrasound in general clinical practice, Patient Safety

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 - Friday, 23rd September, TTU SUB/ Caprock)

24. Lung Ultrasound in the Evaluation of the Medical and Trauma Patient

Traditional evaluation for medical and trauma patients with shortness of breath or thoracic trauma has involved chest radiography. While ultrasound has been included in the Extended FAST exam, it is still common to find the supine one view chest plain film used instead of an ultrasound evaluation for pneumothorax. Chest plain films have been demonstrated multiple times in the literature to have poor sensitivity for pneumothorax, pulmonary edema and pulmonary edema and yet are still commonly used throughout the hospital. Ultrasound has excellent sensitivity for these entities as well as many others and should be included both in everyday clinical practice and resident training.

We will discuss common protocols for thoracic ultrasound including the Volpicelli and BLUE protocols. Interpretation of lung ultrasound will be described, including defining lung artifacts such as A lines, B lines and Z lines. Finally, using common clinical situations we will discuss the practical use of thoracic ultrasound both in evaluation and treatment of medical and trauma patients both in the hospital and in more austere environments.

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TOPIC AREAS: Point of Care ultrasound in health care delivery to underserved populations, Point of Care ultrasound in general clinical practice, New Uses

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 - Friday, 23rd September, TTU SUB/ Caprock)

25. Novel Water Bath Method for Ultrasound Imaging of Distal Extremities

Water baths can greatly enhance point of care ultrasound imaging of the distal extremity and improve patient care in a number of clinical scenarios (1, 2, 3). Traditional water baths involve placement of the distal extremity into a bath of water, usually a large flat pan, and submerging the ultrasound probe into this water bath in the horizontal plane (4). This improves the transmission of sound waves and subsequently increases image quality. The area of interest must then be positioned directly under the ultrasound probe in the horizontal plane, requiring some manipulation of the patient. This manipulation can be limited due to pain or difficulty moving an area of interest in line with the probe due to normal anatomic restrictions of the joints. Our new method of water bath imaging removes the element of manipulating the patient into the correct position by imaging through the side of a flat walled, column shaped, thin plastic container without submerging the ultrasound probe. This allows for 360 degrees of imaging freedom and as a result much easier image acquisition. Image quality in traditional water baths rely on the steadiness of the operator's hand while holding the probe above the imaging area of interest and also on the patient's steadiness holding in a fixed position. In our method of water bath imaging the probe is

held against the external wall of the water bath; providing superior probe stabilization and more consistent, higher quality images. This method also improves stabilization of the area of interest by allowing the patient to stabilize the distal extremity against the bottom of the water bath column; reducing patient movement and again contributing to the generation of more consistent, higher quality images. Additionally this method requires a small volume of water that is easier to transport than the large, shallow baths typically employed for traditional water bath imaging; making ultrasound water bath imaging more convenient to apply in the busy clinical environment. Essentially this novel method of water bath imaging allows users to achieve the advantages of increased image quality, while correcting for the limitations of traditional water baths by providing superior stabilization of the probe and patient, and greater freedom of imaging in 360 degrees with minimal manipulation of patient position

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TOPIC AREAS: Point of Care ultrasound in general clinical practice, New Uses

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 - Friday, 23rd September, TTU SUB/ Caprock)

26. Importance Of Transthoracic Echocardiography Practised In Emergency Departments By The Emergency Physician In The Management Of Patients And Their Referral To Specialised Departments

KEY WORDS: transthoracic echocardiography -emergency physician -management

OBJECTIVE: The aim of this study is to assess the importance of transthoracic echocardiographic examination (TTE) to the emergency physician in the management of patients admitted to emergency departments and in their subsequent referral to specialised centres.

MATERIAL AND METHODS: This randomized prospective study was carried out in the emergency department over 3 months, involving patients presenting an acute chest pain or severe dyspnea or a state of non-traumatic shock. All patients had the benefit of echocardiography performed by a previously trained emergency physician in Doppler echocardiography. As evaluation criteria, we adopted in the first place the changes that had to be made after echocardiographic examination on the level of diagnosis, therapeutic approach and referral of patients to concerned departments. As a secondary

criterion, we chose the agreement of the diagnosis made in the emergency department with the final diagnosis.

RESULTS: We realised 64 transthoracic echocardiographic examinations. As a result the diagnosis had to be changed in 30% of cases, the therapeutic approach was corrected in 41% of cases and the patient had to be referred to a different department in 19% of cases.

The findings were in accordance with the final diagnosis made in hospital (based on the hospitalisation report) in 92% of inpatients. Thus, we obtained a sensitivity of 87%, a specificity of 95%, a positive predictive value of 97% and a negative predictive value of 87% of TTE against the initial diagnosis made.

CONCLUSION: Transthoracic echocardiography can be a useful and reliable tool in the hands of emergency physicians. It should be an integral part of the investigations procedures used in emergency departments, but should by no means replace a detailed physical examination and the other routine special investigations undertaken in emergency departments.

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TOPIC AREA: Point of Care ultrasound in general clinical practice

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 - Friday, 23rd September, TTU SUB/ Caprock)

27. Race Does Not Affect Ultrasound Cross-Sectional Area of Upper Extremity Nerves

INTRODUCTION: Age, sex, and body mass index (BMI) affect cross-sectional area (CSA) of peripheral nerves on ultrasonography. However, the effect of race on the CSAs is not well defined. **objective:** The aim of this study is to assess the importance of transthoracic echocardiographic examination (TTE) to the emergency physician in the management of patients admitted to emergency departments and in their subsequent referral to specialised centres.

METHODS: 120 healthy subjects (male and female), age 18 to 30, of Caucasian, African American, and Mexican American descent participated. Measurements were made at 5 standard points along median and ulnar nerves. Anthropometric data including fat mass, muscle mass, and BMI were recorded.

RESULTS: There was no statistically significant difference in normal values of CSA for median and ulnar nerves between races after adjusting other confounders. Females showed smaller CSA at each point ($p < 0.05$), but the difference between sexes was insignificant when controlled for fat-free mass index (FFMI).

DISCUSSION: For ultrasonography of major upper extremity nerves, race-specific reference values will not be needed. Normative data of CSAs should be obtained according to anthropometric parameters (FFMI, sex).

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TOPIC AREAS: Point of Care ultrasound in health care delivery to underserved populations, Point of Care ultrasound in general clinical practice

SESSION: A8 » Oral Presentation 3: Point-of-Care Ultrasound in Underserved and General Clinical Practice (1:00 - Friday, 23rd September, TTU SUB/ Caprock)

28. Performance Of A Simplified Wall Motion Score Index Method For Emergency Physicians To Assess Left Ventricular Ejection Fraction: Prospective Study About 65 Cases

OBJECTIVE: The purpose of our study is to evaluate a simple and rapid method for the assessment of left ventricular ejection fraction (LVEF), that can be used by emergency physicians, namely the Simplified Wall Motion Score index method (SWMSI). The score is derived from the 17 segment-model that is based on evaluation of regional contractility of the left ventricle obtained from a left short axis parasternal view and an apical view.

METHOD: This randomized prospective study was carried out in the cardiology department over a period of one month involving patients aged > 16 years who had to undergo a transthoracic echocardiography examination (TTE). The patients had a double Doppler echocardiography examinations. Topic areas: Point of Care ultrasound in general clinical practice, New Uses

An initial echocardiographic investigation was done by an emergency physician who had received a three-month training in Doppler echocardiography. This examination comprised an estimate of LVEF by the SWMSI method following by a global visual estimation (GVE)

The second echocardiographic examination was performed by an echo-proficient reader. This investigation comprised an estimate of LVEF by successively SWMSI, GVE and by the biplane Simpson's method BS which constituted our reference method. The concordance of SWMSI estimate with the GVE and BS estimates were calculated in both readers by the inter-class concordance coefficient of Cronbach's alpha.

RESULTS: Sixty-six patients were involved in the study. Mean age was 56 ± 14 years; sex ratio was 9 males/4 females. The patients were included independently of the degree of alteration of the left ventricle contractility.

For the emergency physician, the concordance of SWMSI obtained from a left short axis parasternal view and by the biplane Simpson's method was 0.74 (IC 95% = [0.70 - 0.78]; $p < 10^{-3}$) and the concordance of SWMSI obtained from an apical view and by the biplane Simpson's method was 0.72 (IC 95% = [0.70 - 0.75]; $p < 10^{-3}$) and the concordance of GVE and that obtained by the biplane Simpson's method were 0.95 (IC 95% = [0.50 - 0.59]; $p < 10^{-3}$).

For the cardiologist, the concordance of SWMSI obtained from a left short axis parasternal view and that from an apical view and the concordance of GVE and that obtained by the biplane Simpson's method were 0.95 (IC 95% = [0.92 - 0.98]; $p < 10^{-3}$).

CONCLUSION: Assessment of LVEF was better performed among emergency physicians with the SWMSI method than with the GVE method independently of the degree of alteration of the left ventricle contractility. The semi-quantitative method should be adopted by emergency physicians for LVEF estimated. Nevertheless, a minimum three-month training in Doppler echocardiography would be necessary.

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TOPIC AREA: Point of Care ultrasound in general clinical practice

SESSION: SESSION: B5 . Oral Presentation 4: Ultrasound In Undergraduate Medical Education (3:00 - Friday, 23rd September, TTU SUB / Soapsuds)

29. Integration of Ultrasound Skills In The Training of New Age Medical Students

AIMS OF THE STUDY:

1. To identify the challenges in integrating the ultrasound skills in the Medical education curriculum settings.
2. To arrive at recommendations in integrating ultrasound skills to new age Medical students
3. To make effective and efficient clinical assessments and the role of ultrasound towards the same.

The making of a Physician involves the learning of the sum total of the different aspects of care at a clinical level. The journey towards this competency build up is extensive and can even be described as complicated. The fundamental mandatory competency of a basic Physician is to assess and diagnose with certainty and manage the clinical condition appropriately. To diagnose is to assess the clinical condition and arrive at definitive diagnosis or the most probable differentials. To manage is to treat effectively at the primary level or to refer to appropriate clinical expertise person.

Traditionally the clinical evaluation revolves around History taking, Inspection, palpation, percussion, auscultation and the appropriate level of investigations to arrive at a diagnosis. As this remains the same as ever, the additions of newer investigations in the armamentariums

of a clinician, the methods of clinical evaluation are getting redefined. As always, the assessment and diagnosis forms the corner stone of any clinical care situation. The first point of care is the most crucial in this regard. Ultrasound as a tool is of immense utility here. Without doubt it adds to the diagnostic confidence. With its development, in modern initial clinical evaluation setting, sonopalpation has become the fifth skill in action along with other point of care assessments like one touch blood sugar investigation.

While ultrasound as a technology has matured enough to be used as a highly optimized hand held device for clinical assessment, the trainings towards the use of the same at the basic level is far from reality. Worldwide, there had been many attempts to integrate the ultrasound teaching into the respective curriculums.

The various aspects of the learning of ultrasound for a Medical Professional are getting redefined. At one stage stage ultrasound was regarded a highly specialized imaging modality which required great deal of training and expertise to use it optimally. Even though the skill of the user is very much operator dependent, it has moved from a strictly high end imaging modality to a hand held tool which can also be used as a primary screening imaging tool. With this development, the clinical value of ultrasound at the point of care has seen unmatched results. Every Medical student is always seen as a primary care Physician (Basic Doctor) in the making to begin

with. The big question here is when, where and how to develop the essential ultrasound skills to the New age Medical students.

Comprehensive evaluations of the various current ultrasound teaching and learning methods are analyzed. The basic expected competency of a new medical graduate and the dynamics of global clinical care services are discussed in the study.

The aim of this paper is to assess comprehensively the present level of ultrasound learning in the development of a Physician worldwide. The paper also aims to come out with the most possible seamless way of learning the art and science of ultrasound evaluation during the formative years of a medical student. The focus is on the effective and efficient way of learning. It is significant to define the content of the ultrasound course and time the course delivery appropriately as medical school learning content in general is exhaustive in nature.

The role of hand held ultrasound is likely to further grow in stature with point of care services being provided in home care settings in many countries. Technology is assisting here in several dimensions like miniaturization, powerful handheld devices and development of multitude of application.

At the same time the future directions of patient care is also kept in mind and the alignment of ultrasound learning towards

this is addressed. For example, like ultrasound has transformed from a specialized modality to a simple hand held tool for evaluation, endoscopic assessment is taking a similar path. Ultrasound integrated assessment along with endoscopic evaluation (Endoscopic ultrasound) seems to head towards primary evaluation setting as the technology and training matures.

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TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Point of Care ultrasound in general clinical practice, Technology

SESSION: B5 » Oral Presentation 4: Ultrasound in Undergraduate Medical Education (3:00 – Friday, 23rd September, TTU SUB / Soapsuds)

30. Tiered Longitudinal Ultrasound Curriculum for Undergraduate Medical Education

OBJECTIVE: To develop a tiered longitudinal ultrasound curriculum which will enable medical students at The Ohio State University College of Medicine (OSUCOM) to become better clinicians by enhancing their knowledge of anatomy, physiology, and medical decision making.

BACKGROUND: The Ultrasound Interest Group (USIG) at OSUCOM has consistently been involved in creating opportunities for medical students to acquire ultrasound skills throughout their four years in medical school. The USIG decided to survey medical students at OSUCOM to evaluate perceptions of the current ultrasound opportunities. Based on the students responses, the USIG Executive Board reorganized the training experiences and developed a tiered curriculum that builds on the previous opportunities.

METHODS: In March 2015, the USIG executive committee sent out a survey to the student body asking for feedback on the current state of the ultrasound program at OSUCOM. Students were asked about their level of involvement and reasons for participating in the offered ultrasound activities. Additionally, free-text response boxes were provided for any additional comments. Based on the results of the survey and verbal suggestions from classmates, the USIG executive committee held a series of meetings where the ultrasound activities were compiled into a cohesive curriculum.

RESULTS: We developed a tiered longitudinal ultrasound curriculum for medical students at OSUCOM. The curriculum is separated into Beginner Ultrasound, Intermediate Ultrasound, Advanced Ultrasound, and Honors Ultrasound each with a one year duration which are to be completed during all four years of medical school. Each program is designed to build sequentially on the previous and take a medical student from completely naive to a proficient scanner. Upon completion of the ultrasound course, students will be able to graduate with an advanced competency in ultrasound. Beginner ultrasound consists of learning ultrasound physics, three types of scans (FAST, aorta, cardiac), 5-10 Trained Simulated Ultrasound Model (TSUP) modeling hours. Intermediate ultrasound adds ultrasound artifacts, didactics, 3 more scans (pelvic, procedural, critical care), additional TSUP modeling hours and 10 saved

scans. Advanced ultrasound emphasizes on recognizing pathology and learning more advanced scanning specific to the student's medical field of interest. Honors ultrasound is a year long elective in the fourth year that includes an ultrasound project, journal club, proctoring hours, and an ultrasound portfolio of saved scans.

CONCLUSION: We expect this curricular format to provide a logical, consistent and coherent ultrasound training for medical students and to serve as a core for future expansion and refinement of the ultrasound program at OSUCOM. This program also allows for easy integration into the framework for students to graduate with an advanced competency in ultrasound.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

SESSION: B5 » Oral Presentation 4: Ultrasound in Undergraduate Medical Education (3:00 - Friday, 23rd September, TTU SUB / Soapsuds)

31. A Randomized Study of Training with Large Versus Small Vessel Size On Successful Ultrasound Guided Peripheral Venous Access

INTRODUCTION: Obtaining intravenous (IV) access is a fundamental skill in which healthcare professionals must be trained. It is essential for laboratory analysis, medication administration, and fluid infusion. The use of ultrasonography for obtaining vascular access is increasingly becoming incorporated into guidelines and clinical practice.

METHODS: Students who participated in a voluntary, extracurricular ultrasound training day were asked to participate in the study as part of their procedural training. They were given a standardized education and demonstration of how to use ultrasound to place a peripheral IV. They were then allowed to practice on a homemade phantom models with either a 5mm diameter simulated vessel or a 2.5mm one. The simulated vessels were made of balloons filled with ultrasound gel and the simulated soft tissue was made of a 3:1 ratio of gelatin and psyllium fiber. Each student was allowed three attempts at vessel cannulation on their respective phantom.

After their training and three practice attempts, each student was observed by one of the

researchers completing a USGPV attempt on one of three large vessel test phantoms. The researcher recorded success rate, number of sticks, number of redirects, time to cannulation, and total time including setup. After their observed test, each student completed a brief demographic survey, including age, gender, year in medical school, previous USGPV exposure, previous US exposure, whether or not they played video games as a child, and whether or not they own a smart phone.

RESULTS: Fifty-one students from 5 institutions were included in the analysis. The average time to cannulation between both groups was 79.2 seconds and the success rate was 86% (44/51, Table 2). Overall, 6 students (11.8%) had more than one stick, and the average number of redirects per student was 4.28. There were no statistically significant differences between the small and large vessel groups on any of the variables measured. Of note, the group that reported having video game exposure had a statistically significant higher overall success rate of 97% (v. 70%, $p < .01$).

CONCLUSION: In our small sample, there was no difference in success rate of novice students trained in ultrasound-guided peripheral IV access using either a smaller or a larger vessel phantom. Future work should focus on elucidating other aspects of training in ultrasound-guided procedures and should attempt a similar study with a larger sample size.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice

SESSION: B5 » Oral Presentation 4: Ultrasound in Undergraduate Medical Education (3:00 - Friday, 23rd September, TTU SUB / Soapsuds)



32. Is Undergraduate Ultrasound Training Valuable? An Ongoing Evaluation of the Opinions of Residents and their Directors

OBJECTIVE: To examine the views of residents and their residency directors on an integrated medical school ultrasound curriculum.

METHODS: As part of a larger survey of the medical school's curriculum, graduates of the University of South Carolina School of Medicine were queried regarding their experience with an integrated undergraduate ultrasound curriculum at the conclusion of their PGY-1 year. Input from the graduates' current program directors was also solicited. Findings were compared to survey results from the previous year to assess change over time.

RESULTS: 37 out of 85 graduates (44%) completed the overall survey, 33 (89%) of which completed the ultrasound portion. On a 5-point scale ranging from "poor" to "excellent," respondents rated the ultrasound curriculum 4.65, with 100% of respondents choosing either "good"(4) or "excellent"(5). Compared to the previous year this was an increase from 4.43 and 91% respectively.

97% of respondents felt the undergraduate ultrasound curriculum was beneficial during their first year of residency and 94% of graduates felt ultrasound should be standard

in medical education. Compared to the previous year this was an increase by 2% and 5% respectively.

Only 9% felt their exposure to ultrasound influenced their choice of residency specialty (decreased from 18% the year before). The proportion of respondents who felt having ultrasound training gave them an advantage in the match was unchanged at 34%. However 84% felt it would be an advantage for future graduates (up from 70%). 41% of graduates responded that they viewed a residency program more favorably if it had opportunities for ultrasound use.

While 64% of residency director respondents felt ultrasound would be an important skill for future residents, and 58% felt having undergraduate ultrasound experience was a positive attribute for current applicants and (both down from 70% and 67% respectively), only 29% felt it would be an advantage for future residents in the match (down from 67%).

DISCUSSION: Medical schools across the country are introducing ultrasound training into their curriculum. Whether this training influences career choices and the residency match is unknown, with no data yet published on the experience of graduates of these programs. Although important differences among opinions exist between specialties, nearly all resident respondents of this survey found their undergraduate ultrasound experience beneficial during their PGY-1 year.

When selecting a program, most respondents viewed programs with ultrasound opportunities more favorably and believe undergraduate ultrasound training will be an advantage for future graduates in the match. The discordance from residency directors and the decrease in the percentage of directors with positive opinions regarding the curriculum compared to last year maybe explained by differences in respondent demographics, however, further study is warranted.

CONCLUSION: Undergraduate training in ultrasound is viewed positively by current residents and although it does not appear to influence career choice, may influence program selection. Further study on trends of these opinions and how they influence the residency match process is warranted.

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TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education

SESSION: B5 » Oral Presentation 4: Ultrasound in Undergraduate Medical Education (3:00 - Friday, 23rd September, TTU SUB / Soapsuds)

33. Evaluation of Sophomore Medical Students' Competencies in Image Recognition and Interpretation of Ultrasound Pathology: An Innovative Ultrasound Curriculum Developed at the Wayne State University School of Medicine

BACKGROUND: Ultrasound education was first incorporated into the Wayne State University School of Medicine (WSUSOM) undergraduate curricula in 2006. Sophomore students since 2008 have had to demonstrate skills in image capture and interpretation of ultrasound pathology as part of their Physical Diagnosis final exam. The goals of this study are: 1) to provide a description of the sophomore ultrasound curriculum. 2) To determine how well students perform on the final exam after introduction to abdominal and cardiac ultrasound pathology. 3) To evaluate student performance since 2013 for improvement in scores with modification to instructional methods.

METHODOLOGY: An average of 288 medical students during their sophomore year at WSUSOM, receive instruction on image recognition and interpretation of ultrasound pathology using a case-based approach to

teaching. Students also enhance their image acquisition skills using standardized patients with an instructor to student ratio of 1:4. Sessions include an in-class image review of ultrasound pathology and a debriefing session with focusing on presentation and discussion of clinical cases. The final exam includes an image capture portion, and a computer-based 10 item multiple choice exam with embedded video clips focusing on recognition and interpretation of ultrasound pathology.

RESULTS: Average scores from 2011-2015 are included below;

Academic Year	# of Students	Mean Score
2011-2012	280	76.5%
2012-2013	300	74.4%
2013-2014	285	81.7%
2014-2015	290	80.8%

Students also performed very well in their image capture portion (6 second video clips) of the final exam with mean scores of 89.3% and 85.1% for the 2013-14 and 2014-15 academic years respectively. Images were graded using a 4-point scoring criteria based on 1) correct orientation 2) appropriate depth adjustment 3) overall image resolution 4) correct image based on clinical question.

CONCLUSIONS: Developing innovative teaching methods since 2013 during the sophomore ultrasound course has resulted in improvement in student scores in their image acquisition skills, recognition and interpretation of ultrasound pathology. Fusion of ultrasound education into the sophomore medical school curricula provides students with unique learning opportunities in pathology.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

SESSION: B5 » Oral Presentation 4: Ultrasound in Undergraduate Medical Education (3:00 - Friday, 23rd September, TTU SUB / Soapsuds)

34. A Case-based Approach to Teaching Clinical Ultrasound Applications to Junior Medical Students at the Wayne State University School of Medicine (WSUSOM)

BACKGROUND: A curriculum for teaching clinical ultrasound applications to 3rd year medical students at the WSUSOM was first introduced in 2009. This is part of the longitudinal ultrasound curriculum developed at the medical school in 2006. The curriculum was designed using a case-based approach to teaching clinical ultrasound applications with a focus on musculoskeletal & procedural, abdominal & trauma, and echocardiography & hemodynamic concepts. About 100 medical students at one clinical site participate in these sessions which include hands-on scanning with standardized patients. The goals are; 1) to provide a description of the 3rd year ultrasound curriculum. 2) To assess pre-requisite knowledge prior to participating in these sessions. 3) To evaluate the effectiveness of the educational program after implementation.

METHODOLOGY: About 100 medical students at one clinical site during their junior year participate in three clinical ultrasound instructional sessions over a 5 month period. Students receive detailed curriculum documents focusing on musculoskeletal/procedural,

abdominal/trauma and cardiac/hemodynamic applications, review articles, and a pretest to assess pre-requisite knowledge prior to each session. Sessions include hands-on image acquisition skills using standardized patients, and image recognition & interpretation using a case-based approach to teaching. These small group sessions have an instructor to student ratio of 1:4 allowing for detailed discussion of presented cases for effective learning. Students also participate in 1 hour image review sessions during core 8-week General Surgery and Internal Medicine rotations.

RESULTS: Pre & Post test scores for the Abdominal/Trauma clinical ultrasound sessions:

Abd/Trauma

Pre-test

students 75 0-59% 60-69% 70-79% 80-89% 90-100%

students / %score 14/75 (18.6%) 15/75 (20%) 19/75 (29%) 12/75 (16%) 15/75 (20%)

Abd/Trauma

Post-test

students 53

0-59% 60-69% 70-79% 80-89% 90-100%

students / % score 8/53 (15%) 8/53 (15%) 13/53 (25%) 9/53 (17%) 15/53 (28%)

The pre-test was completed by 75% of the students but just over 50% completed the post-test for the abdominal/trauma unit. 49/84(58%) students performed very well

on the Musculoskeletal & Procedural pre-test with scores over 80%. 30/67(45%) students scored >80% on the echocardiography and hemodynamics pre-test. Post-tests were administered as a comprehensive test at the conclusion of the 3rd year ultrasound sessions, and not shortly after each unit.

CONCLUSIONS: Clinical ultrasound applications provide unique opportunities for medical students to develop important skills in medical decision making regarding the choice of diagnostic tests during patient evaluation, and also offers a foundation for the development of psychomotor skills while preparing for residency.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

SESSION: B5 » Oral Presentation 4: Ultrasound in Undergraduate Medical Education (3:00 - Friday, 23rd September, TTU SUB / Soapsuds)

35. Using and Assessing Ultrasound to Teach Physical Examination and Diagnosis: A Self-Directed Learning Activity in the Family Medicine Accelerated Track (FMAT)

PURPOSE: Our institution is currently implementing and assessing a 3-year accelerated medical school curriculum that culminates in the MD degree and prepares students for a standard 3-year family medicine residency. This program, which has graduated four classes of students and has another three classes in training, incorporates extensive use of ultrasound in training students for physical examination and diagnosis. While ultrasound has become increasingly common in medical education settings as a tool to enhance the teaching of anatomy and as a skill to enhance physical examination and diagnosis, assessment of ultrasound has been slower to emerge. The purpose of this initiative is to provide assessment of 1) whether students develop proficiency in the use of ultrasound equipment; 2) whether students can locate anatomical structures and use ultrasound appropriately in clinical settings or simulations; and 3) whether ultrasound is effective relative to other teaching modalities.

METHODS: During the FMAT1 course in the summer of 2016, students in the FMAT Class of 2018 are studying outcomes from educational activities that employ the use of ultrasound in physical examination and diagnosis. During the Musculoskeletal Week, students will measure their own baseline knowledge and skills and participate in follow-up assessment of the use of ultrasound to locate structures and assist with examination and diagnosis.

RESULTS: As a self-directed learning activity, students are responsible for identifying, analyzing, and synthesizing information relevant to their learning needs about how ultrasound can be used as a diagnosis tool in primary care settings. In the collaborative setting that involves a small group of students and faculty facilitators, learners can also assess their learning needs, share information with their peers and faculty, and receive feedback on their skills as they develop expectations for appropriate examination and history-taking for a diagnosis.

CONCLUSIONS: This poster will highlight the activity's key characteristics and evaluation results. Development of the poster and data gathering will be largely driven by the M2 students enrolled in the program. The poster will provide learning outcomes and student perspectives about the use of ultrasound in medical student teaching sessions and its effectiveness as an opportunity for innovative self-directed learning.

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TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

SESSION: B5 » Oral Presentation 4: Ultrasound in Undergraduate Medical Education (3:00 - Friday, 23rd September, TTU SUB / Soapsuds)

36. Integrating Ultrasound with 3D-CT in Assessing Tibula-Fibula Fractures on Donor Cadavers and Healthy Volunteers

INTRODUCTION: Tibula-fibula (TF) fractures are a relatively common fracture presenting among trauma to emergency services. Ultrasound (US) has been proven to be effective in identifying fractures, especially for displaced fractures by inspection of the skeletal cortex. SECTRA visualization table (SVT) is a technology rendering CT/MRI DICOM files into 3D. SVT-ORTHO is a branch program that assists in restoring anatomy for orthopedic surgery. The objective of this study was to see if medical students could recognize and assess TF fractures from undissected cadaveric tissue following an imaging protocol involving SVT imaging.

METHODS: A literature search was conducted regarding the integration of US and 3D-CT software of TF from donor cadavers and healthy volunteers. First-year medical students (MS1) dissected the TF region, and then viewed TF x-rays, CT, and SVT. 18 MS1 used 5-12 and 18 MHz probes on the TF during dissection and were divided into formal 20-min tutorial groups three times weekly to view and assess TF fractures on the SVT. Students were given the autonomy to access US and SVT outside

of formal hours. Each had a minute and a half to engage with SVT before they were asked to leave the room and complete an illustration (AP and PA view) of the fracture they had examined. 24 hours later, students were asked to draw the AP and PA views of the same fracture after an additional exam with the US.

CONCLUSIONS: Clinical ultrasound applications provide unique opportunities for medical students to develop important skills in medical decision making regarding the choice of diagnostic tests during patient evaluation, and also offers a foundation for the development of psychomotor skills while preparing for residency.

RESULTS: Literature search revealed no known studies. Students successfully conducted the 5-12 and 18 MHz probes to identify the TF and were able to utilize the SECTRA with success to better understand the fracture.

DISCUSSION: Approximately 80-90% of TF fractures are displaced, most of which require surgery. Typical protocol for TF fractures includes X-rays with CT scans. US is a rapidly evolving tool for fracture recognition that, used during triage or on early admission, may expedite and improve patient care. The SVT-ORTHO was designed to assist in the rehearsing of morphologies for orthopedic surgery. With combined palpations, visualizations, and dissections, students were able to use

US to improve in accuracy on subsequent illustrations.

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TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Technology

SESSION: B5 » Oral Presentation 4: Ultrasound in Undergraduate Medical Education (3:00 - Friday, 23rd September, TTU SUB / Soapsuds)

37. Efficacy of Ultrasound Education for Foreign Physicians Taught by First Year Medical Students

OBJECTIVE: In developing countries, the use of ultrasonography has been implicated as a cost effective and efficient tool to supplement and/or use in conjunction with more expensive and non-portable radiological services. As a rapid and safe measurement, the utility of ultrasonography has been indicated to extend beyond the specialists' office to the general practitioner's clinic to facilitate diagnosis and treatment. Ultrasound education programs established by foreign physicians in developing countries have been proven to be successful and sustainable; evidencing that ultrasound is a teachable skill that may be mastered at a sufficient level within the course of a short-term intensive training. The aim of this study was to assess the short-term efficacy of a 4-week ultrasound curriculum taught by University of California, Irvine first-year medical students to attending and resident general practitioners working in public health care clinics—called puskesmas—in Bandung, Indonesia.

METHODS: The short-term ultrasonography course was conducted at Dinas Kesehatan, the government-run health office that oversees all of the public clinics in Bandung, Indonesia. It was three weeks long and was divided into a session per subject along with 3 office hour periods.

During the first session, the subjects were administered a pre-course survey and pre-test. The course was taught in English, but subjects were given an Indonesian version to enhance comprehension. The ultrasound course curriculum was structured to begin each session with a lecture presentation on the given topic (30 mins), followed by hands-on ultrasound training (2 hours), followed by a short multiple choice quiz (10 minutes).

During the final session of the course, the students were given the post-test, which was identical to the pre-test. They also took a practical exam, a post-course survey, as well as an Intent to Use survey. The practical exam required the subjects to perform certain scans from each teaching session and was graded by the UCISOM medical student course directors for accuracy. For each question, the students could earn up to 3 points – 1 point for correct probe orientation and indicator positioning,

1 point for placing the probe in the correct anatomical position, and 1 point for producing the correct image and correctly identifying the structures on the image.

RESULTS: The ultrasound curriculum had 52 physicians enrolled, with 41 completing the course, resulting in a 78.9% retention rate. Out of the 41 physicians who completed the course, 38 had attended all 6 class sessions. A majority of those physicians who completed the course reported minimal prior ultrasound exposure.

The average practical score was 83.2% (SD=0.145) with 82.9% of the class passing (score above 70.0%). The average pre-course final exam score was 35.2% with a 2.4% pass rate, whereas the average post-course final exam score was 82.0% with a 92.7% pass rate. Assuming equal variance, a two-tailed t-test was utilized, finding a highly significant difference in the scores between the pre-course final exam scores (M=0.352, SD=0.141) and post-course final exam scores (M=0.820, SD=0.117); $t(80) = -16.4$, $p = 2.83E-27$.

Post-survey feedback indicated that the physicians found that watching the scans being performed was most helpful (M=4.60, SD=0.63), followed by practicing the scans (M=4.28, SD=1.21).

attending class lecture (M=4.23, SD=0.80), studying online materials (M=3.54, SD=0.98), using other study tools (M=3.50, SD=0.92), and using the study guides (M=3.42, SD=1.36). On average, the physicians independently studied 2.57+/- 3.37 hours per week, and spent 0.66+/- 1.49 hours per week in office hours.

CONCLUSION: Given our data, there is strong evidence that 1st year medical students with high quality, integrative, year long ultrasound education, can teach ultrasound to attending physicians in foreign countries, effectively, in a three week time frame. Further studies are necessary in order to characterize the long term retention of ultrasound knowledge as well as to determine the accuracy with which the physicians are able to diagnose pathology in clinical practice after taking the course.

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TOPIC AREA: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in health care delivery to underserved populations, Point of Care ultrasound in general clinical practice

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 - Friday, 23rd September, TTU SUB / Caprock)



38. Experience with a Longitudinal Ultrasound Curriculum in Internal Medicine GME: Resident Perceptions Before and After Implementation

BACKGROUND: Internal Medicine (IM) residents are increasingly exposed to point-of-care ultrasound (POCUS), particularly in academic Emergency Departments and Intensive Care Units. In addition, medical schools across the country are integrating POCUS training into the undergraduate curriculum. Despite growing interest among IM residents and faculty, several barriers exist to establishing a formal ultrasound curriculum in IM. Our residency program at Palmetto Health USC recently initiated a structured longitudinal curriculum using limited resources. This experience may be helpful for other programs looking to incorporate ultrasound training at their institution.

OBJECTIVES:

- 1) To describe the current longitudinal curriculum including the hurdles and successes experienced by the residents and the faculty.
- 2) To discuss survey data on the experience and opinions of the residents within the program prior to the curriculum initiation and compare to repeat survey data that will be collected annually.

METHODS: Prior to initiating the new curriculum, the outgoing residents were surveyed in 2015. While all residents had POCUS experience, they did not have experience with a structured longitudinal curriculum. The incoming interns were also surveyed prior to initiation. In June and July 2016, the outgoing PGY3 residents, those starting PGY2, and the new incoming interns will complete additional surveys. This data will be compared between years within each group and between groups at a set time within the education. Interns will list level of experience upon entry to the program, confidence in a variety of clinical skills to include bedside ultrasound, opinions on timing and duration of ultrasound education, intended specialty, and what they each think are the top three applications of POCUS. Residents further in the program will be surveyed on the amount of POCUS training they have received within residency and the barriers to using POCUS in residency in addition to the questions given to incoming interns.

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TOPIC AREA: Use of ultrasound in Graduate Medical and Continuing Education

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 - Friday, 23rd September, TTU SUB / Caprock)

39. Focusing on Safety: Quality of Widely Available Video Instructional Materials for Point-of-Care Ultrasound Guided Procedures in Internal Medicine

OBJECTIVE: Point-of-care ultrasound (POCUS) guidance is becoming the standard of care for bedside procedures. This change in practice is based on evidence showing increased success rate and added safety with ultrasound imaging. Many instructional materials for POCUS guided procedures exist today, however, their quality and utility may be variable. The aim of our study was to assess the quality and content of widely available videos for POCUS-guided central line insertion, thoracentesis, and paracentesis and whether there was adequate discussion of safety-related competencies.

INTRODUCTION: Tibula-fibula (TF) fractures are a relatively common fracture presenting among trauma to emergency services. Ultrasound (US) has been proven to be effective in identifying fractures, especially for displaced fractures by inspection of the skeletal cortex. SECTRA visualization table (SVT) is a technology rendering CT/MRI DICOM files into 3D. SVT-ORTHO is a branch program that assists in restoring anatomy for orthopedic surgery. The objective of this study was to see if medical students could recognize and assess TF fractures from undissected cadaveric tissue

following an imaging protocol involving SVT imaging.

METHODS: We performed content analysis of instructional videos available on the internet for point-of-care ultrasound guided paracentesis, thoracentesis and internal jugular central line insertion. Searches were performed on Ovid Medline database, Ovid Medline Multimedia database, Google videos, and YouTube. The videos assessed for eligibility were determined using a discontinuation rule of 20: when 20 consecutive videos did not meet eligibility criteria and were excluded, no further videos were assessed. Searches were conducted in July 2015 and repeated in January 2016. Inclusion criteria were English language, video-based educational resources showing use of ultrasound to complete the whole or a part of the procedure. Procedures included were central venous catheterization, thoracentesis and paracentesis. Videos were excluded if there was evidence of copyright infringement, poor sound quality and duplicated results.

RESULTS: 5050 videos were identified for POCUS guided central venous catheterization. 4976 were excluded by discontinuation rule. 76 were assessed for eligibility and 12 unique videos were included. The videos had an average global educational value of 4.5. In the videos, 16 of the 23 essential competencies were discussed. Indications to abort the procedure were discussed in 3 (25%) videos

and 5 (42%) videos described the indications and contraindications to perform central venous catheterization. Only 4 (33%) videos discussed confirmation of catheter position with ultrasound after placement of catheter. For POCUS guided thoracentesis, 2111 videos were identified, and 78 assessed for eligibility. Finally, 8 videos were identified. The videos had an average score for global educational value of 4. Sixteen of 32 essential competencies were discussed in the videos. One video discussed indications to abort the procedure and only 3 (37%) videos discussed sterile technique. Only 1 video commented on how to recognize access to fluid. For POCUS guided paracentesis, 2621 videos were identified. With the discontinuation rule, 2563 videos were eliminated and 58 assessed for eligibility. 7 videos were included in the analysis. The average global educational value score was 4.1. Fifteen of 28 essential competencies were discussed. Only 1 video discussed indications to abort the procedure, 3 (43%) discussed starting a scan with sufficient depth to avoid missing far-field findings and 2 (29%) described the location of the inferior epigastric artery.

CONCLUSIONS: Ultrasound guidance for commonly performed procedures is now becoming the standard of care. A total of 27 videos of the POCUS guided procedures of interest were found. Most resources scored highly on the global educational value scale indicating their utility for general instruction.

However, despite the main justification for use of POCUS being improved safety, there is a lack of safety-related information in the currently available resources. The next generation of instructional resources should shift the focus from basic instruction to emphasize prevention and identification of complications, which is the original impetus behind promotion of procedural ultrasound guidance.

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Patient Safety

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 - Friday, 23rd September, TTU SUB / Caprock)

40. Ultrasound Evaluation of Soft Tissue Foreign Bodies by U.S. Army Medics

BACKGROUND: Ultrasound (US) represents an ideal imaging modality to evaluate for various types of soft tissue foreign bodies (FBs) due to its accuracy, cost, and lack of ionizing radiation exposure to patients. Portability of machines have allowed ultrasound to be utilized increasingly at the point of care, however, ultrasound remains an operator-dependent diagnostic adjunct. The objective of this study was to determine US-naïve personnel's accuracy in detecting radiolucent foreign bodies using bedside ultrasound in soft tissue hand models. Secondary objectives were to assess US stand-off pad effects on soft tissue FB detection rates and assess the established FB detectable lower limit size of 2 mm.

METHODS: This was a prospective, single blinded, observational study. US Army medics naïve to ultrasound recruited as voluntary participants for this study underwent a two hour block of didactic and hands-on instruction on using ultrasound for evaluating soft tissue. Wooden foreign bodies ranging from 1 to 3mm were embedded in 8 of 20 chicken thigh models which were then randomized. Participants' abilities to detect FB utilizing a SonoSite® M-Turbo US and 13-6 MHz linear probe, with and without stand-off pad, were assessed. Results: We developed a tiered longitudinal

ultrasound curriculum for medical students at OSUCOM. The curriculum is separated into Beginner Ultrasound, Intermediate Ultrasound, Advanced Ultrasound, and Honors Ultrasound each with a one year duration which are to be completed during all four years of medical school. Each program is designed to build sequentially on the previous and take a medical student from completely naïve to a proficient scanner. Upon completion of the ultrasound course, students will be able to graduate with an advanced competency in ultrasound. Beginner ultrasound consists of learning ultrasound physics, three types of scans (FAST, aorta, cardiac), 5-10 Trained Simulated Ultrasound Model (TSUP) modeling hours. Intermediate ultrasound adds ultrasound artifacts, didactics, 3 more scans (pelvic, procedural, critical care), additional TSUP modeling hours and 10 saved scans. Advanced ultrasound emphasizes on recognizing pathology and learning more advanced scanning specific to the student's medical field of interest. Honors ultrasound is a year long elective in the fourth year that includes an ultrasound project, journal club,

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in health care delivery to underserved populations, New Uses

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 - Friday, 23rd September, TTU SUB / Caprock)



41. The Interrater Reliability of Optic Nerve Sheath Diameter Measurements Performed by Non-Ultrasound Fellowship Trained Emergency Medicine Physicians and Emergency Medicine Residents Using Bedside Ultrasound

BACKGROUND: Several studies have proposed using point-of-care ultrasound measurements of the optic nerve sheath diameter (ONSD) for evaluation of increased intracranial pressure (ICP). The optic nerve sheath is continuous with the dura allowing free communication of the cerebral spinal fluid (CSF). When ICP increases the pressure is transmitted into the optic nerve sheath and causes its diameter to increase. A measurement greater than 5mm has been reported in the literature to provide good sensitivity, but poor specificity, for increased intracranial pressure (>20cmH2O).

OBJECTIVES: To determine the interrater reliability of ultrasound measurement of the ONSD when performed by non-ultrasound fellowship trained emergency medicine physicians and residents.

METHODS: Five non-ultrasound fellowship trained emergency medicine physicians and five emergency medicine residents received one hour of instruction on ocular ultrasound and measurement of the ONSD using a 13-6 MHz

high frequency linear ultrasound transducer (Sonosite, Bothell, WA). The ten physicians then performed 3 replicate measurements of the ONSD on the right eye and then left eye of five normal volunteer test subjects. Results were evaluated for the reliability of measurements between participating physicians. We assessed reliability with the intraclass correlation coefficient (ICC) and its 95% confidence interval. We then calculated a p-value for our data to determine if the ICC results were significantly greater than the lower cutoff for substantial reliability (ICC of 0.60).

RESULTS: The calculated intraclass correlation coefficient (ICC) was 0.735 (95% CI 0.353-0.924) for the left eye, 0.708 (95% CI 0.307-0.914) for the right eye, 0.789 (95% CI 0.493-0.939) for both eyes. While the mean ICC values were >0.6, none of the values reached statistical significance ($p>0.05$).

CONCLUSION: The ICC values calculated in this study did not reach significance for the lower cutoff for substantial reliability (0.60), indicating a wide variance and poor interrater reliability. Future studies are needed to further determine both the accuracy and reliability of ultrasound measurements of the ONSD when performed by non-ultrasound fellowship trained practitioners.

AUTHORS: Duncan Hansing (University of Texas Health Science Center San Antonio), Christopher Gelabert (University of Texas Health Science Center San Antonio), Joel Michalek (University of Texas Health Science Center San Antonio), **Craig Sisson** (University of Texas Health Science Center San Antonio)

TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice, Patient Safety

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 - Friday, 23rd September, TTU SUB / Caprock)

42. Assessment of an Internal Medicine Residency Point-of-Care Ultrasound Elective

BACKGROUND: Background: Point-of-care ultrasound (POCUS) is an increasingly utilized diagnostic modality in internal medicine, and internal medicine residents desire training in POCUS. Residency programs across the country have implemented various strategies to teach POCUS applications, though a standardized modality to assess the effectiveness of these interventions has not been established.

OBJECTIVE: Our aim is to describe the structure of a one-month POCUS elective offered to internal medicine residents at the University of California, San Francisco, the impact of the elective on POCUS knowledge as determined by a pre/post-elective online test, resident confidence in and use of POCUS after the elective, and resident feedback on the elective.

METHODS: For our residency program we developed both a basic introduction to POCUS and an intensive POCUS elective. Because procedural ultrasound training is already established in our residency we focus on diagnostic POCUS. All first-year residents participate in a 2-hour hands-on training session focused on a comprehensive volume status assessment. Second and third-year residents are offered a month-long POCUS elective that employs a “flipped classroom” approach, such that all background learning is achieved online prior to the elective and elective time is used for hands-on experiences. We can accommodate two residents per month. Prior to the elective residents take an anonymous 26-question multiple choice online test of core POCUS knowledge and image interpretation. Guessing is strongly discouraged; test takers are instructed to choose the common fifth answer choice “not sure” unless they are certain of the correct answer. After taking the test residents are assigned chapters from a free electronic book; several educational websites are recommended as well.

During the elective residents spend 4-6 half-days per week on POCUS activities. They spend over half their time scanning with POCUS experts in three different emergency departments. They spend their remaining time shadowing echocardiography technicians, interpreting echocardiograms with cardiologists, scanning in intensive care units, and, if their schedule allows, attending a weekly dedicated POCUS image review session. One to three months after the elective residents take the same online test and answer survey questions about their elective experience and their post-elective use of POCUS. We compared mean test scores pre vs. post-elective and analyzed the survey results.

Data involving feedback on specific elective experiences were supplemented by results of informal interviews of residents at the end of the elective.

RESULTS: At the time of this writing, 23 residents have completed the pre-elective test and 16 residents have completed the post-elective test and survey. On average, residents answered 37% questions correctly on the pre-elective test, compared to 71% on the post-elective test.

69% of residents were “very likely” and 31% “somewhat likely” to recommend the elective to other residents. 23% of residents were “very confident” and 69% “somewhat confident” in their overall ability to use POCUS after the elective. Specifically, residents were confident assessing global left ventricular function and volume status via IVC and IJ scanning and identifying pleural and pericardial effusions, ascites, pulmonary edema, and pneumothorax. These were also the applications residents utilized regularly after the elective.

Residents highly valued emergency department scanning experiences (particularly when the student: teacher ratio was low) and image review sessions. Some residents felt that echocardiography reading room and scanning lab experiences were not useful. A majority of residents wished they had receiving additional training in ultrasound-guided peripheral IV placement.

CONCLUSIONS: Participation in a POCUS elective enhances internal medicine residents’ ultrasound knowledge and ability to interpret images, as demonstrated by improved performance on an online test. After the elective residents were fairly confident in their POCUS skills, particularly for cardiac and pulmonary applications, which were the applications they continued to utilize regularly. Residents highly valued the elective’s emergency department hands-on scanning time and image review sessions but desired additional training in ultrasound-guided peripheral IV placement.

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TOPIC AREA: Use of ultrasound in Graduate Medical and Continuing Education

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 – Friday, 23rd September, TTU SUB / Caprock)

43. Integrating Graduated Didactics Into Training Reduces The Time Required To Build Skill In Focused Cardiac Ultrasound

INTRODUCTION: Focused cardiac ultrasound (FoCUS) has become a widely used tool for the point of care evaluation of basic cardiac pathology, and there is a growing need for efficient and consistent training in this modality. We developed a self-directed, simulator-based curriculum that includes a graduated, integrative approach to learning FoCUS and allows for more efficient acquisition of technical and cognitive skill.

METHODS: Fifteen nurse practitioners and resident physicians completed a FoCUS curriculum using simulator technology to scan a mannequin with a mock transducer. Training was presented in a stepwise fashion, beginning with instruction on the technical acquisition of standard cardiac views through practice capturing these views in a normal heart. This was followed by instruction on the focused assessment of selected cardiac structures for the diagnosis of basic pathology, again integrated with practice in assessing these structures by scanning the mannequin to obtain and interpret pathologic images. Thus, didactic instruction on echocardiography was gradually presented in the context of image acquisition and image interpretation. Learners were then asked to apply the skill they had acquired in

image acquisition and interpretation to complete three undifferentiated practice cases, obtaining all standard views and analyzing the pathology. The curriculum was self-directed, and learners were allowed to freely move between practice modules as desired. They were provided with additional cases to scan ad libitum.

Six of the learners completed a pre-test on the simulator and nine completed a pre-test on a standardized patient. All learners completed a post-test comprised of three simulator test cases, obtaining and interpreting images in each case. Psychomotor (technical) skill in image acquisition was assessed in terms of the angle deviation between the plane of the learner-acquired image and the anatomically correct plane for the specified view. The angle deviation metric was provided immediately to the learner as visual and numeric feedback as each image was acquired throughout training, while all test cases were completed without any feedback on image accuracy. Cognitive skill in image interpretation was assessed through multiple choice questions on pathologic findings.

The time to complete the curriculum and the angle deviation and image interpretation score after training were compared between the new graduated curriculum and a previously validated curriculum in which all didactic instruction on echocardiography was presented before the practice scanning in the traditional, lecture-before-hands-on-practice format. Change in psychomotor and cognitive skill

was also compared for the subset who took the simulator pre-test.

RESULTS: The average time to completion decreased from 8.0 ± 2.5 hours using the traditional curriculum to 4.6 ± 2.0 hours using the new curriculum ($p < 0.0001$). After training psychomotor skill by mean angle deviation was similar in the new vs. traditional curriculum (26 ± 15 vs. 36 ± 24 degrees, $p=0.11$), as was cognitive skill (65 ± 15 vs $71 \pm 8\%$, $p=0.16$). Learners who took the simulator pre-test showed a similar decrease in angle deviation (-40 ± 32 vs. -47 ± 33 degrees, $p=0.33$) and a similar improvement in cognitive skill (20 ± 31 vs. $27 \pm 21\%$, $p=0.52$) after completing the new vs. traditional curriculum.

DISCUSSION: In comparison to a previously validated traditional curriculum, a new curriculum developed to specifically instruct learners in a stepwise fashion provided an equally effective but more efficient means of teaching psychomotor and cognitive skills in FoCUS. This curriculum maintains the ability to teach FoCUS in a self-directed manner and provides an improved method in efficiently and consistently training practitioners. Topic Area: Use of ultrasound in Graduate Medical and Continuing Education

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TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Technology

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 - Friday, 23rd September, TTU SUB / Caprock)

44. Use Of A Simulator To Teach Focused Cardiac Ultrasound

We enrolled 22 individuals, internal medicine residents, hospitalists, emergency medicine physicians at a community teaching hospital, to participate in a study to assess improvement in focused cardiac ultrasound (FoCUS) technique with an advanced ECHO simulator. The simulator gave the operator the ability to view cardiac windows in real time with real pathology. Each participant underwent a pre-test and practice section for parasternal long and short axis, apical 4-chamber and 2-chamber views, and

subxyphoid view. This was followed by a test section that assessed for improvement. During the practice session the participants could view the ideal plane for each view on the simulator program, however this option was removed during the test. The data from 14 of the participants was ultimately usable for data analysis as these were the only ones to complete all of the simulations.

Our data shows that during the pre-test phase the average angle degree of deviation was 60.8 degrees. This improved to 23.5 degrees during the practice phase when participants were able to see the ideal plane. During the testing section this increased accuracy was nearly maintained with an average deviation of 32.9 degrees ($p < 0.0005$).

Participants were also tested on their ability to interpret their images, which were based off of real pathological ECHO images. The average score during the pre-test was 43% ($SD \pm 23\%$), which improved to 72% ($SD \pm 14\%$) during the testing section ($p < 0.00005$).

There were no correlations with age, gender, level of training, or interestingly prior extensive video game experience (defined as peak of 10-20+ hours per week). There was some suggestion that more formal training had a tendency towards better initial degree deviation, though this was not significant.

This study will continue over the next year with the same participants repeating the testing section at 4, 8, and 12 months to see if simulator based training can show sustained technique and interpretation skills. Based upon the initial results the expectation is favorable that the skills will be retained and honed at the interval assessments. As ultrasound, especially at the bedside, becomes more prevalent, positive results from our study could point to a great way to achieve training.

AUTHORS: Brad Sanville (Legacy Internal Medicine Residency), Rob Morgan (Legacy Internal Medicine Residency), Gordon Johnson (Legacy Internal Medicine Residency), Shashank Bathula (Western University)

TOPIC AREAS: Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice, Technology

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 - Friday, 23rd September, TTU SUB / Caprock)

45. 3D Power Doppler Ultrasound In Early Diagnosis of Preeclampsia

OBJECTIVE: Compare 3D power Doppler indices (3DPD) of utero-placental circulation (UPC) in the first and second trimester of pregnancy in patients who developed preeclampsia and those who did not and test the hypothesis that the parameters of vascularization and placenta flow intensity, as determined by three-dimensional ultrasound (3D) are different in normal pregnancies compared with preeclampsia.

METHODS: A prospective observational study using 3D power Doppler was performed to evaluate the placental perfusion in 96 low risk pregnant women who came to do the ultrasound routine between 11 and 14 weeks. The placental vascular index (VI), flow index (FI), blood vessels and blood flow index (VFI) by three-dimensional Doppler histogram were calculated. All patients repeated the exam between 16 and 20 weeks. The outcome was scored as normal or preeclamptic.

RESULTS: The placental vascular indices including VI, FI and VFI were significantly lower in preeclamptic placentas compared with controls in the study performed in the second trimester ($p < 0.001$). There was no statistical difference in the patients examined in the first trimester.

CONCLUSION: Our findings suggest that 3D-Power Doppler assessment of placental vascular indices in the second trimester has the potential to detect women at low risk for subsequent development of PE.

AUTHORS: Raul Moreira Neto (Ecomoinhos - School of Medical Ultrasound)

TOPIC AREAS: Technology, New Uses

SESSION: B6 » Oral Presentation 5: Ultrasound in Graduate and Continuing Medical Education and Technology (3:00 - Friday, 23rd September, TTU SUB / Caprock)

46. Standardized Patients, Image Evaluation, Hands On Scanning Labs, and Student Feedback Within the Ultrasound Curriculum at Eastern Virginia Medical School

Getting medical students to scan with Ultrasound (US) is only the start. They need frequent feedback on their images and scanning techniques and have opportunities to scan more and refine their skills. With large class cohorts this can present logistical nightmares. At EVMS standardized patients (SP's) have evaluated professionalism routinely and now help to provide feedback in Ultrasound examinations, as well.

At EVMS medical students are exposed to US week one of their education. During the first semester US is part of their Anatomy course and formal US lectures. Lectures are followed by proctored scan labs. Students then scan independently and capture assigned images. The major weakness in this has been faculty ability to provide ongoing image feedback.

At the end of the first semester an OSCE examination evaluates US images. SP's evaluate professionalism as well as length of scan, transducer placement, and basic equipment manipulation.

At EVMS we have made efforts to improve SP awareness of US examination requirements, preps, and required dress. We have found that this is appreciated by SP's and that many are anxious to work in US labs.

In conjunction with Old Dominion University (ODU) we are conducting research on image evaluation by non-experts by providing a comparison ideal image and Likert scale questions. An image of kidney/Liver interface is being used for research on this process. Once results are proven consistent with experts and non-experts, ideal images and Likert scale evaluation questions will be developed for other images. This as a long term goal.

At EVMS we hope that as students scan more, they create portfolios of images to help them during their residency application process and allowing them to document participation in the US exams required to apply for US credentialing examinations.

We hope to improve the feedback that students get to their portfolios by making the evaluation system less onerous to a small percentage of the faculty. By using this system SP's and M4's participating in Ultrasound electives will be able to help with the image evaluation process. This will allow M1's to work on scan techniques earlier to hone their skills.

We find students support US in their curriculum and want to increase the amount of scanning time they get and the amount of feedback they receive.

Our research shows that medical students appreciate US within the curriculum and feel it improves their medical education. We are also find SP's invaluable in US evaluation, which involves all aspects of the exam; professionalism, patient positioning, transducer placement, and hopefully, in the future, image evaluation.

Our research shows promising results with non-expert image evaluation. With development of other master images, we are hopeful that this alleviates the gap in image evaluation. We expect SP's to evaluate images during OSCE testing and will compare expert and SP results of images Fall 16 as part of follow-up research.

AUTHORS: Felicia Toreno (Eastern Virginia Medical School), Barry Knapp (Eastern Virginia Medical School), Donald Byars (Eastern Virginia Medical School), Craig Goodmurphy (Eas), Mark Serbo (Old Dominion University), Lorraine Lyman (Eastern Virginia Medical School)

TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Technology, New Uses

SESSION: B7 » Oral Presentation 6: Panel Discussion (3:00 - Friday, 23rd September, TTU SUB / Canyon)

47. Planning a Successful Ultrafest: A Regional Symposium for Teaching Ultrasound to Medical Students

PROBLEM STATEMENT: Point-of-care ultrasound (US) is a rapid, non-invasive tool, which has become essential in many areas of medicine. While some institutions have recognized the importance of ultrasound and have integrated ultrasound education into the undergraduate curriculum, there are many medical schools that have not. Students may not be aware of this important educational and clinical tool. In order to begin to fill this gap in education and awareness, our institution recently conducted a regional ultrasound education event for medical students from local medical schools.

The concept of "Ultrafest" has been previously described to address this gap in education. However, understanding how to implement one of these programs at an institution without a robust integration of ultrasound and medical education can be difficult. Even with appropriate support and resources, implementing an Ultrafest can be a daunting task. The purpose of this panel is to help interested faculty members learn how to develop and implement an Ultrafest at their institution.

APPROACH: This panel will have several faculty and students from several different medical schools who have successfully designed and implemented an "Ultrafest" at their respective schools. Each represented institution will have one panel member present a brief presentation on the pearls and pitfalls experienced with developing and implementing Ultrafest. A discussion and question and answer session for the panel will follow.

POTENTIAL PANEL MEMBERS:

J. Matthew Fields, MD,
Sidney Kimmel Medical College
at Thomas Jefferson University

Joshua Davis, M4,
Sidney Kimmel Medical College
at Thomas Jefferson University

Creagh Boulger, MD
The Ohio State University College of Medicine

Vivet Lobo, MD, Stanford
University School of Medicine

Chanel Fischetti, MD, PGY2,
Duke University School of Medicine

Christian Fox, MD, University of California at
Irvine, Irvine School of Medicine

LEARNING OBJECTIVES:

1. Understand the potential impact of hosting an UltraFest event
2. To learn the timeline for planning an event
3. To learn the resources required
4. To demonstrate 3 examples of UltraFest in action
5. To understand how to use Social Media to promote Ultrafest
6. To understand how to survey participants and capitalize on the momentum to form Ultrasound Interest Groups

AUTHORS: Josh Davis (Thomas Jefferson University), J. Matthew Fields (Thomas Jefferson University)

TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

SESSION: B7 » Oral Presentation 6: Panel Discussion (3:00 – Friday, 23rd September, TTU SUB / Canyon)

48. A New Model for Determining Competency in Ultrasound Education Using an Outcome-Based Determination of Comprehension, Confidence and Insight: A Four Year Study of an Emergency Ultrasound Elective and Medical Student Performance

BACKGROUND: Historically, a “competent sonographer” has been defined as someone who performed a predetermined number of ultrasound studies. The number is usually rather low, and in Emergency Medicine this cutoff was twenty five scans per modality. This number has been supported by National Societies including the American College of Emergency Physicians. However, physicians who do the majority of the bedside training know that performing an arbitrary number of scans does not reflect the actual attainment of “competency.” A more objective method of assessment based on outcomes and not numbers is needed.

OBJECTIVES: To describe a new method of competency assessment based on the three separate outcome categories of comprehension, confidence and insight.

METHODS: A total of 50 fourth year medical students participated in our one month Emergency Ultrasound elective between 2012 and 2016. Each student was given a 50-question test at the beginning of the elective to determine baseline comprehension of the course material. At the end of their test the students were asked to rate their confidence in their answers on a 100mm visual analog scale. To measure their insight they were also asked to state how many questions out of fifty they think they answered correctly. During the 4-week rotation the students met with an ultrasound fellowship trained faculty member twice a week. On each of these days the students received a didactic lecture, performed supervised scanning within the University of Texas School of Medicine Center for Clinical Ultrasound Education, and also performed supervised scanning on patients within the Emergency Department. Two days each week the students performed independent scanning sessions in the Emergency Department and recorded all their studies for review by the course instructors. At the conclusion of the rotation, the same outcome based competency test was then provided to each student. Values for student comprehension (total number of correct answers), confidence (visual analog

measurement in mm), and insight (difference between comprehension and the students estimated number of correct answers) were obtained for the pretest and posttest, then compared using paired T-Tests. All testing was 2-sided with a significance level of 5%. SAS Version 9.4 for Windows was used throughout.

RESULTS: Comprehension increased by a mean of 11.9 (95% CI, 10.8–13.1), $p<0.001$. Confidence increased by a mean of 49.1mm (95% CI, 43.4–54.8), $p<0.001$. Student insight mean was 7.5 in the pretest (95% CI, 5.6–9.3), $p<0.001$ and 0.62 (95% CI, -0.82–2.1), $p<0.001$ in the posttest. The variance decreased from pretest to posttest (pre 42.9, post 25.8, $p=0.078$) and the posttest mean was significantly closer to zero than the pretest mean (pre 7.5, post 0.62) indicating better insight. In each case, insight was greater than zero, showing that students on average underestimated their number of correct answers.

CONCLUSIONS: Our new competency model allowed for objective determination of three specific aspects of student ultrasound competency. Using this model we were able to determine that the students objectively showed improvement in comprehension, confidence and insight. Using this system, it may be possible to define specific learner outcome profiles that educators can use as a guide during training. It may also allow educators to specifically tailor training to

individual learner weaknesses and improve learner outcomes at the end of training.

AUTHORS: Craig Sisson (University of Texas Health Science Center San Antonio), Joel Michelek (University of Texas Health Science Center San Antonio), Christopher Gelabert (University of Texas Health Science Center San Antonio)

TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Point of Care ultrasound in general clinical practice, Patient Safety

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 - Saturday, 24th September, TTU SUB / Soapsuds)

49. The Inaugural Year of an Ultrasound Curriculum for First Year Medical Students: The Standardized Patient Perspective

INTRODUCTION: Ultrasound education of undergraduate medical students often includes interactions with standardized patients. The University of Arkansas for Medical Sciences just completed the inaugural year of a longitudinal ultrasound curriculum designed to provide first year medical students with multiple opportunities for learning anatomy-focused ultrasound while enhancing standardized patient (SP) interaction skills. Hand-held GE Vscan dual probe devices were used by students to scan the thyroid gland/carotid sheath contents, heart, abdomen, femoral/popliteal regions, and kidney/bladder/pelvic organs of SPs. Although multiple studies have reported student assessment of undergraduate ultrasound curricula, no studies have assessed these activities from the SP perspective.

METHODS: All 37 SPs involved in the ultrasound curriculum were recruited from an existing pool used by the Center for Clinical Skills. SPs could self-select to participate in four faculty guided one-hour ultrasound sessions scheduled throughout the year, as well as an optional ultrasound OSCE review session and an end-of-the-year ultrasound OSCE. The SPs were briefed upon arrival on what was going to

occur in the student ultrasound session that day. Prescreening of the SPs was performed by faculty prior to student arrival to identify any potential concerns related to the region being scanned. Data regarding the SP perspectives and experiences in the ultrasound curriculum were solicited at the end of the academic year using an anonymous, 85-item evaluation consisting of multiple choice, LIKERT and open response questions.

RESULTS: Preliminary responses from the survey of SPs (24/37 participant responses to date) indicate that the vast majority of respondents agreed/strongly agreed that they enjoyed being an SP during the individual ultrasound sessions (75%) and that their overall experience was positive (92%). Nearly all of them indicated they would participate in these sessions next year (98%). SPs generally appreciated students showing them their ultrasound scans (96%) and reported learning something about their body during the ultrasound sessions (88%). Two thirds of the SPs previously had a clinical US performed on them, while 46% had seen one performed on someone else. A significant number of SPs reported that they directed students on how to position their body (38%), properly drape them (29%), hold the ultrasound probe (42%), or use the Vscan device (25%). About a third of the SPs reported that the faculty identified something unique in their anatomy that they reported to the students during the session (29%) or that they had volunteered



something clinically relevant about themselves during the student scanning sessions (29%). SPs indicated that they would like to learn more about ultrasound (88%), gain first hand experience scanning like the students (79%) and learn more about ultrasound in order to play a more direct role in student education (86%). The majority of SPs indicated an interest in attending an optional anatomy lecture on the organs being scanned (67%), actually viewing the anatomy of isolated cadaver organs in the gross lab (88%) or viewing organs in a cadaver in situ (79%). Positive comments included being able to serve as a normal model versus a disease presenting SP and being a part of the student “aha” moment of discovery during the scanning sessions. A few negative comments included insufficient bathroom breaks, the 3-hour length of the sessions, and feeling uncomfortable being scanned in some particular region of their body.

CONCLUSIONS: The results of our survey indicate that SP involvement in the ultrasound curriculum was a generally positive experience. Although the inclusion of SPs in the ultrasound curriculum was designed to enhance student learning, a significant portion of the SPs themselves reported learning something about their body and many of them indicated a desire to learn more about the technique as well as the anatomy of the organs that the students were scanning during the ultrasound sessions. The SP feedback obtained from the survey highlighted organizational and patient care

areas that need to be further addressed in preparation for next years M1 and M2 curricular offering.

AUTHORS: Alisa Kanfi (Department of Radiology, University of Arkansas for Medical Sciences), Gregory R. Snead (Department of Emergency Medicine, University of Arkansas for Medical Sciences), Kevin D. Phelan (Department of Neurobiology and Developmental Sciences, University of Arkansas for Medical Sciences)

TOPIC AREA: Use of ultrasound in Undergraduate Medical Education

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 – Saturday, 24th September, TTU SUB / Soapsuds)



50. Procedural Simulation: Medical Student Preference And Value Of Three Task Trainers For Ultrasound Guided Regional Anesthesia

INTRODUCTION: Ultrasound guided regional anesthesia is widely taught using task trainer models. Commercially available models are often used; however, they can be cost prohibitive. Therefore, alternative "homemade" models with similar fidelity are often used. The purpose of this study is to determine realism, durability and cleanliness of three different task trainers for ultrasound guided nerve blocks.

METHODS: This was a prospective observational study using a convenience sample of medical student participants during an ultrasound-guided nerve block training session. Participants were asked to perform simulated nerve blocks on three different task trainers including 1 commercial and 2 homemade. A questionnaire was then given to all participants to rate their experiences both with and without the knowledge on the cost of the simulator device.

RESULTS: Data was collected from 25 participants. The Blue Phantom model was demonstrated to have the highest fidelity. Initially, 10 (40 %) of the participants preferred

the Blue Phantom model, while 10 (40%) preferred the homemade gelatin model and 5 (20 %) preferred the homemade tofu model. After cost awareness, the majority, 18 (72%) preferred the gelatin model.

CONCLUSIONS: The Blue Phantom model was thought to have the highest fidelity, but after cost consideration the homemade gelatin model was preferred.

AUTHORS: Shadi Lahham (University of California, Irvine School of Medicine), Erica Frumin (University of California, Irvine School of Medicine), Taylaur Smith (University of California, Irvine School of Medicine), Jessa Baker (University of California, Irvine School of Medicine), **Amanda Purdy** (University of California, Irvine School of Medicine), Bret Winners (University of California, Irvine School of Medicine), Sean Wilson (University of California, Irvine School of Medicine), John Christian Fox (University of California, Irvine School of Medicine)

TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Technology

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 - Saturday, 24th September, TTU SUB / Soapsuds)

51. Is There More To Wrist Extension Using SonicEye Finger Probe versus Classic Linear Probe Ultrasound to Assess Radial Artery Movement Prior To Cannulation and Blood Draw?

INTRODUCTION: "Extend the wrist and the radial artery will come to the surface and make that cannulation or arterial blood gas draw easier." Often spoken words, but are they an old wives tale or accurate? The radial artery (RA) has gained popularity within the cardiac arteriogram discipline. Many users are shifting from the old gold standard of the femoral artery to the RA. The anatomy just proximal to the wrist is dense in structures. Each structure lives within a plane that is relatively finite. The objective of this study was to use ultrasound to investigate if the RA moves significantly to the surface during wrist movement enabling invasive procedures.

METHODS: Literature search was conducted to investigate dynamic RA measurements in multiple positions during wrist movement with different ultrasound probes. Healthy volunteers (N=152:304 sides, Age 20-42) were used. Exclusion criteria consisted of wrist or upper limb vascular surgery. Fukuda-Denshi ultrasound system UF760-AG was used with a classic linear probe (5-12 MHz) and a novel SonicEye finger probe (5-12 MHz). Two examiners performed 3 measurements at 3 positions of the RA from a set proximal wrist point to skin surface (wrist in neutral, 45 degrees flexion and extension).

RESULTS: Literature search revealed no dynamic measurement studies of RA in multiple positions. RA moved up to 2.5mm deeper or posterior from the neutral position during 45 degrees flexion and moved up to 0.7mm superficially or anteriorly during 45 degrees wrist extension.

DISCUSSION: Statistical analysis of RA depth demonstrated no statistical significance between Rt and Lt sides in neutral position. Extension may also reduce risk of damage to neighboring structures (median nerve), which may also be beneficial. Compression of veins during extension, which lie adjacent to the RA could also be useful.

CONCLUSION: Ultrasound can be used to determine RA location, depth and relation to intimate anatomic structures in various positions to allow safe, confident and consistent cannulation and ABG draws. Wrist extension may protect the surrounding structures more than causing anterior RA movement.

AUTHORS: Brion Benninger (Western University)

TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Technology

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 - Saturday, 24th September, TTU SUB / Soapsuds)

52. Ulnar Collateral Ligament Ultrasound of the First MCP with High Resolution Probes on Cadavers and Healthy Subjects

INTRODUCTION: The ulnar collateral ligament (UCL) of the first metacarpophalangeal (MCP) joint is commonly injured from a fall causing hyperextension and abduction of the thumb. Diagnosis is made following physical examination and X-ray to rule out avulsion fracture and/or Stener lesion. This study investigated if medical students (MS) could use ultrasound (US) to identify UCL from cadavers and healthy subjects.

METHODS: Literature search was conducted regarding US of UCL by MS. Recently deceased unembalmed donor cadavers (RDUDC) received 324 (108 per probe) trials from MS using 3 different US probes (5-12, 18, 22 MHz) and 42 trials on healthy individuals. All MS conducted timed trials bilaterally.

RESULTS: There is an estimated 200,000 cases annually of ulnar collateral ligament tear at the 1st MCP joint. 216/216 trials successfully identified UCL with 18 & 22 MHz probes, (108 trials failed to clearly identify UCL with 5-12 MHz probe). 42 trials with 18 MHz probe on a healthy individual revealed 57% accuracy on the left side and 74% accuracy on the right.

DISCUSSION: Literature search revealed no known studies regarding medical students identifying UCL with ultrasound. This study demonstrated MS with novice ultrasound skills could identify the UCL using high-resolution probes. UCL injury of the first MCP joint is confirmed by physical diagnosis and X-ray to exclude fractures. However, ultrasound is now becoming the standard to identify UCL tears with or without Stener lesions. Ultrasound allows for dynamic examination during passive movements to review injuries to the UCL distal attachment at the base of the proximal phalanx of the thumb. The 18 MHz probe allowed those students to identify the UCL from RDUDC and healthy volunteers while the 5-12 MHz probe made viewing the UCL very difficult.

CONCLUSION: This study revealed medical students could successfully scan the UCL on cadaveric specimens and healthy volunteers with high resolution probes.

AUTHORS: Brion Benninger (Western University)

TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Technology

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 - Saturday, 24th September, TTU SUB / Soapsuds)

53. Implementing Newly Designed Anatomical Protocol Providing an Ultrasound Footplate to Identify Anterolateral Ligament

INTRODUCTION: The recently (re)defined anterolateral ligament (ALL) has been a hot topic in the media recently. It has become particularly relevant in sports medicine due to its importance in rotational stability of the knee, anterior cruciate ligament injuries and Second fractures. The anatomy and morphology of the ALL has been sufficiently described in multiple anatomical studies; however, imaging of this ligament has been elusive. The objective of this study was to develop a protocol to identify the ALL using ultrasound (US).

METHODS: Literature search was conducted on imaging of the ALL using ultrasound. 12 MHz and 18 MHz US probes were used to identify the ALL in 2 un-embalmed and 2 embalmed donor cadaver patients (DCPs). MRI was completed on one un-embalmed DCP. Deep dissection of the DCPs was completed to reveal the morphology of the ALL. The US protocol was implemented on 40 healthy knees in an attempt to consistently identify the ALL. The protocol was then taught to 20 novice US users and US identification was attempted on a control healthy knee. 20 Novice US users were taught this protocol. 20/20 were able to identify the ALL in a control healthy knee.

RESULTS: Literature search revealed no known studies. The ALL was successfully identified in 40/40 healthy human knees using the US protocol developed on DCPs.

DISCUSSION: Literature search revealed no known studies. The ALL is becoming of increasing interest in sports medicine and orthopedics, but reliance on MRI to diagnose ALL injuries has been inconsistent. MRI and deep dissection confirmed the morphology of the ALL as visualized on US imaging.

CONCLUSION: Ultrasonography can successfully identify the Anterolateral Ligament of the knee in healthy human knees and may be of future value in diagnostic evaluation of rotational instability of the knee, or injuries of the anterior cruciate ligament, lateral collateral ligament, or posterolateral corner.

AUTHORS: Brion Benninger (Western University)

TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in general clinical practice

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 – Saturday, 24th September, TTU SUB / Soapsuds)

54. Innovative Wearable Miniaturized Wireless Wrist-Worn Ultrasound System Developed for Extended Fast Exam with Integrated Dual-Plane Finger Probe

INTRODUCTION: Portable ultrasound (US) has proven to be a valuable triage tool for civilian trauma emergency services. Wilderness medicine and evacuation groups have different limitations regarding portable US. Essentially, they need wearable ultrasound (WU), which is light and efficient. The objective of this study was to further develop WU for dangerous and non-threatening arenas.

METHODS: Literature search was conducted on WU. We collaborated with Sonivate to develop a dual-plane ultrasound finger probe (DPFP). Previous WU prototypes were wearable and successfully acquired images, but size and weight were unacceptable. Fukuda-Denshi UF-76OAG US system will be integrated with SonicEye DPFP to address weight and size. The system will communicate wirelessly with a "smart" phone, tablet or computer. WU will be tested with medical students conducting the extended FAST exam on donor cadavers and subsequently with healthy individuals.

RESULTS: Literature search revealed no known results. The 3rd has conducted previous research with WU. This study successfully acquired diagnostic quality images with acceptable size and weight considerations.

DISCUSSION: Literature search revealed one previous study by the research team. Novel DPFP is 2nd generation device based on Sonivate's original prototype. It was developed and built for the military arena with benefits to civilian medicine. WU with integrated DPFP was successfully designed. It is extremely difficult to manage US technology in the field. The research team has experience with designing and developing WU. This project demonstrates the design and development of the evolving WU technology. Second generation design will be tested on donor cadavers and healthy individuals for image acquisition, quality of imaging and wearable practicality. Testing on donor cadavers has proven a useful training ground for medical students and could be used to train providers. It will enable the provider to become efficient with US while learning relevant anatomy.

CONCLUSION: This study successfully demonstrated a DPFP which acquired quality images, integrated with a newly designed 2nd generation wearable US to be used efficiently by providers in both dangerous and non-threatening arenas.

AUTHORS: Brion Benninger (Western University)

TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Point of Care ultrasound in general clinical practice, Technology

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 – Saturday, 24th September, TTU SUB / Soapsuds)

55. Using Triple Stimulation Provides A Powerful Learning Tool Integrating Surface Anatomy Landmarks With Ultrasound Imaging To Augment Medical Students' Physical Examination Skills

INTRODUCTION: Anatomy is the cornerstone and foundation of medicine and other human sciences. Learning anatomy is generally focused deep beneath the skin. Invasive procedures that require needle placement can be more accurately positioned by using ultrasound and understanding visual and palpable surface anatomy landmarks. The objective of this study was to identify clinically important surface and palpable anatomy representing common pathology.

METHODS: Literature search was conducted regarding surface anatomy teaching in high-school baccalaureate, and medical school levels. Fukuda Denshi UF-760 AG ultrasound system with a novel Sonic Eye finger probe was used to identify neurovascular and muscle-tendon structures, osteology landmarks, and organs while recording the surface landmark to target vector angle for optimum visualization. Ten healthy volunteers were imaged for surface anatomy landmarks of the trunk, limbs, and head & neck. Once target structures were identified, Molotow skin writing markers were used to draw and outline target structures.

RESULTS: All ten subjects consistently revealed common landmarks for both surface and palpable anatomy. Ultrasound confirmed neurovascular and muscle-tendon structures, osteology landmarks, and organs that were mapped out onto a volunteer for the body art. Subjects successfully drew the organ outlines from ultrasound. **DISCUSSION:** Literature search revealed no known studies regarding surface anatomy with ultrasound guidance for anatomy teaching k-12, baccalaureate, and medical school teaching. This study developed a surface anatomy module that was used by k-12, baccalaureate, and medical students. Surface anatomy should have at least two major components, one being visual and the second being palpable. Generally when people are learning surface anatomy they do not use ultrasound to confirm what is deep to the surface or the palpable landmarks. This study demonstrated the utility of using ultrasound to identify the architecture beneath surface contours of common landmarks. This pilot study was successful when conducted with a group of 20 medical students and is now ready for trial with larger groups.

CONCLUSION: This study revealed triple stimulation can be applied to learn surface anatomy while integrating a dynamic ultrasound image modality which could have a profound effect on physical examination skills.

AUTHORS: Brion Benninger (Oregon Health & Science University)

TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Technology

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 – Saturday, 24th September, TTU SUB / Soapsuds)

56. Sustainable Medical Student Directed International Ultrasound Projects

INTRODUCTION: Education for medical students at UC Irvine (UCI) has been significantly enhanced through the integration of ultrasound into the curriculum [1]. It deepens students' understanding of medicine, provides avenues for new research opportunities, and increases the fund of knowledge that these students are able to share in both their local communities and abroad. Previous studies have shown that medical students are able to accurately and effectively learn basic, point-of-care ultrasound after 16 standardized training hours, and in turn teach these skills to others [1,2]. In addition, follow up studies have shown that those who learn ultrasound from medical students are able to reach the required competency level to continue using ultrasound accurately in a clinical setting [3,4,5]. In an effort to both use and improve their newly developed ultrasound skills, students have organized trips abroad to areas where fast and efficient imaging modalities are desperately needed. These students have participated in a wide range of research projects, some of which include: imaging abdominal schistosomiasis and tuberculosis, teaching healthcare workers obstetrical triage ultrasound to assist childbirth in remote villages, and screening

for gallstones and pediatric heart disease. Additionally, other projects have focused on disseminating ultrasound knowledge through arranging ultrasound electives at international, rural-based medical schools.

METHODS/RESULTS: In the past four years since these projects began, over 150 UCI students have traveled abroad to enrich their medical school experience through teaching point-of-care ultrasound. Students have traveled to Australia, Brazil, India, Indonesia, Ireland, Ethiopia, Nicaragua, Panama, Romania, Switzerland, Tanzania, Turkey, and Vietnam. Many of these projects have become longitudinal in that students are returning to build upon the advances of the previous class and create sustainable projects for the communities they are serving. We now have four generations of students who have traveled Panama and Tanzania to continue and improve upon ultrasound projects. The most recent group to travel abroad (2016) was unique in that a single overarching IRB was created for ultrasound education research in order to add power to their studies. These trips have collectively resulted in 8 publications in peer-reviewed journals, 10 podium presentations, and over 50 poster presentations.

DISCUSSION: The impact of these projects is multi-fold. There is benefit to those underserved areas where students travel, through providing an imaging modality to

detect pathology that would normally be missed. There is the additional benefit of promoting sustainability through teaching international medical students and healthcare workers, who will continue to use ultrasound in their communities. With the positive feedback UCI students have continuously given over the years upon returning from their trips, it is evident that this experience is both productive and stimulating for their medical education. By encouraging students to continue to pursue their interests within ultrasound as clinicians, researchers, and educators, we are creating more competent physicians with a better understanding of a broad variety of cultures, pathology, and practice methods. Our hope is that through publicity of our projects, international ultrasound programs like ours can be implemented at other medical schools.

The organization of these projects has been completely student run, initially through our Ultrasound Student Interest Group (USIG). The popularity and growth of these projects prompted the development of a separate student-run group, the UCI International Initiative, focused solely on international ultrasound research projects. This group holds events throughout the year to prepare students for their summer abroad, including workshops on IRB submission, grant applications, and fundraising. In our experience, funding has been the greatest obstacle. In 2012, UCI received a generous \$100,000 donation

to fund these trips, which supported four generations of projects through the summer of 2016. The UCI International Initiative's focus has shifted from fairly distributing existing grant funds, to now strategizing with groups to optimize crowdfunding while pursuing additional large-scale funding sources.

CONCLUSION: Students at UCI are fortunate to have ultrasound training built into the curriculum, which allows us to develop a unique skill that most medical students do not have. In the spirit of our school motto, "Discover, Teach, Heal," we have decided to use our ultrasound knowledge to discover new uses for ultrasound abroad with hope that this can lead to the healing of those who might usually go untreated.

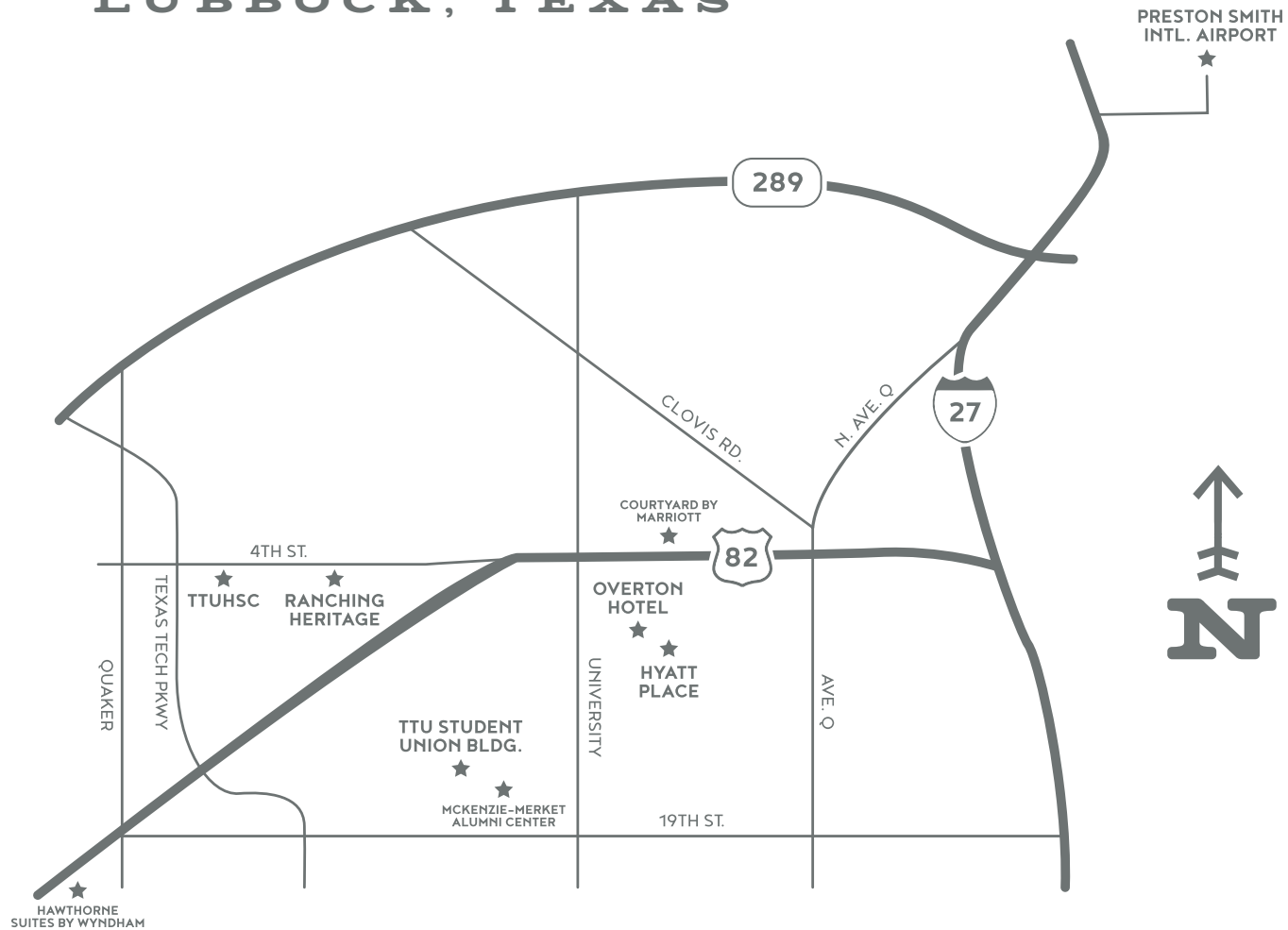
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TOPIC AREAS: Use of ultrasound in Undergraduate Medical Education, Use of ultrasound in Graduate Medical and Continuing Education, Point of Care ultrasound in health care delivery to underserved populations

SESSION: C8 » Oral Presentation 7: Ultrasound in Undergraduate Medical Education (1:00 – Saturday, 24th September, TTU SUB / Soapsuds)



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TEXAS TECH UNIVERSITY STUDENT UNION BUILDING

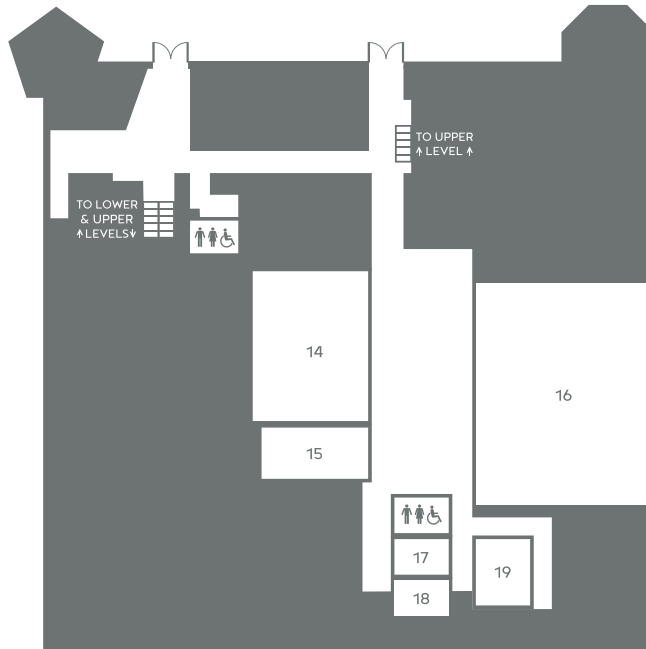
1. Bell Tower
2. Arroyo
3. Caprock
4. Canyon

5. Masked Rider
6. Double T
7. Playa
8. Brazos

9. Mesa
10. Traditions
11. Soapsuds
12. Lone Star

13. Matador
14. RR - Ballroom
15. RR - Lounge
16. Allen Theatre

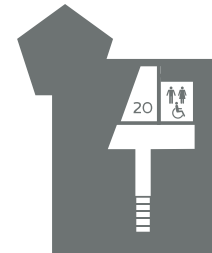
17. Llano Estacado
18. Lubbock
19. Senate
20. Escondido Theatre



GROUND LEVEL



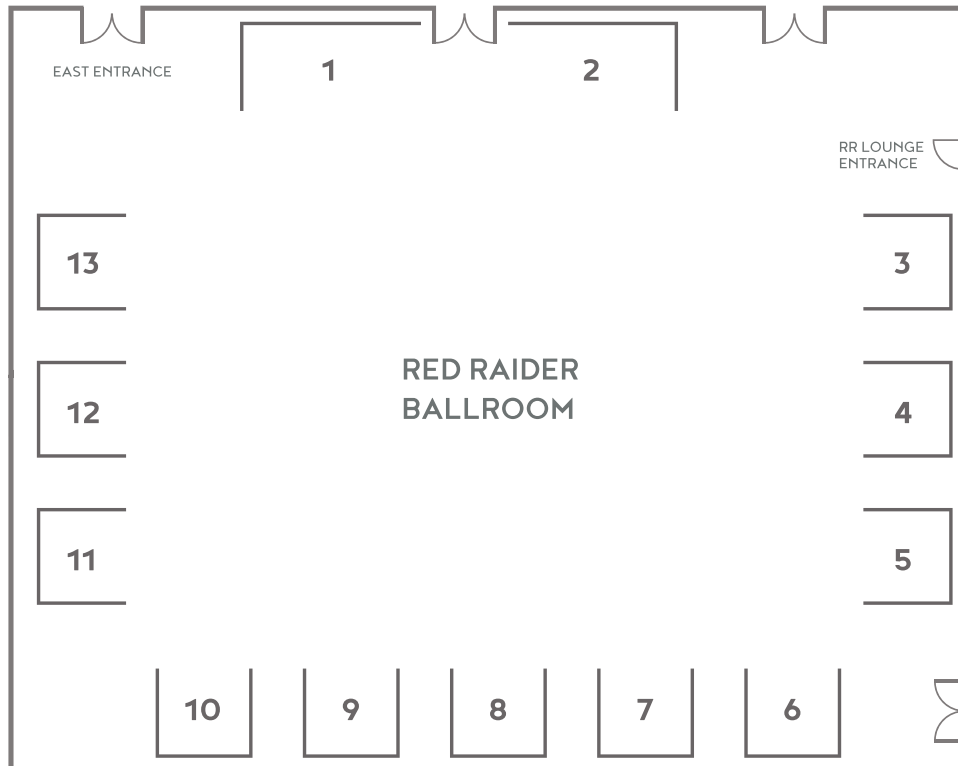
UPPER LEVEL



LOWER LEVEL



EXHIBITOR HALL



1. GE Healthcare
2. GE Healthcare
3. Philips
4. FujiFilm SonoSite
5. SonoSim, Inc.
6. Telexy
7. MedaPhor
8. Clarius Mobile Health
9. Touch of Life Technologies
10. Society of Ultrasound in Medical Education
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