Point-of-Care Ultrasound in Low Resource Settings

Sally Graglia, MD, MPH
University of California, San Francisco – Zuckerberg San Francisco General
Director of Medical Student Ultrasound Educator

Overview

- Introduction
- What is Point-of-care Ultrasound (POCUS)?
- Historical context
- Point-of-care Ultrasound (POCUS) Utility
- Program development
- Cases
  - Basics
  - Tropical/low resource environments
  - “Indication creep”
- Conclusion

Goals

- Share my experience
- Provide brief overview to building programs in low-resource environments
- Spread the word: POCUS Potential
- Become a resource for you!


FLU
UCSF
21378800897253
Sally Graglia, MD, MPH
Assistant Clinical Professor
Emergency Medicine
DOCTOR

Students Faculty & Staff Parents Alumni Map Directory bConnected News Search Berkeley Web

Berkeley
UNIVERSITY OF CALIFORNIA

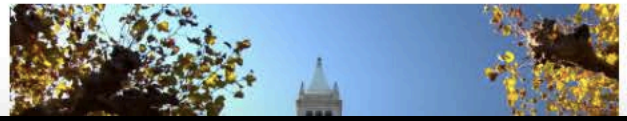
About Admissions Academics Research Campus Life

About Berkeley

The University of California was founded in 1868, born out of a vision in the State Constitution of a university that would "contribute even more than California's gold to the glory and happiness of advancing generations."

By the numbers

From faculty awards to the number of books in our libraries, see Berkeley through its facts and figures.



UC DAVIS HEALTH | SCHOOL OF MEDICINE

Student-Run Clinics

See how our medical students help provide care in the Greater Sacramento Area

Pause

Student Resources

Faculty and Staff

- Admissions
- Education Programs
- Academic and Clinical Departments
- Graduate Medical Education

ABOUT ACADEMICS ADMISSIONS DEPARTMENTS RESEARCH STUDENT LIFE PRACTICE & TRAINING NEWS GIVING

JOHNS HOPKINS
BLOOMBERG SCHOOL
of PUBLIC HEALTH

Protecting Health, Saving Lives—*Millions at a Time*

COVID-19: What You Need to Know

The Center for Health Security's situation reports, fact sheets, travel updates, and more

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Join the Conversation #PowerOfPublicHealth

Program Information

Medical Student Programs

Residency Programs

The UCSF-ZSFG Emergency Medicine residency program is a four-year ACGME-accredited program. Graduates meet the eligibility criteria to sit for the American Board of Emergency Medicine (ABEM) Qualifying Examination.

The primary goal of the UCSF-ZSFG Emergency Medicine residency program is to educate physicians in the unique body of knowledge and skills that comprise the discipline of emergency medicine. Central to this goal is the development of a high level of competence in the immediate recognition, evaluation and


MGH
1811


SFGEDXPORTE06
SonoSite
RESUSCITATION


SonoSite
M-Turbo
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Res
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8%
MI
0.7
TIS
0.1
2.7
Res
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MB On
Dual
Page 1/2
Setup
Report
Review
Pattern
Zoom
Depth
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B
Exam
AutoGain
Set
Select
Save Calc
Update
Caliper
Calcs
Clip
Save
M Mode
Doppler
Color
2D
Freeze


1:33
Delete
Simpson's EF
Estimated EF
Auto-calculated via Simpson's (monoplane)
56%
Edit
Save

What is Point-of-Care Ultrasound?

- Dynamic
- Safe
- Portable
- Focused
- Ideal

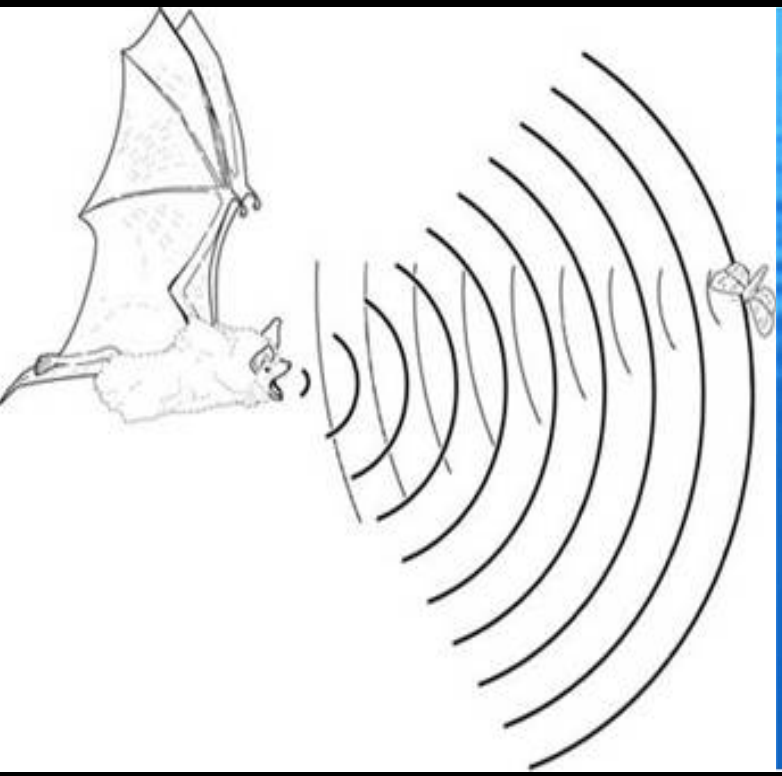
Point-of-Care Ultrasound is NOT:

- A replacement for a thorough history and physical exam
- A replacement for a comprehensive, radiology-performed ultrasound
- A biopsy

What is ultra-sound?

- Sound
  - the transfer of mechanical energy from a vibrating source to another through a medium
- Ultra
  - Human hearing is in the range from 20 Hz - 20,000 Hz (20 KHz or 0.02 MHz)
  - Ultra-sound is a frequency above the human audible range, i.e. above 20 kHz
  - Most point of care ultrasound applications use frequencies between 2-10 MHz

What is ultra- sound?

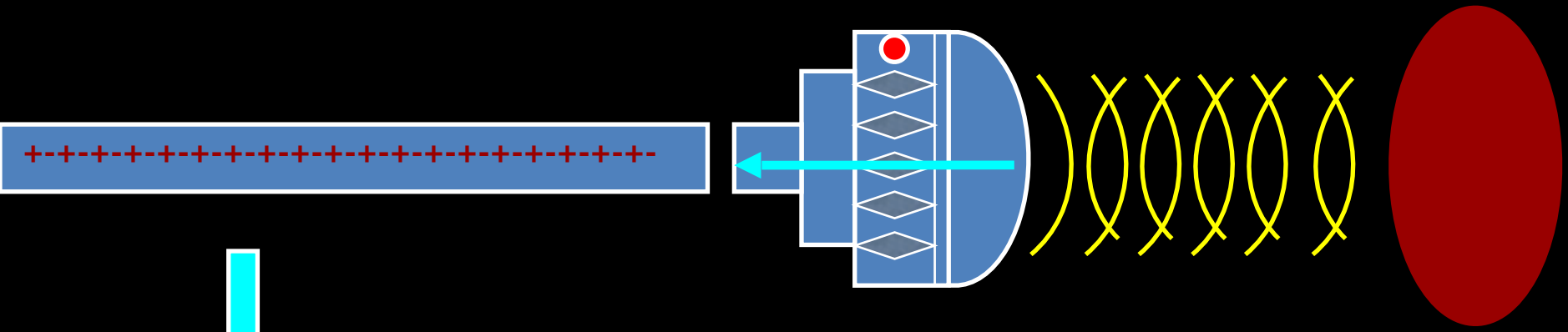


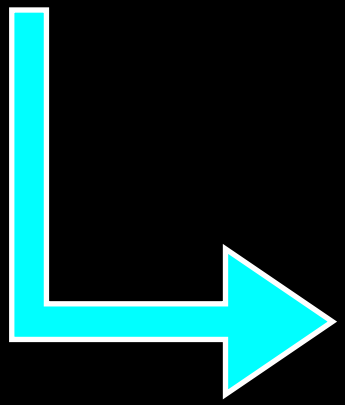
How does ultrasound work?

Electricity

Crystals

Sound






Voluson
E8
49Hz/10.7cm
60°/1.3
1 Trim./OB
HI M 7.90 - 4.50
Gn -2
C6/M7
FF4/E2
SRI II 2/CRI 2

The PURE Initiative: Point-of-care Ultrasound in Resource-limited Environments

LATEST NEWS

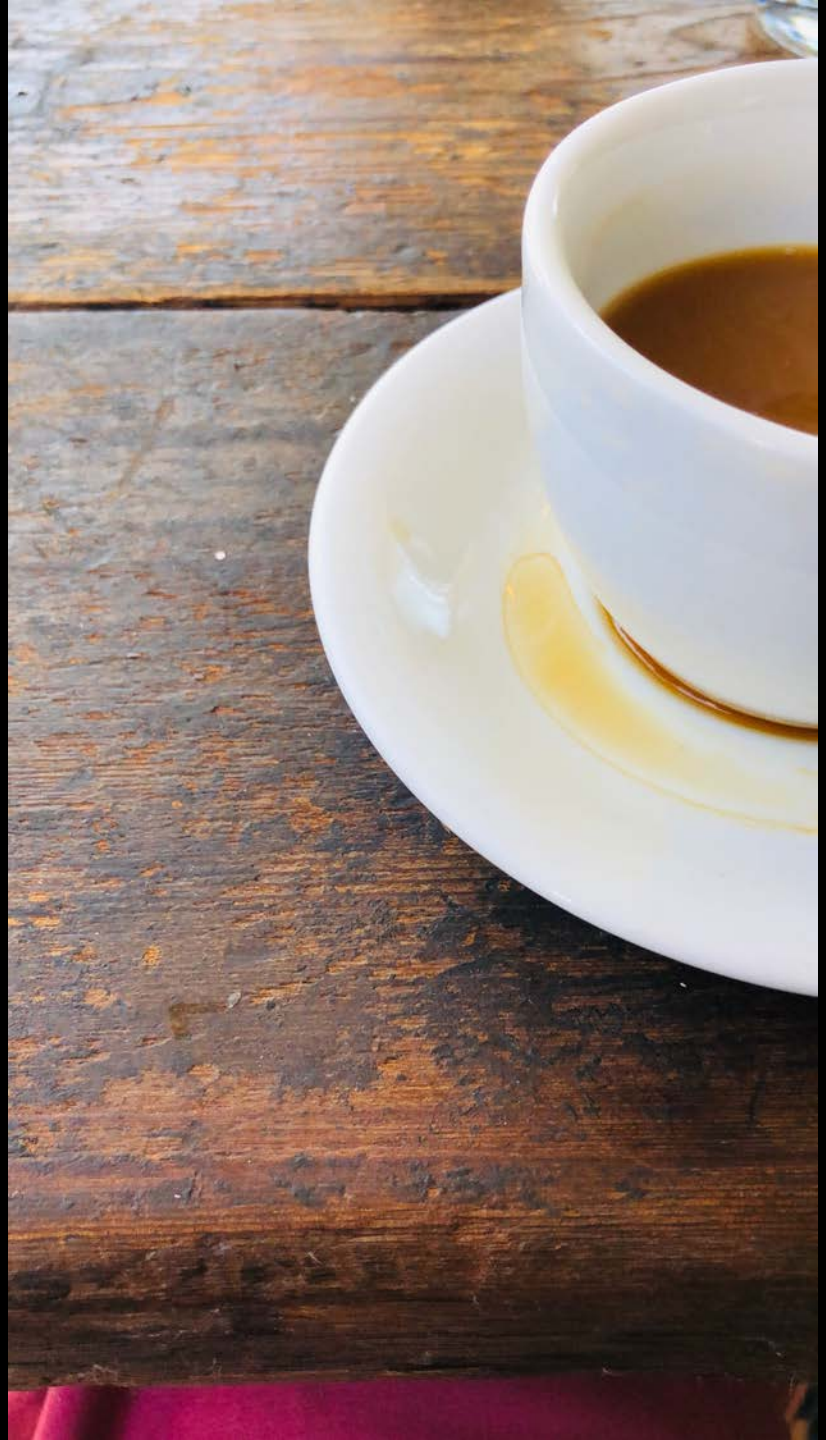
REGIONAL PURE TEAM UPDATES – APRIL 2019

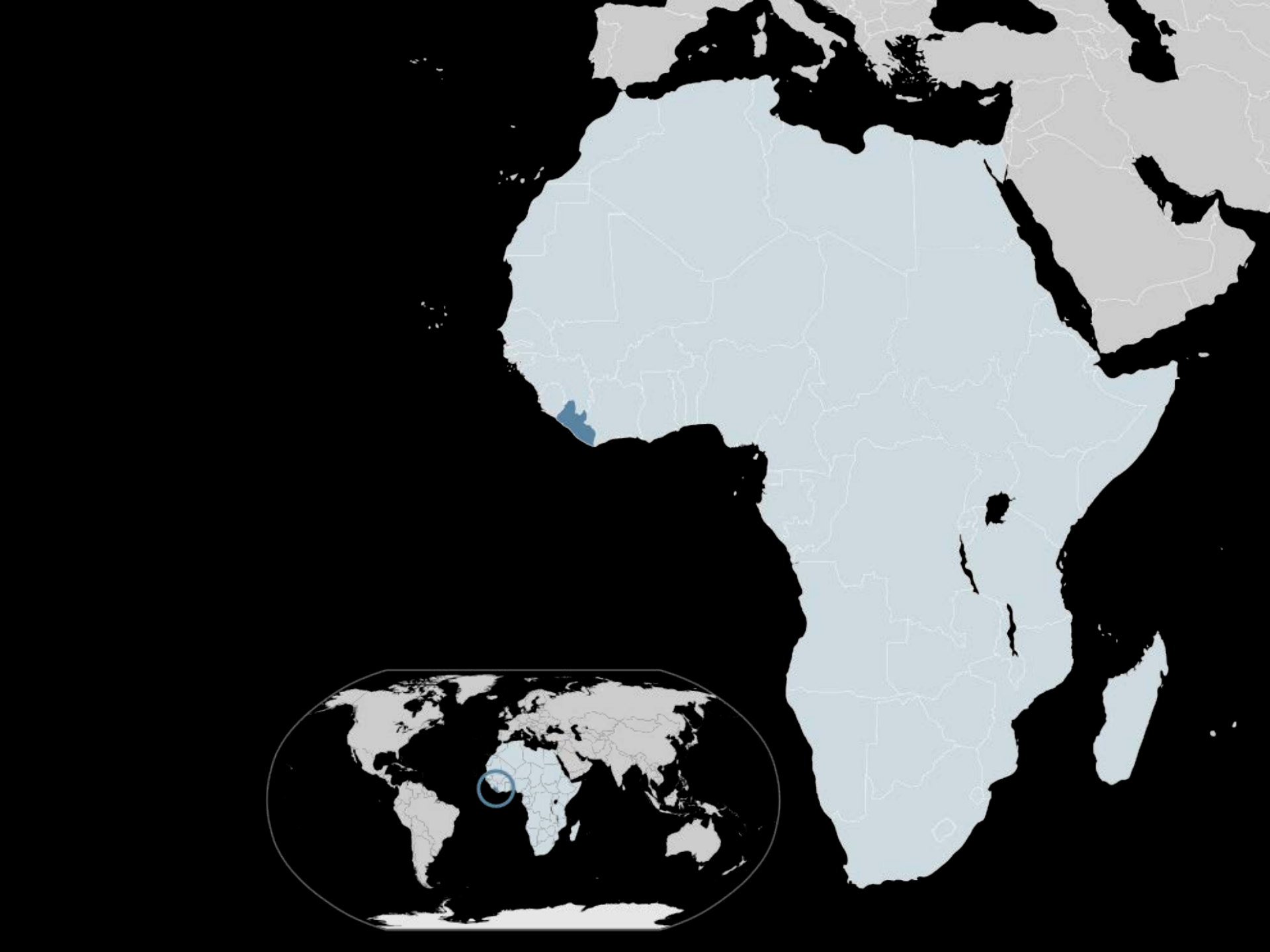
APRIL 10, 2019 SAM

PURE GALLERY

Boston Children's Hospital

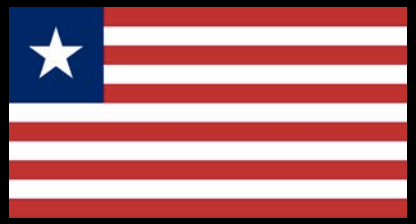
Until every child is well℠





Historical Context

1822



1847


MONROVIA CITY CORPORATION PRESENTS THE 16 TRIBAL MASKS OF LIBERIA
KPELLE
GIO
DEY
GBANDI
MANO
KISSI
KRU
GOLA
GREBO
BASSA
MENDE
BELLE
LORMA
KRAHN
VAI
MANDINGO

SHOW LOVE AND CONCERN FOR PEOPLE LIVING WITH HIV

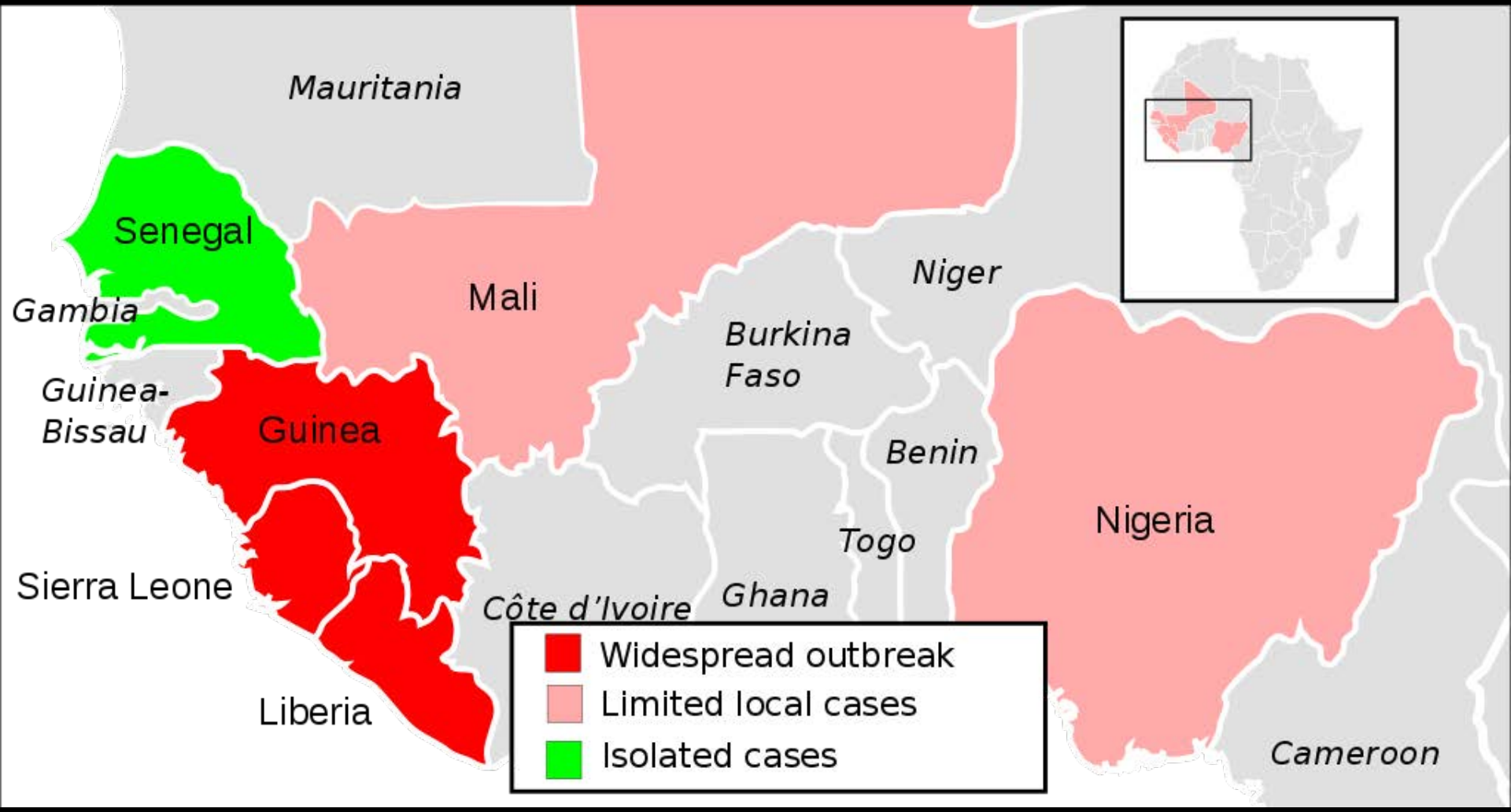
THEY ARE JUST LIKE YOU

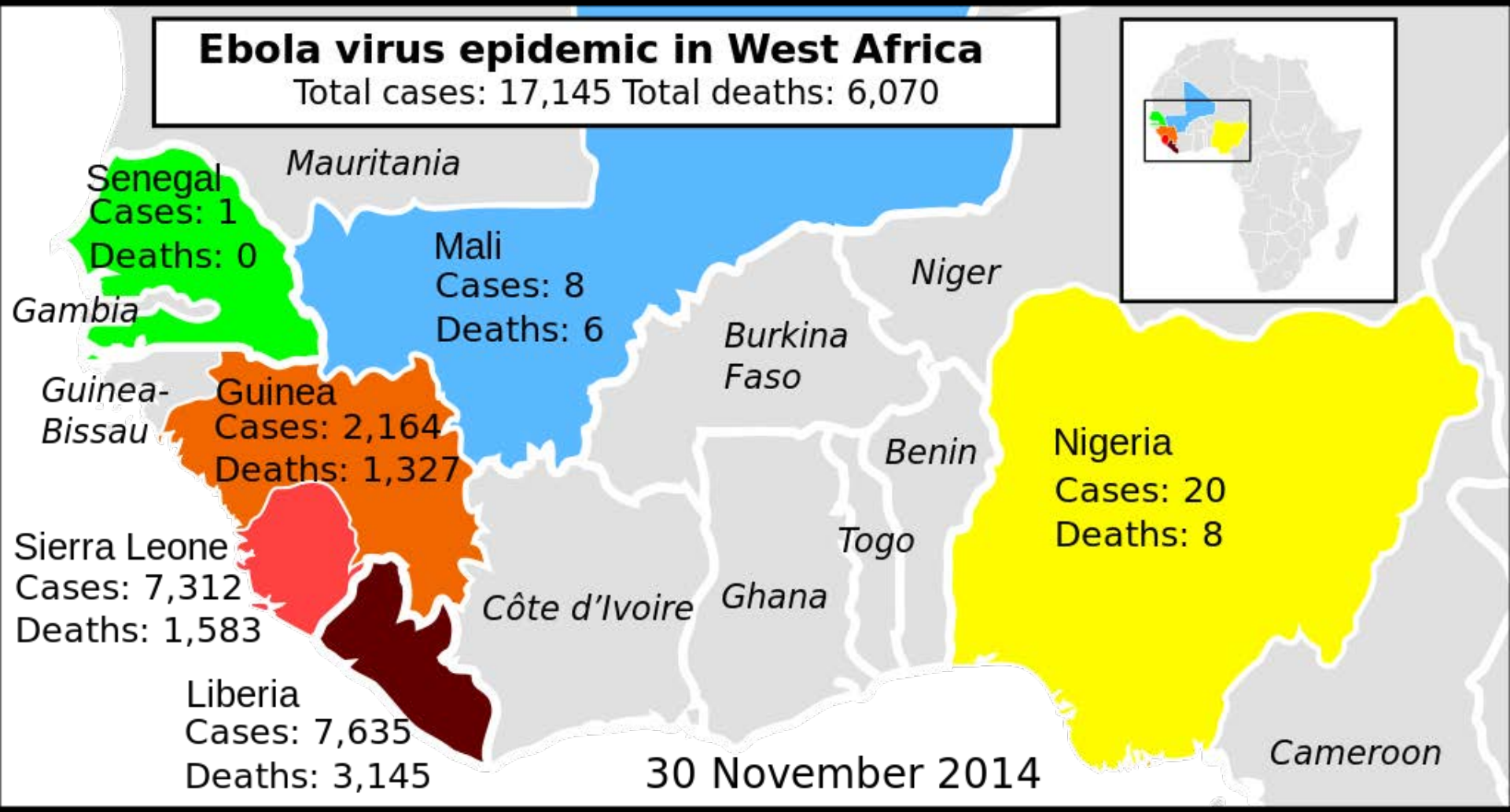
KNOW YOUR


Beer

In 2006, there were 51 doctors for a population of 3.8 million people.

March 30, 2014


Mauritania
Senegal
Gambia
Mali
Niger
Burkina Faso
Guinea-Bissau
Guinea
Benin
Nigeria
Togo
Sierra Leone
Ghana
Côte d'Ivoire
Liberia
Cameroon
Widespread outbreak
Limited local cases
Isolated cases


Ebola virus epidemic in West Africa
Total cases: 17,145 Total deaths: 6,070
Mauritania
Senegal
Cases: 1
Deaths: 0
Gambia
Mali
Cases: 8
Deaths: 6
Niger
Burkina Faso
Guinea-Bissau
Guinea
Cases: 2,164
Deaths: 1,327
Benin
Nigeria
Cases: 20
Deaths: 8
Sierra Leone
Cases: 7,312
Deaths: 1,583
Togo
Côte d'Ivoire
Ghana
Liberia
Cases: 7,635
Deaths: 3,145
30 November 2014
Cameroon

Ultrasound Utility


SonoSite
M-Turbo
2018Jan04 03:36
Res
S
MB
Msk
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TIS
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2.7
Res
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Select
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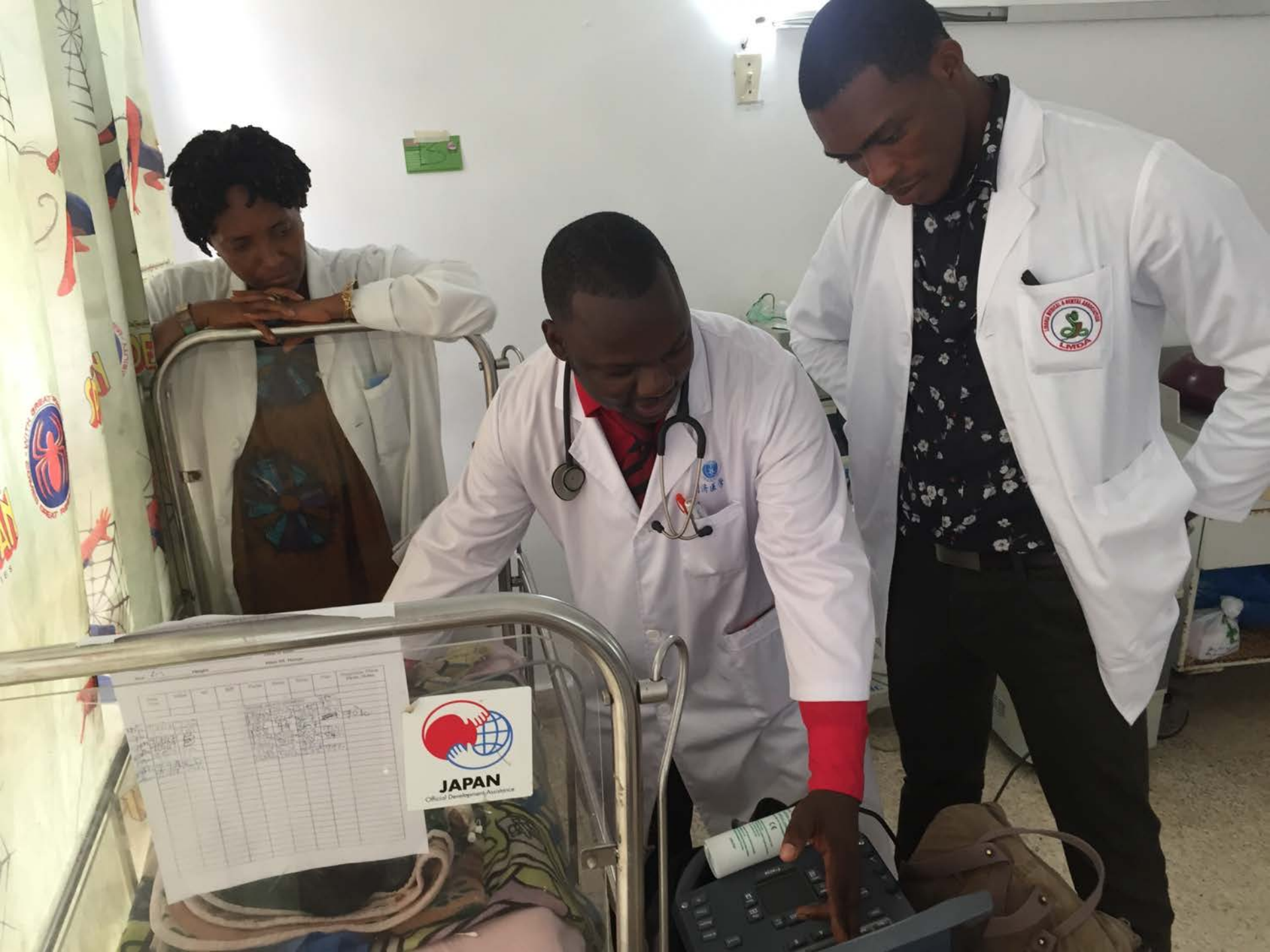
Freeze


JFK
MEMORIAL
HOSPITAL
EMERGENCY


JAPAN
Official Development Assistance

Ultrasound Track

Ultrasound Track

Ultrasound Track

Ultrasound Track

Program Development

1) Mentorship

2) Relationship


UB BEER OUTLET

3) Buy-in


LIBERIA
PROGRAM
(2015-2021)

4) Thoughtful integration

Monday
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Wednesday
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Thursday
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Friday
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Saturday
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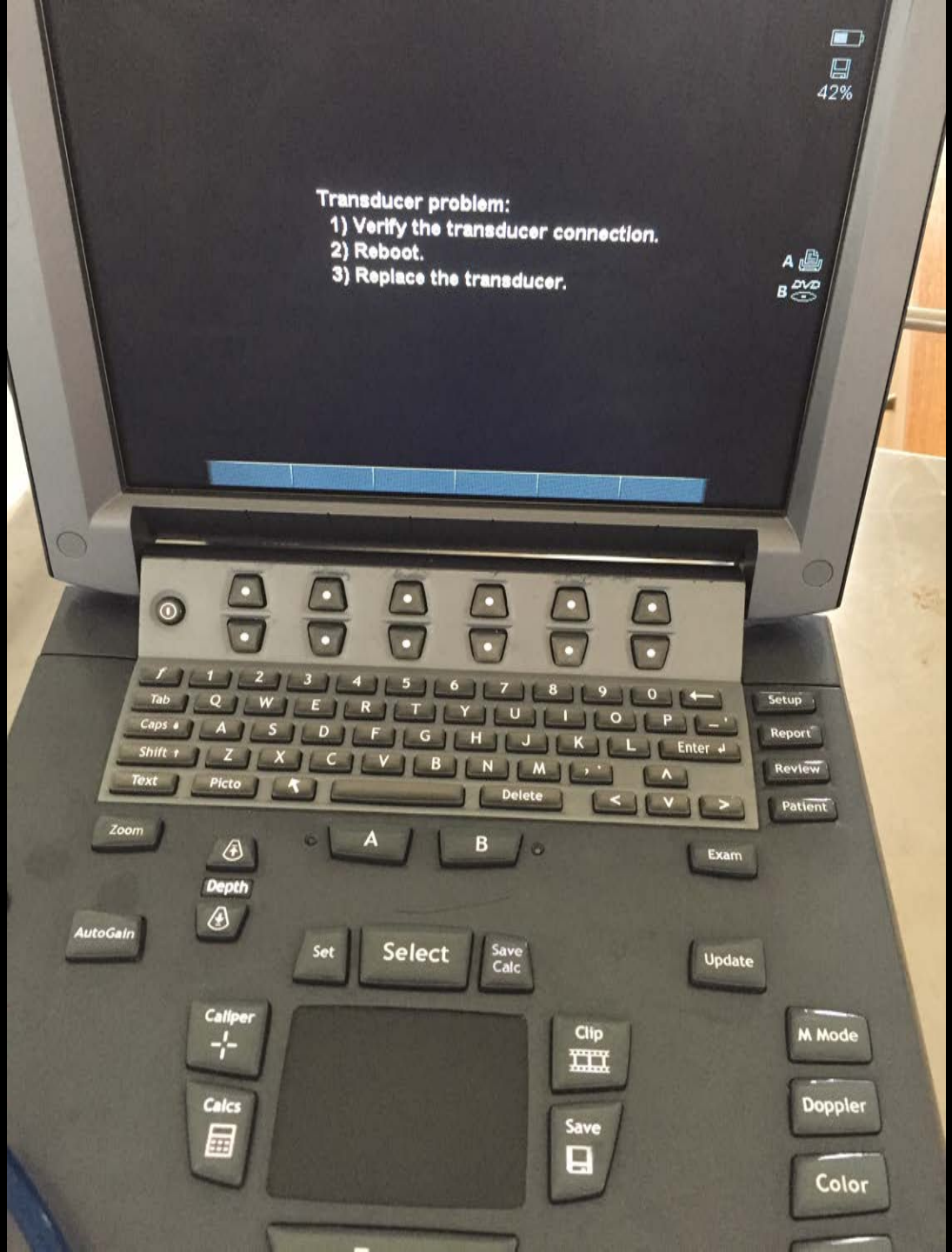
Sunday
25

5) Equipment


42%
Transducer problem:
1) Verify the transducer connection.
2) Reboot.
3) Replace the transducer.
A
B DVD
Setup
Report
Review
Patient
Zoom
A
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Exam
Depth
AutoGain
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Update
Caliper
Clip
M Mode
Calcs
Save
Doppler
Color


UNIVERSAL
Note: If Power Supply appears to be non-functional, disconect AC power cord from wall outlet for 20 seconds, then reconnect.
SonoSite
FUJIFILM
Power Supply(电源适配器)
REF 型号P09823 – 06
Input (输入): 100 – 240V~ 50 – 60Hz 2.0 – 1.0A
Output (输出)#1: + 15V ⎓ 5A
Output (输出)#2: + 9 to 12.6V ⎓ 2.3A
Combined output not exceeding 75W
Distributed by (经销商):
FUJIFILM SonoSite Inc
Bothell,WA 98021 – 3904 USA
Manufactured by (制造商):
ICC Electronics (Dongguan)Ltd.
辉碧电子（东莞）有限公司
3rd Row,Block A,Shangyuan Road,
2nd Industrial Zone,Qingxi Town,
Dongguan City,P.R.China.523640
Power Supply Model(型号) REF 4083F
LR53696
C US
N16130
S&E
No user serviceable parts inside
机内无使用者可操作的元件
LOT (批次) 2013-04
REV.(版次) : C
Made in China
(中国制造)
SERIAL NO(序列号): 053089
06


EDAN

USI-1057

Medicine Trolley with 4 Drawer

- Overall Approx. Size: 76L x 46W x 81Hcms
- Frame work of MS tubes mounted on 10cms castors
- Two SS shelves with three side railing on top shelf
- Two drawer under the each shelf
- Epoxy Powder Coated Finish

USI-40D

Case History Trolley

- Approx. Size : 680 x 400 x 850 mm
- Made of ABS Material
- Double row , 40 layers with a drawer
- 3" Castor

USI-20D

Case History Trolley

- Approx. Size : 336 x 400 x 850 mm
- Made of ABS Material
- Single row , 20 layers with a drawer
- 3" Castor

USI-805

Utility Trolley (Two shelves)

- m.s. Frame work
- s.s. Shelves
- one m.s. Drawer
- 10 cms castors

USI-971

X-Ray View Box

A-For one film
B-For two film
C-For three film
D-For four film


accel
in collaboration with
Liberia College of Physicians and Surgeons

6) Standards

Emerg
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American
Emergenc
ADVANCING EMERGENC

Approved October 2008

Revised and approved by the ACEP Board of Directors October 2008

Originally approved by the ACEP Board of Directors June 2001

Section 1: Int

Emergency ul
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ACEP Policy Statement

Emergency Ultrasound Imaging Criteria Compendium

Approved by ACEP
Board of Directors
April 2006

This compendium contains the following criteria:

- Aorta
- Biliary
- Echocardiography
- Pelvic Ultrasound
- Renal
- Trauma
- Ultrasound-Guided Procedures
- Venous Thrombosis

Aorta

1. Introduction

The American College of Emergency Physicians (ACEP) has developed these criteria to assist practitioners performing emergency ultrasound studies (EUS) of the abdomen and retroperitoneum in patients suspected of having an acute abdominal aortic aneurysm (AAA).

Ultrasound has been shown to be accurate in identifying both aneurysmal and normal abdominal aortas. In most cases, EUS is used to identify or exclude the presence of infrarenal AAA. In some cases, EUS of the abdominal aorta can also identify the presence of suprarenal AAA or of distal dissection. If thoracic aortic aneurysm or proximal dissection is suspected, these may be detected using transthoracic techniques or may require additional diagnostic modalities. Patients in whom AAA is identified also need to be assessed for free intraperitoneal fluid.

EUS evaluation of the aorta occurs in conjunction with other EUS applications and other imaging and laboratory tests. It is a clinically focused examination, which, in conjunction with historical and laboratory information, provides additional data for decision-making. It attempts to answer specific questions about a particular patient's condition. While other tests may provide information that is more detailed than EUS, have greater anatomic specificity, or identifies alternative diagnoses, EUS is non-invasive, is rapidly deployed and does not entail removal of the patient from the resuscitation area. Further, EUS avoids the delays, costs, specialized technical personnel, the administration of contrast agents and the biohazardous

2016 Model of the Clinical Practice of Emergency Medicine

The Core Content Task Force II created and endorsed the 2001 Model of the Clinical Practice of Emergency Medicine (EM Model) as published in the June 2001 Annals of Emergency Medicine and Academic Emergency Medicine.

The 2016 EM Model Review Task Force conducted the seventh review of the EM Model. Their work is built on the original 2001 EM Model and the subsequent four revisions. The 2016 EM Model is published online in the March 2017 *Journal of Emergency Medicine*.

All changes that resulted from the 2016 EM Model Review Task Force are summarized in Figure 1.

Preamble of the Core Content Task Force II, Adapted for the 2016 EM Model

In 1975, the American College of Emergency Physicians and the University Association for Emergency Medicine (now the Society for Academic Emergency Medicine; SAEM) conducted a practice analysis of the emerging field of Emergency Medicine. This work resulted in the development of the Core Content of Emergency Medicine, a listing of common conditions, symptoms, and diseases seen and evaluated in emergency departments. The Core Content listing was subsequently revised four times, expanding from 5 to 20 pages. However, none of these revisions had the benefit of empirical analysis of the developing specialty but relied solely upon expert opinion.

2016 EM Model Review Task Force

Francis L. Counselman, M.D., Chair
Kavita Babu, M.D.
Mary Ann Edens, M.D., MPH
Diane Gorgas, M.D.
Cherri Hobgood, M.D.
Catherine A. Marco, M.D.
Eric Katz, M.D.
Kevin Rodgers, M.D.
Leonard Stallings, M.D.
Michael C. Wadman, M.D.

2013 EM Model Review Task Force

Francis L. Counselman, M.D., Chair
Marc A Borenstein, M.D.
Carey D. Chisholm, M.D.
Michael L. Epter, D.O.
Sorabh Khandelwal, M.D.
Chadd K. Kraus, D.O., MPH
Samuel D. Luber, M.D., MPH
Catherine A. Marco, M.D.
Susan B. Promes, M.D.
Gillian Schmitz, M.D.

2011 EM Model Review Task Force

Debra G. Perina, M.D., Chair
Patrick Brunett, M.D
David A. Caro, M.D.
Douglas M. Char, M.D.
Carey D. Chisholm, M.D.
Francis L. Counselman, M.D.
Jonathan Heidt, M.D.
Samuel Keim, M.D., MS
O. John Ma, M.D.

2009 EM Model Review Task Force

Debra G. Perina, M.D., Chair
Michael S. Beeson, M.D
Douglas M. Char, M.D.
Francis L. Counselman, M.D.
Samuel Keim, M.D., MS
Douglas L. McGee, D.O.
Carlo Rosen, M.D.
Peter Sokolove, M.D.
Steve Tantama, M.D.

2007 EM Model Review Task Force

Harold A. Thomas, M.D., Chair
Michael S. Beeson, M.D
Louis S. Binder, M.D.
Patrick H. Brunett, M.D.
Merle A. Carter, M.D.
Carey D. Chisholm, M.D.
Douglas L. McGee, D.O.
Debra G. Perina, M.D.
Michael J. Tocci, M.D.

2005 EM Model Review Task Force

Harold A. Thomas, M.D., Chair
Louis S. Binder, M.D.
Dane M. Chapman, M.D., Ph.D.
David A. Kramer, M.D.
Joseph LaMantia, M.D.
Debra G. Perina, M.D.
Philip H. Shayne, M.D.
David P. Sklar, M.D.
Carnie J. Sorensen, M.D., M.P.H.

2003 EM Model Review Task Force

Robert S. Hockberger, M.D., Chair
Louis S. Binder, M.D.
Carey D. Chisholm, M.D.
Jeremy T. Cushman, M.D.
Stephen R. Hayden, M.D.
David P. Sklar, M.D.
Susan A. Stern, M.D.
Robert W. Strauss, M.D.
Harold A. Thomas, M.D.
Diana R. Viravec, M.D.

Core Content Task Force II

Robert S. Hockberger, M.D., Chair
Louis S. Binder, M.D.
Mylissa A. Graber, M.D.
Gwendolyn L. Hoffman, M.D.
Debra G. Perina, M.D.
Sandra M. Schneider, M.D.
David P. Sklar, M.D.
Robert W. Strauss, M.D.
Diana R. Viravec, M.D.

Advisory Panel to the Task Force

William J. Koenig, M.D., Chair
James J. Augustine, M.D.
William P. Burdick, M.D.
Wilma V. Henderson, M.D.
Linda L. Lawrence, M.D.
David B. Levy, D.O.
Jane McCall, M.D.
Michael A. Parnell, M.D.
Kent T. Shoji, M.D.

19.5 **Ultrasound**

19.5.1 Diagnostic ultrasound

19.5.2 Procedural ultrasound

The Emergency Medicine Milestone Project

A Joint Initiative of

The Accreditation Council for Graduate Medical Education

and

The American Board of Emergency Medicine

12. Other Diagnostic and Therapeutic Procedures: Goal-directed Focused Ultrasound (Diagnostic/Procedural) (PC12) Uses goal-directed focused Ultrasound for the bedside diagnostic evaluation of emergency medical conditions and diagnoses, resuscitation of the acutely ill or injured patient, and procedural guidance.					
Has not Achieved Level 1	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
	Describes the indications for emergency ultrasound	Explains how to optimize ultrasound images and Identifies the proper probe for each of the focused ultrasound applications Performs an eFAST	Performs goal-directed focused ultrasound exams Correctly interprets acquired images	Performs a minimum of 150 focused ultrasound examinations	Expands ultrasonography skills to include: advanced echo, TEE, bowel, adnexal and testicular pathology, and transcranial Doppler
☐	☐	☐	☐	☐	☐
Comments:					

Suggested Evaluation Methods: OSCE, SDOT, videotape review, written examination, checklist

UCSF ED Point-of-Care Lower Extremity Vascular Ultrasound Protocol

Anatomy: An understanding of the anatomy is vital to this study, specifically the following facts.

A) The External Iliac Artery and Vein pass beneath the inguinal ligament and emerge as the Common Femoral Artery (CFA) and Common Femoral Vein (CFV), with the vein medial (CVA = Crotch, Vein, Artery or "Venous –> Penis," as you prefer.

B) The CFA bifurcates into the Superficial Femoral Artery (SFA) and Profunda Femoris Artery (PFA) about 2-3cm below this point.

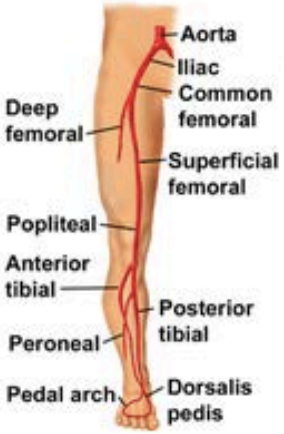
C) At about that same level, the Greater Saphenous Vein (GSV) empties into the CFV at the Saphno-Femoral Junction (SFJ) from the medial side.

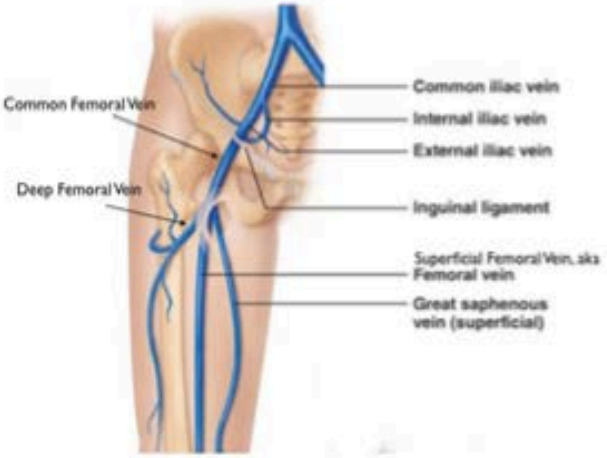
D) Just distal to this, the CFV splits into the Superficial Femoral Vein (SFV) and the Deep Femoral Vein (DFV).

E) Both the PFA and the DFV dive deep (and lateral) into the thigh after splitting off. You won't see them on ultrasound after this point.

F) The SFA and SFV continue together like lovers in springtime down the thigh and, after diving through the adductor hiatus, emerge as the popliteal artery (PA) and vein (PV).

***Note that the SFV is a deep vein, not a superficial one** (it's the main deep vein of the upper leg) and a clot in this vessel is absolutely 100% a DVT. Confusion over this nomenclature has led UCSF Radiology to push for re-naming the SFV the "Femoral Vein" (FV) instead, although this has not caught on outside of this institution. In our ED, SFV is preferred since this is how the label on our ultrasound machines are set up.





Observed Structured Clinical Exam FAST Assessment Form

(To be completed by the Evaluator observing the clinician/Trainee use of ultrasound)

Trainee: _____ Date: _____

Evaluator: _____ Training Site: _____

All fields to be scored in 0-2 scale:
0 – action not performed
1 – action performed with prompting
2 – action performed independently

Pre-scan		Score
1	Turned on machine	
2	Positioned machine properly	
3	Positioned patient properly	
4	Entered data into machine properly	
5	Cleaned hands prior to scan	
6	Cleaned probes prior to scan	
7	Communicated well with patient	

Scanning	PR	PO	OR	AN	IN	IM

Modified from: PURE

Patient Name:
Date of scan:
Location: ○ Ward ○ OPD ○ Emergency ○ Other

Sonographer(s) _____, _____
Supervised scan ○ No ○ Yes, by _____

What was the clinical question(s) this ultrasound was trying to answer?

Cardiac

Effusion?
○ Yes
○ No

RV dilatation?
○ Yes
○ No

EF?
○ Normal
○ Decreased
○ Severely decreased

Other findings:

TLS

TP | TN
FP | FN

Abdomen

RUQ free fluid?
○ Yes
○ No

LUQ free fluid?
○ Yes
○ No

Pelvic free fluid?
○ Yes
○ No

TLS

TP | TN
FP | FN

Lungs

	Lung sliding?	Pleural fluid?	Multiple B-lines?	Consolidation?
Right	○ Yes ○ No	○ Yes ○ No	○ Yes ○ No	○ Yes ○ No
Left	○ Yes ○ No	○ Yes ○ No	○ Yes ○ No	○ Yes ○ No

TLS

TP | TN
FP | FN

Obstetric

Gest. sac
○ Yes
○ No

Yolk sac
○ Yes
○ No

Fetal pole
○ Yes
○ No

IUP Number: ___
FHR: _____bpm

Uterine mass?
○ Yes
○ No

Adnexal mass?
○ Yes
○ No

EMM
_____mm

CRL	BPD	HC	AC	FL
_____ cm	_____ cm	_____ cm	_____ cm	_____ cm
_____ EGA	_____ EGA	_____ EGA	_____ EGA	_____ EGA

Fetal lie
○ Transverse
○ Long

Placenta position
○ Anterior
○ Posterior

Previa:
○ Yes
○ No

AFI – Q1: ___ Q2: ___ Q3: ___ Q4: ___ Total: _____ ○ Polyhydramnios ○ Oligohydramnios

TLS

TP | TN
FP | FN

Spleen Splenomegaly Echogenicity Masses

TP | TN

7) Tailored

Partners In Health

Over 20 years of health and social justice

MANUAL OF ULTRASOUND



FOR RESOURCE-LIMITED SETTINGS

Sachita Shah MD Daniel Price MD
Gene Bukhman MD Sachin Shah MD Emily Wroe MD

8) Desirable

ULTRASOUND CHAMPION APPLICATION:

Name: _____ _____ _____
(First) (Middle Name(s)) (Last)

Level of training: ☐ Resident physician (program: _____ year in training: _____)
☐ Consultant physician (Department/Faculty: _____)

Do you have any previous experience with ultrasound? ☐ Yes ☐ No If yes, please describe:

_____
_____
_____

Why do you want to pursue training in ultrasound?

_____
_____
_____
_____
_____

In what type of setting would you like to practice in when you complete your training?

_____
_____
_____
_____
_____
_____

Would you be willing to service as an ultrasound trainer in for the next cohort of residents? Why or Why not?

_____
_____
_____
_____
_____

How would you evaluate yourself in each of the below?

	Excellent	Good	Satisfactory	Needs Improvement
Enthusiasm	☐	☐	☐	☐

9) Deliverable

ULTRASOUND TRACK: **MANUAL**

Sally Graglia, MD, MPH
Liberia College of Physicians and Surgeons
Boston Children's Hospital

MONTHLY CURRICULUM CALENDAR:

Month 1 (July) – Ultrasound physics; Machine cleanliness

- Due:
  - Required reading:
    - (under machine maintenance) Ultrasound probe infection control: challenges and solutions
    - (under physics) Ultrasound Physics
- Ultrasound Conference:
  - Ultrasound physics lecture
  - Journal review and discussion
  - Review saving images on the machine
- On the wards:
  - Navigating the machine, saving images, uploading images
- Homework:
  - Required reading:
    - (under FAST) AIUM Practice Guideline for the Performance of the Focused Assessment with Sonography for Trauma (FAST) Examination
    - (under FAST) Secondary Ultrasound Examination increases the sensitivity of the FAST exam in blunt trauma
    - Video: eFAST video (https://www.youtube.com/watch?v=NjAprHhQ7lU&feature=youtu.be)
  - Optional reading:
    - (under FAST) FAST after pre-hospital HoTN| Annals EM. 2004
  - Required scans:
    - Export 1 ultrasound study to your USB
    - Delete your old ultrasound studies

10) Measurable

AutoSave OFF — UStracking010819

Home Insert Draw Page Layout Formulas Data Review View — Share — Comments

Paste — Calibri (Body) 12 — Wrap Text — General — Merge & Center — Conditional Formatting — Format as Table — Cell Styles — Insert — Delete — Format — Sort & Filter — Find & Select — Ideas — Sensitivity

D1 — Patient Intiials

	A	B	C	F	G	H	I	J	K	L	M	N	O	P	Q
1	Resident Name	Issues	Reviewed	Location:	Supervised scan:	Supervised by:	Clinical Question	echo				All Intrep.	All Intrep. Sums	TN/TP Interp.	Sum TN/TP Interp.
2								effusion	RV dilation	EF	vegetations				
3															
4	Cassell		x	ward	yes	Dr. Sally	What type of mass in the epigastrum?					0	83	0	81
5	Cassell			OPD	yes	Dr. Sally						0		0	
6	Cassell	please put a line through NO for change in man		ward	no		post appendectoy tachycardia h/o internal hemorrhage					0		0	
7	Cassell	TLS, management change, probe cleaning		emergency	yes	Dr. Sally	bowel obstruction r/o perfortion					0		0	
8	Cassell			ward	yes	Dr. Sally	bladder outlet obstruction r/o BPH vs prostate ca					0		0	
9	Cassell			ward	yes	Dr. Sally	bladder tumor r/o hydronephrosis and free fluid					0		0	
10	Cassell			ward	yes	Dr. Sally	pelvic tumor r/o sarcoma and free fluid					0		0	
11	Cassell		x	emergency	yes	Dr. Sally	evaluation of blunt trauma					0		0	
12	Cassell	only 2 images saved? No cardiac images?		emergency	no		FAST/FOCUS in a patient with bowel obstruction	UTF	UTF	UTF		0		0	
13	Cassell			ward			FOCUS/FAST in a patient with a gunshot wound	TN	TLS			1		1	
14	Cassell			ward			Post op appendectomy	TN	TLS	TN		2		2	
15	Cassell			emergency	no		blunt abdominal trauma	TN	TLS	TN		2		2	
16	Cassell			ward	no		FAST/FOCUS in a patient with a soft tissue tumor	TN	TLS	TN		2		2	
17	Cassell			ward	no			TN	TLS	TN		2		2	
18	Cassell			ward			FOCUS in a paitent with soft tissue tumor	TN	TLS	TN		2		2	
19	Cassell	NEEDS REVIEW		ward	yes	Dr. Sally	FOCUS for patien with abdominal mass	FN	TLS	FN		2		0	
20	Cassell				no		post op appendectomy assessing FOCUS	TN	TLS	TN		2		2	
21	Cassell			ward			FOCUS/FAST in a patient wth stage IV leisarcoma	TP	TLS	TFN		1		1	
22	Cassell	need longitudinal pelvis		emergency	no			TN	TLS	TN		2		2	
23	Cassell			emergency	no		FAST/FOCUS in a patient with blunt abd trauma	TN	TLS	TN		2		2	
24	Cassell			emergency			obstructed congential RIH					0		0	
25	Cassell			emergency			bladder outlet obstruction r/o BPH					0		0	
26	Cassell											0		0	
27	Cassell			emergency			blunt abdominal trauma r/o hemoperitoneum					0		0	
28	Cassell	NEEDS reivew					appendicitis r/o perforation					0		0	
29	Cassell	NEEDS reivew		ward			polytraumatized patient r/o hemoperitoneum	TLS				0		0	
30	Cassell						blunt abdominal trauma r/o hemoperitoneum					0		0	
31	Cassell			OPD			cause of suprapubic distention					0		0	
32	Cassell			emergency			general peritonitis r/o ruptured appendicitis / typhoid perforation					0		0	
33	Cassell			emergency			blunt abdominal trauma r/o viscous rupture					0		0	
34	Cassell			emergency	no		blunt abdominal trauma (FOCUS, FAST)	TN	TLS	TN		2		2	
35	Cassell			ward			FAST/FOCUS in a paietnw ith fall from height	TN	TLS	TN		2		2	
36	Cassell	A4C tips; pelvis needs transverse and longitudin			no		abdominal distention	TN	TLS	TN		2		2	

Bartekwa | Blapooh | Cassell | Goyah | Igwilo | Ireland | Jallah | Paye | Richards | Sanoe | Seville | Woheel | <- resident names | Calcs | Needed | Sum

Count: 112 — 100%

Program Challenges

1) Funding


FUNDED BY: THE WORLD BANK
Ford

1) Sustainability

Point-of-Care Ultrasound (POCUS)


Voluson
E8
49Hz/10.7cm
60°/1.3
1 Trim./OB
HI M 7.90 - 4.50
Gn -2
C6/M7
FF4/E2
SRI II 2/CRI 2


2017Nov17 03:42
Gen THI
S MB
Abd
P21
89%
MI
1.1
TIS
0.8
A
B
DVD
19
Gen
0
Guide
MB On
THI
On
Page 1/2


2017Nov17 03:58
Res
S
MB
Msk
HFL
87%
MI
0.7
TIS
0.1
A
B
DVD
2.7
Res
0
Guide
MB On
Dual
Page 1/2

Cases
(the basics)

Case #

17M presented after motorbike accident.

Unable to obtain a blood pressure with cool extremities to touch.

Abrasions to shoulder but no external bleeding, no obvious long bone fractures or chest wall trauma.


2017Oct17 05:23
Gen THI
S MB
Abd
P21
28%
MI
1.1
TIS
0.8
A
B
DVD
16
Gen
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Guide
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Page 1/2


2001Jan01 00:01
Gen THI
S MB
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14%
MI
1.0
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0.1
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B
DVD
13
Gen
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Guide
MB On
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Page 1/2


2017Oct17 05:24
Gen THI
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Guide
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Page 1/2


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13%
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Guide
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Page 1/2


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Gen THI
S MB
OB
C60
3%
MI
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TIB
0.2
A
B
DVD
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Gen
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Guide
MB On
THI
On
Page 1/2


2001Jan01 00:03
Gen THI
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C60
13%
MI
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TIS
0.1
A
B
DVD
18
Gen
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Guide
MB On
THI
On
Page 1/2

OR with Surgery

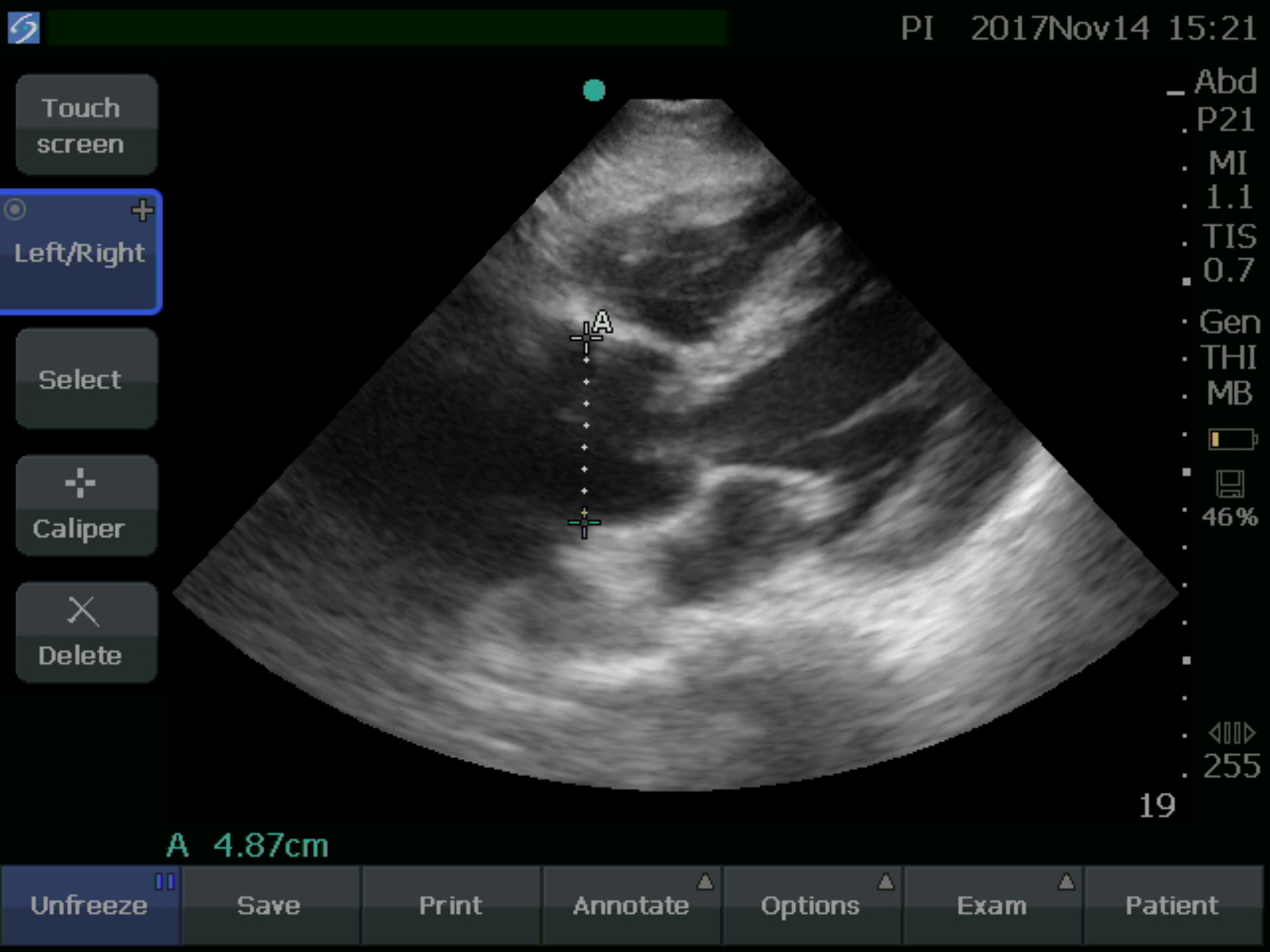
Exploratory laparotomy with finding of splenic rupture

Well 1 week later, discharged

Case #

55M with h/o HTN presenting with severe chest pain radiating to the back

Diaphoretic, increased WOB, clutching his chest


PI 2017Nov14 15:21
Touch screen
Left/Right
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THI
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Unfreeze
Save
Print
Annotate
Options
Exam
Patient


PI 2017Nov14 15:17
Depth
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Auto Gain
Gen
Zoom
Page 1/3
Abd
P21
MI
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TIS
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THI
MB
47%
13
Freeze
Save
Mode
Annotate
Options
Exam
Patient


PI 2017Nov14 15:12
Depth
Gain
Auto Gain
Gen
Zoom
Page 1/3
Abd
P21
MI
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TIS
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Gen
THI
MB
47%
19
Freeze
Save
Mode
Annotate
Options
Exam
Patient


2001Jan01 00:37
Gen THI
S
Crd
P21
1%
MI
0.9
TIS
0.7
A
B
DVD
19
Gen
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Sector
MB Off
THI
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Page 1/3

Family able to fund trip to Ghana for definitive surgical management

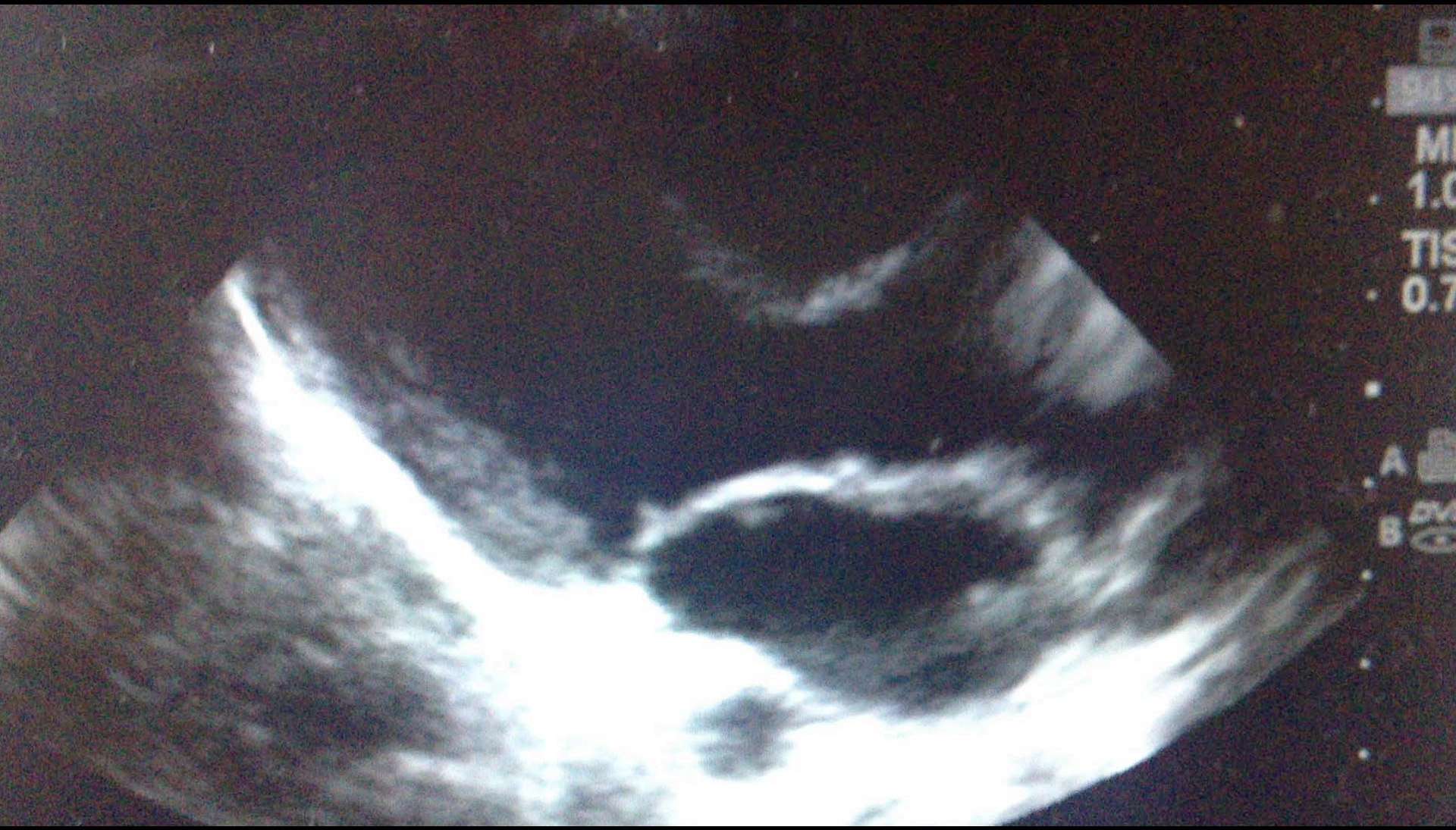
Walked into clinic for follow up in Liberia, alive

Cases
(more specific to low resource settings)

Case #

30 G2P2 F now 3 weeks s/p NSVD now presenting in respiratory distress with hx of shortness of breath, orthopnea, weight gain, bilateral low extremity edema

History is limited as patient is in extremis




JFKMC
2001Jan01
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Gen THI
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Crd
P21
34%
MI
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TIS
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Page 1/3


JFKMC
2001Jan01
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MI
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TIS
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Page 1/3


JFKMC
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Page 1/3


JFKMC
2001Jan01
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Gen THI
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P21
32%
MI
0.8
TIS
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B
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24
Gen
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Sector
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Page 1/3

Peripartum Cardiomyopathy

- Makes up 4% of Dilated Cardiomyopathy (DCM)
- Definition[1,2]:
  - Development of HF toward end of pregnancy or within 5 months after delivery
  - Absence of another cause
  - LV systolic function < 45% +/- dilatation
- Rates range; data incomplete
- Cause remains unknown; ?multifactorial

In this setting, unable to intubate

Treated with diuretics and NIPPV (BPAP)

Patient passed in the Resuscitation Bay with her husband at bedside thought to be secondary to dilated Peripartum Cardiomyopathy

Case #

11M presenting with fever, fatigue


2017Nov06 07:13
Gen THI
S MB
OB
C60
1%
MI
1.0
TIB
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Page 1/2


CB 2018Jan09 09:31
Gen THI
S MB
Abd
C60
80%
MI
0.7
TIS
0.1
A
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Page 1/2


2017Nov06 07:03
Res
S MB
Msk
HFL
3%
MI
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TIS
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A
B
DVD
4.9
Res
0
Guide
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Dual
Page 1/2


2017Nov06 07:04
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S MB
Msk
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Guide
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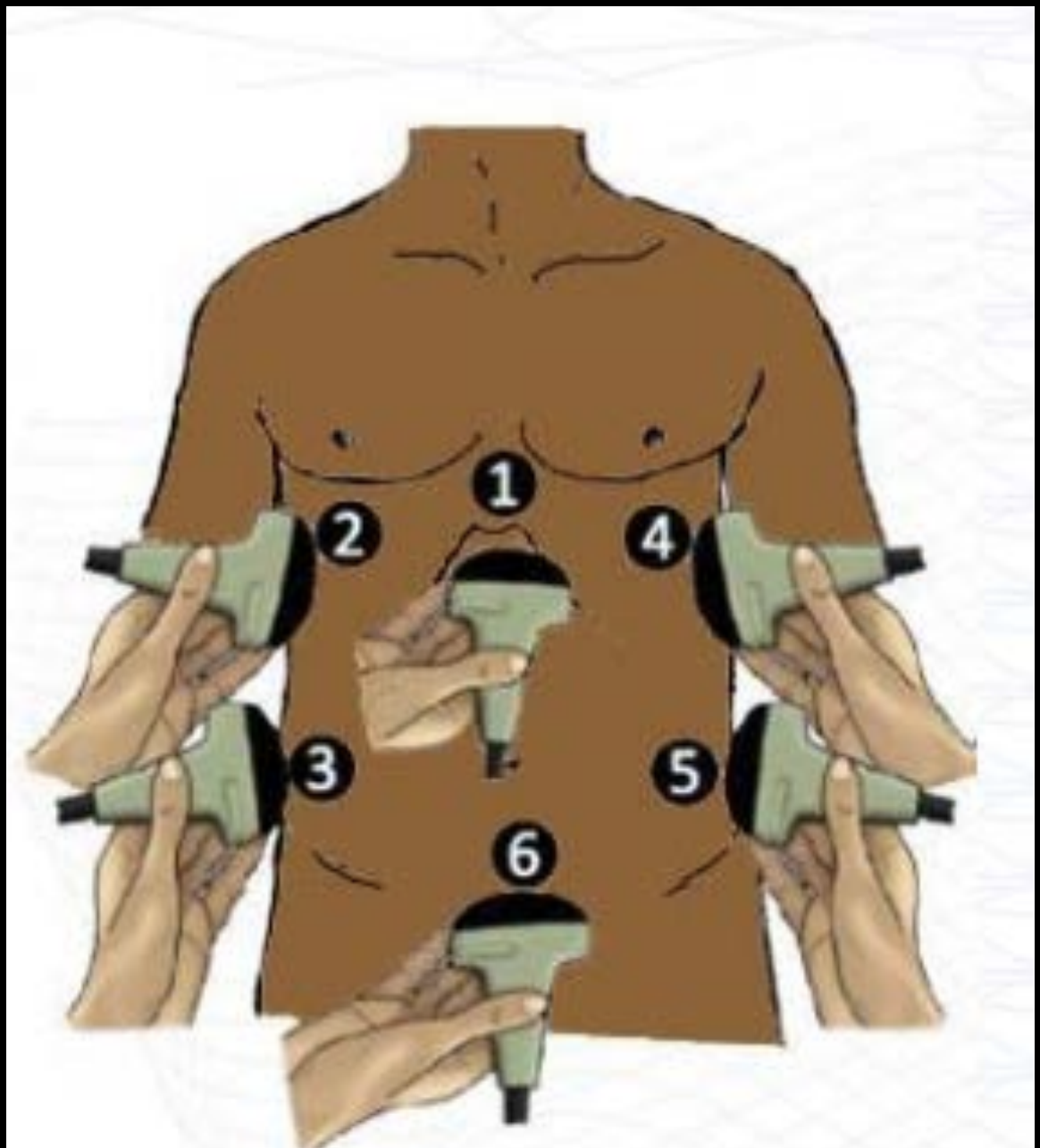
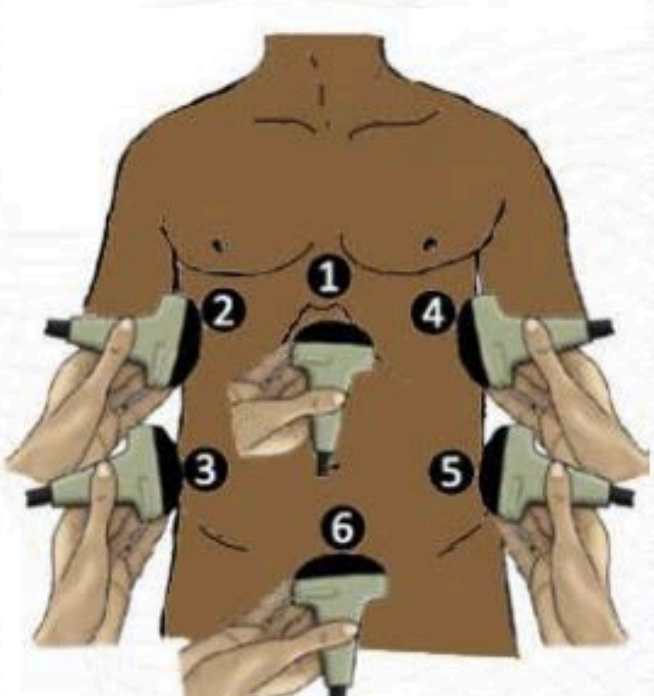
Dual
Page 1/2



Heller, 2013

Probe position



No.	Localization	Possible FASH Findings
1	Epigastric angle	- pericardial effusion - abdominal lymph nodes
2	Right axillary line thorax	- pleural effusion
3	Right axillary line abdomen	- focal liver lesions - ascites in the pouch of Morison
4	Left axillary line thorax	- pleural effusion
5	Left axillary line abdomen	- focal spleen lesions - ascites in spleno-renal pouch
6	Suprapubic pelvis	- ascites in the pouch of Douglas

Heller, 2013

Table II. Abdominal ultrasound findings

Ultrasound findings	Active TB by smear or culture			Frequency	
	OR	95% CI	*p*-value		
Lymphadenopathy	2.63	1.51 - 4.60	0.0002	55.3%	(94/170)
Hepatomegaly	0.63	0.34 - 1.19	0.128	18.8%	(32/170)
Splenomegaly	1.65	0.66 - 4.24	0.242	12.9%	(22/170)
Splenic lesions	1.89	1.04 - 3.46	0.024	37.1%	(63/170)
Ascites	2.24	1.22 - 4.15	0.005	38.2%	(65/170)
Pericardial effusion	2.83	1.62 - 4.96	0.00008	55.9%	(95/170)
Splenic lesions + lymphadenopathy	2.02	1.07 - 3.82	0.019	32.9%	(56/170)
Splenic lesions + ascites	2.43	0.96 - 6.41	0.041	15.9%	(27/170)
Splenic lesions + lymphadenopathy + ascites	2.86	1.07 – 8.07	0.02	15.9%	(27/170)

Patel, 2011

TB and HIV

- Tuberculosis (TB) is primarily a pulmonary disease; hematogenous spread can affect many systems and have varied presentations[3]
- Extra-pulmonary TB (EPTB) and smear negative TB are common in immunocomprimised patients[3]
- Ultrasound can detect findings suggestive of EPTB even if there are no classic pulmonary findings to suggest TB[3]

Unable to obtain biopsy in this setting

Initiated on anti-TB medications, to be followed in the outpatient setting

Case #

40sM presented for evaluation of L flank pain and fever of unclear etiology with +TTP with plan for OR


2017Nov23 04:10
Res
S MB
Msk
HFL
9%
MI
0.7
TIS
0.1
A
B
DVD
4.0
Res
0
Guide
MB On
Dual
Page 1/2


2017Nov23 04:07
Res
S MB
Msk
HFL
10%
MI
0.7
TIS
0.1
A
B
DVD
2.7
Res
0
Guide
MB On
Dual
Page 1/2

Pyomyositis

- Definition
  - Purulent infection of skeletal muscle[4]
- Risk factors:
  - Immunocompromise, trauma, intravenous drug use, other infection, malnutrition
- 3 stages[5]
  - Stage 1: crampy, low grade fever, induration (abx)
  - Stage 2: purulence, fever, edema (abx + I&D)
  - Stage 3: Stage 2 + systemic toxicity (abx + I&D)

Continued antibiotics

Incision and drainage performed at the bedside

Prevented mortality and morbidity associated with OR

Case #

56M presenting with abdominal pain, nausea, and fevers of unclear etiology with RUQ TTP


2001Jan01 00:03
Gen THI
S MB
RUQ
Abd
C60
4%
MI
0.7
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A
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Page 1/2


2001Jan01 00:02
Gen THI
S MB
RUQ
Abd
C60
4%
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0.7
TIS
0.1
A
B
DVD
18
Home
Home/Set
Label...
Symbols...
Word
Done


2001Jan01 00:06
Gen THI
S MB
IVC
Abd
C60
3%
MI
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Page 1/2

Liver Abscesses

- Liver abscesses are the most common type of visceral abscess[6]
- Pyogenic liver abscesses either direct or hematogenous spread
- Klebsiella pneumoniae is the primary cause of pyogenic liver abscesses in various parts of Asia; association with colorectal cancer
- No RCT for abx as treatment
- Consider surgical drainage if multiple, loculated, inadequate response to percutaneous drain

Had percutaneous drains placed with purulent drainage

Started on anti-biotics

Discharged with outpatient follow-up

Case #

24F presented for evaluation of pelvic pain, abdominal pain, and vaginal bleeding


JFK
2017Oct25
00:46
Gen THI
S MB
OB
C60
31%
MI
1.0
TIB
0.1
A
B
DVD
13
Gen
0
Guide
MB On
THI
On
Page 1/2


JFK
2017Oct25
00:55
Gen THI
S MB
OB
C60
30%
MI
1.0
TIB
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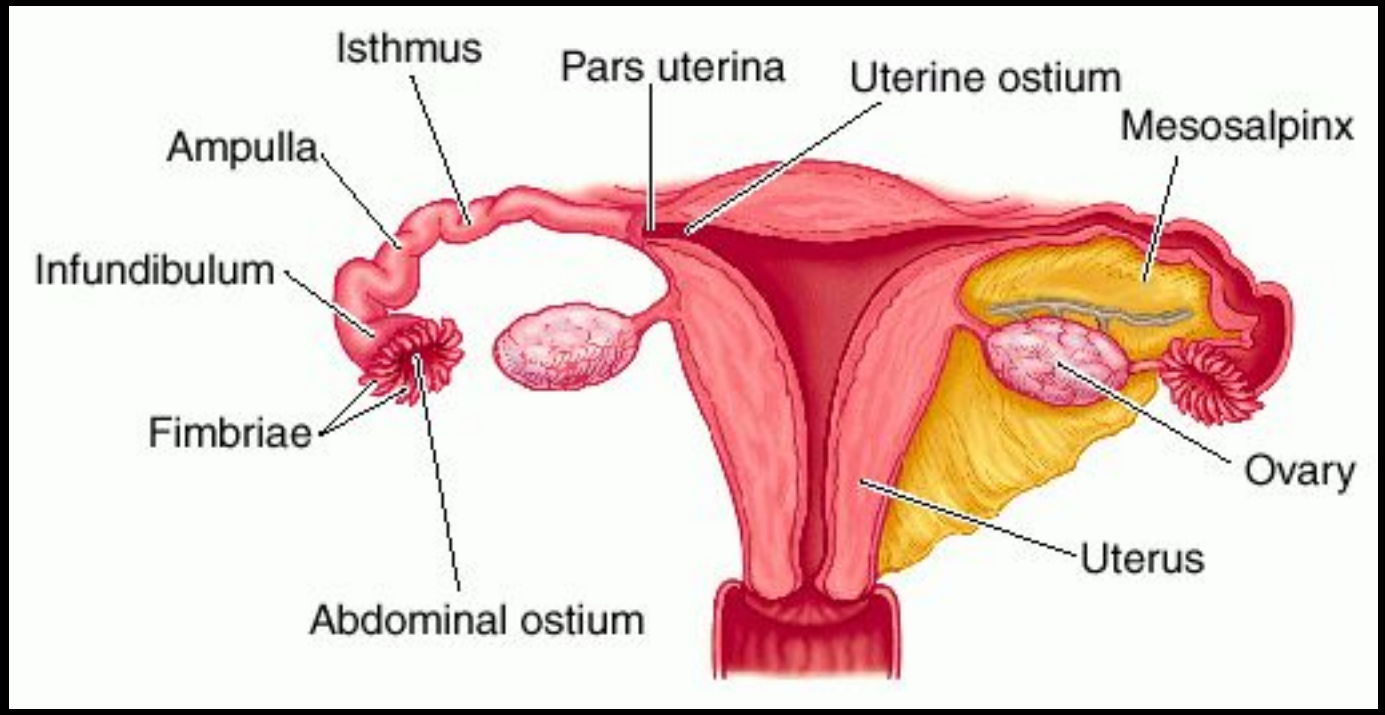
Page 1/2

Ectopic pregnancy



- Risk factors = Disruption of normal anatomy (infection, surgery, congenital, tumors, etc.)
- Most fallopian tubes (96%)
- Ampullary (70%), isthmic (12%), fimbrial (11%), ovarian (3%), interstitial (2%), Abdominal pregnancy (1%)[7]

Went to the OR

Laparotomy with removal of the adnexal ectopic pregnancy

Did well post-operatively

Case #

4M s/p fall from tree with abdominal pain with c/f peritonitis


2017Dec19 13:27
Gen THI
S MB
Abd
C60
62%
MI
1.0
TIS
0.1
A
B
DVD
13
Gen
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Guide
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THI
On
Page 1/2

Negative intra-abdominal FAST for free fluid

Went to OR for exploratory laparotomy which was negative

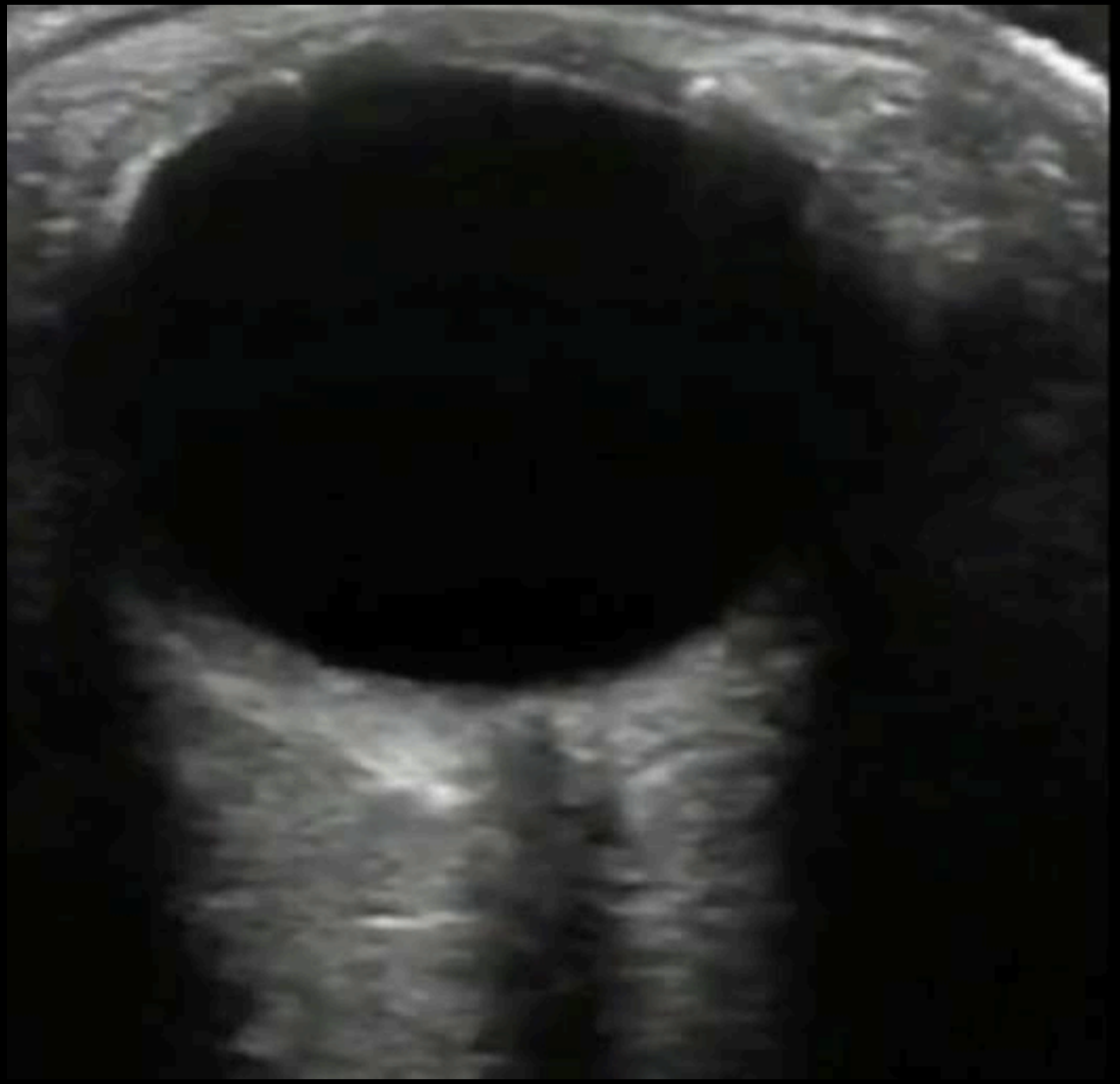
HIV test was ordered and positive

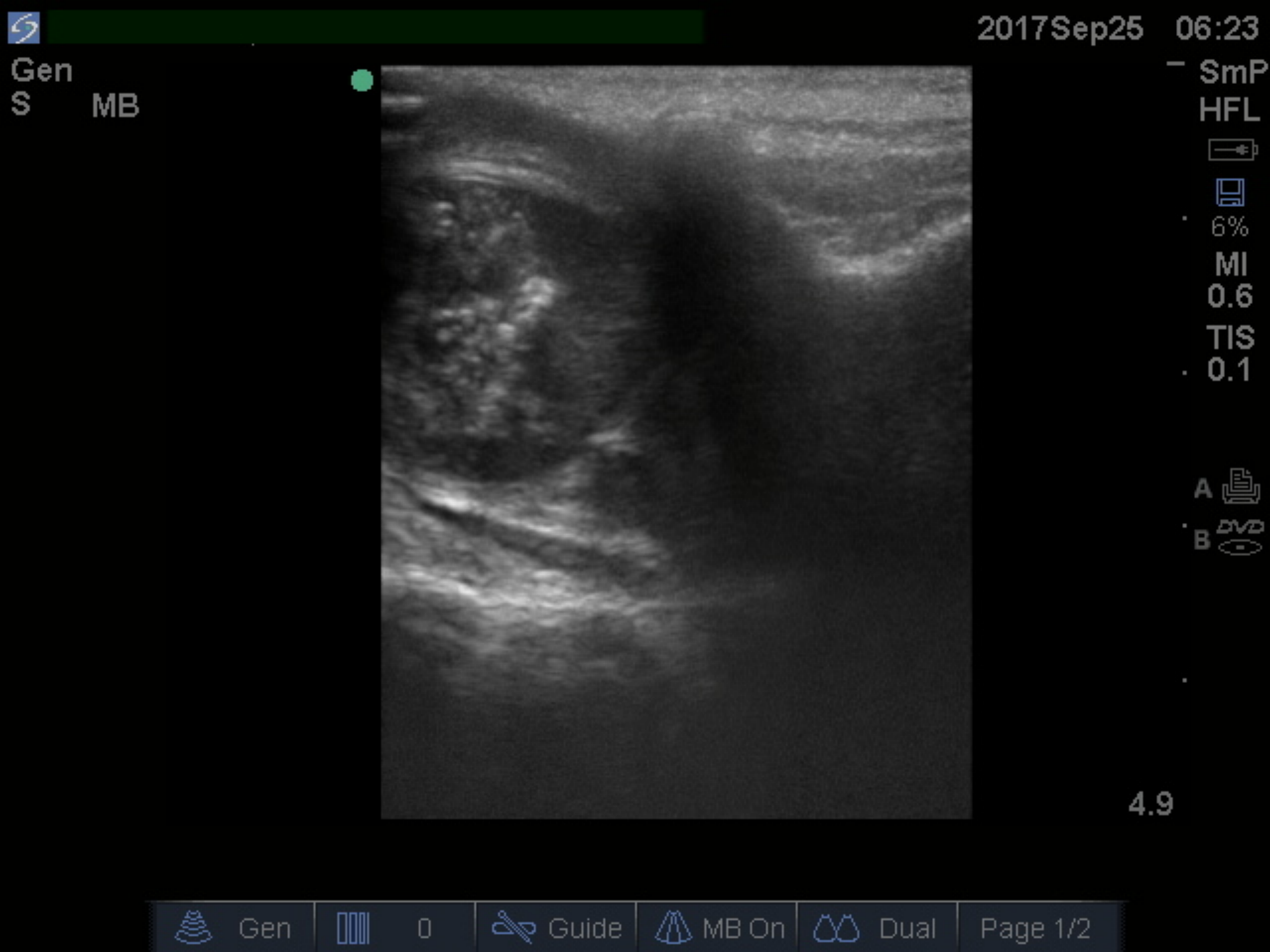
Cases
(Indication creep!)

Case #

13-month-old M referred to pediatrics from ophthalmology clinic with concern for pre-septal cellulitis

No red light reflex




2017Sep25 06:23
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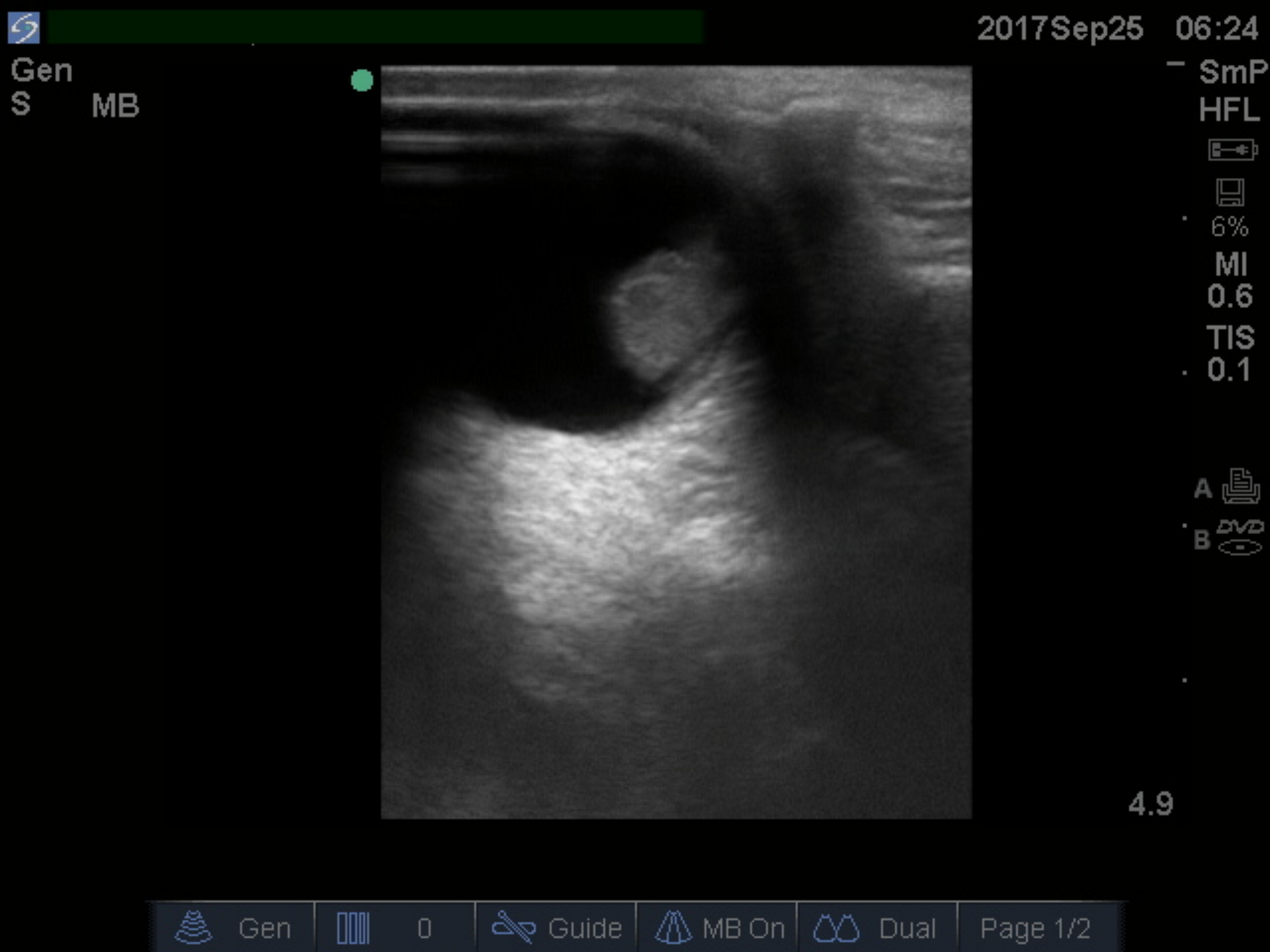
2017Sep25 06:24
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HFL
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Guide
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Page 1/2

Pediatrics team was concerned for retinoblastoma and tried to arrange treatment

Case #

3-week-old, otherwise healthy M, BIB mother for evaluation of “jerking” with fever with no improvement of mental status s/p several days of antibiotics with bulging anterior fontanelle


L38: MSK
MI:
0.51
TIB:
0.08
Res
MHz
6.40
96%
86%
Depth 5.9cm
09:15
01/17/1970


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Guide
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Page 1/2


2017Aug28 03:53
Abd
P10
74%
MI
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TIS
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A
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12
Gen
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Guide
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Dual
Page 1/2

Ventriculomegaly used as prognostic tool for clinical team

Conclusion


SonoSite
M-Turbo
2018Jan04 03:36
Res
S
MB
Msk
HFL
8%
MI
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TIS
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2.7
Res
Guide
MB On
Dual
Page 1/2
Setup
Report
Review
Pattern
Zoom
Depth
A
B
Exam
AutoGain
Set
Select
Save Calc
Update
Caliper
Calcs
Clip
Save
M Mode
Doppler
Color
2D
Freeze

house. Somebody said they just threw them into the hole. Now I must stop talking, for it is time for you to walk around again. Would you like another sandwich?"

"Agnes," said I, endeavoring to speak calmly, "all I want is to be able to tell you—"

"And when you walk, Mr. Cuthbert, you had better keep around the edge of the chamber, for there is no knowing when they may come through. Mr. Burton and the foreman of the ice men measured the bluff so that they say the hole they are making is exactly over the middle of the chamber you are in, and if you walk around the edge the pieces may not fall on you."

"If you don't listen to me, Agnes," I said, "I'll go and sit anywhere, everywhere, where death may come to me quickest. Your coldness is worse than the coldness of the cave. I can not bear it."

"But, Mr. Cuthbert," said Agnes, speaking, I thought, with some agitation, "I have been listening to you, and what more can you possibly have to say? If there is anything you want, let me know. I will run and get it for you."

"There is no need that you should go away to get what I want," I said. "It is there with you. It is you."

"Mr. Cuthbert," said Agnes, in a very low voice, but so distinctly that I could hear every word, "don't you think it would be better for you to give your whole mind to keeping yourself

Overview

- Introduction
- What is Point-of-care Ultrasound (POCUS)?
- Historical context
- Point-of-care Ultrasound (POCUS) Utility
- Program development
- Cases
  - Basics
  - Tropical/low resource environments
  - “Indication creep”
- Conclusion

Thank you!
Questions?

sally.graglia@ucsf.edu

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