



Echo's impact: a global vision
 ASE: Value-based healthcare summit
 Washington D.C., 091214



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“A Doctor is needed in Room 13”

- Obese patient, very short of breath, sweating profusely, unable to speak in full sentences

History by medics:
 “... has been coughing up sputum ... ex-smoker on home O₂ ... history of heart problems ...not sure what meds he's on, ? 'water pill'”

- P.E.:
 - HR 110, RR 28, BP 106/-
 - BS decreased w ? Crackles and rhonchi.

“...the Doctor is thinking in Room 13”

“Is it a problem in the chest ...
 ...Heart [MI, CHF, Pump failure]?
 ...Lung [COPD, pneumonia, PE, Pulm edema]?
 ...Pleura [PTX, massive effusion]?”

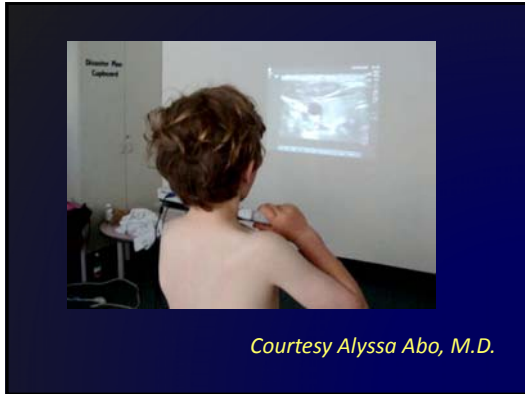
... Is it a volume problem ...
 ... dehydration, sepsis?”

...Is it something else completely...
 ... [CVA, sepsis, overdose, etc]??

... Or a combination of 2 or more of the above?”

What if there were a tool that could rule in or exclude many of these choices in less than 3 minutes, without putting any holes in the patient or subjecting him to ionizing radiation?





It's not that ultrasound is ridiculously simple, but that it interfaces with our brains in a way that makes it ridiculously powerful.

<http://www.studyblue.com/notes/note/n/quiz-4-vision/deck/73217>

Early ultrasound technology

- Problems
 - Bulky equipment
 - Equipment technically challenging
 - Expensive!
 - (Up to \$250,000)
 - Images limited
 - Operator dependent
- Advantages
 - No radiation!
 - Dynamic information

Operator dependent

1962 1980

Current ultrasound technology

1957

↓

2014

Moore's Law + Ergonomics + Medical necessity + Economics

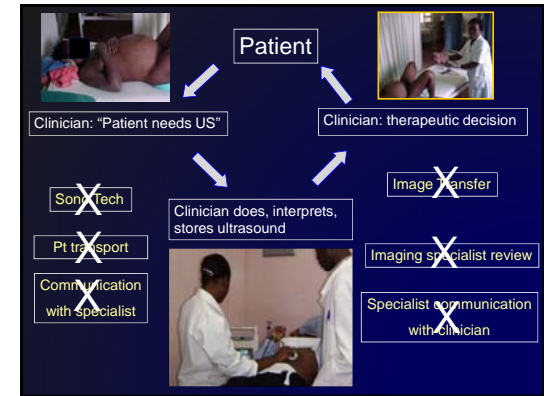
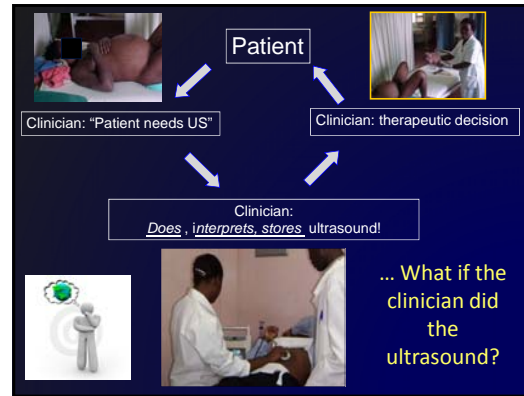
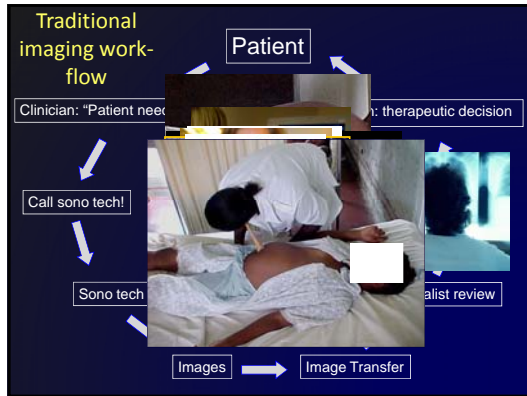
Moore's law + ergonomics

1957

↓

2014

- Problems
 - ~~Bulky~~ **Compact** equipment
 - ~~Technically challenging~~ **User friendly**
 - ~~Expensive!~~ **Inexpensive**
 - (< \$350,000 \$4,000 up)
 - ~~Images limited~~ **improved**
 - ****Operator dependent****
- Advantages
 - No radiation!
 - Dynamic information



Paradigm shift since 1980's

Imaging
by the healthcare provider
at the *point of care*

- ### Paradigm shift
- Highly desirable in settings with
 - Limited financial resources
 - Limited infrastructure
 - Limited # of HC workers
 - Communication challenges
 - Geographically removed / isolated

- ### Resource-poor settings ... ??
- ... every hospital in USA for 75% of week
 - [168-40]/168 >75%
 - Will this change?
 - Increasing (sub)specialization
 - Increasing severity of illness of hospitalized patients
 - Increasingly sick patients at home
 - 24/7 healthcare
 - Healthcare in rural settings
-
- The slide includes two images: a helicopter on a landing pad and an aerial view of a large hospital building.

Medical imaging in World Health

- 50% of the world has no access to any medical imaging
- 75% of the world has no access to ultrasound
- 95% of the world has no access to ultrasound in an emergency

Lancet 2012



Global map representing # of preventable deaths: communicable infections, maternal, perinatal and nutritional conditions.

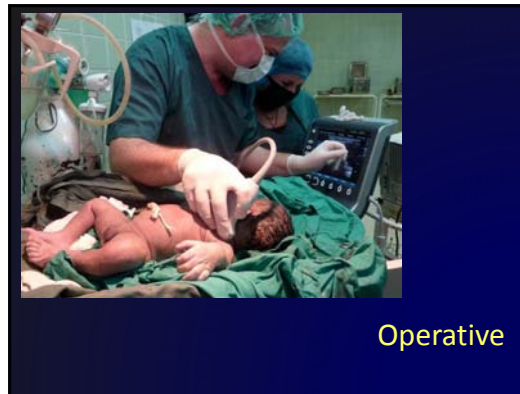
So what are some of the uses of PoCUS in medicine?



Prehospital / EMS



Emergency Department



Operative



Critical Care



Mass casualty



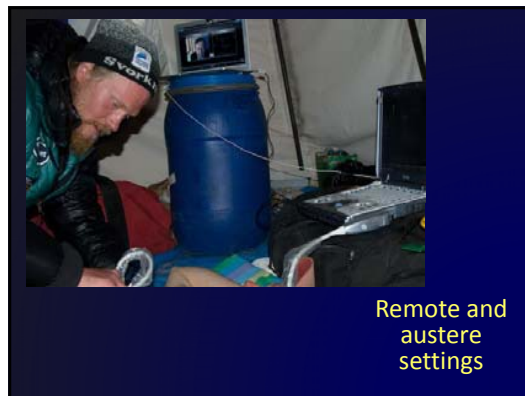
Developing world



Military



Sports
Medicine



Remote and
austere
settings



Tele-
Medicine

Clinical situations lending themselves to PoCUS

- Urgent/emergent diseases:
 - Rapidly progressive or lethal illnesses
 - Therapy that may be deleterious / lethal if misapplied
- Frequently encountered clinical situations
- Relative simplicity
 - #1: The clinical question is binary/simple: "Yes", "no", "don't know"
 - #2: The exam is rapid and relatively easy to perform
 - #3: Interpretation is binary/simple: "Yes", "no", "don't know"
- There are no convenient, timely alternative diagnostic tools

Widely used generalist PoCUS applications

- Chest:
 - Heart, IVC, Lung, pleura
 - Abdomen:
 - Biliary, Renal, Aorta, pediatric
 - Female pelvis
 - Pregnancy, delivery, gynecology
 - Vascular
 - Procedures:
 - Access, drainage, nerves
 - Eye, brain
- ... in all age groups

Ultrasonography

- Cheapest
- Most robust
- Least resource intensive
- Most mobile
- Least biohazardous
- Most broadly clinically applicable
- Most real-time



Diagnostic imaging modality in the world!

... ideal for resource-poor settings ...

So, what's the hitch?

Clinician sonologists can never be as good as specialists ... what if they make a mistake?

What if the (non-specialist) sonologist messes up?

- For many clinical conditions a small number of diseases are responsible for 90+% of occurrences
- Identification of the cause in 95% of patients with a problem is a higher priority than the concern that a condition might be missed in one of the 5%.
 - ... as long as the doctor *knows what s/he doesn't know*

What is the difference between PoCUS and Specialty performed ultrasound?

PoCUS

Asks a **clinically focused** question

Is **limited in scope**

Performed by **someone who knows what s/he doesn't know**

The challenge of PoCUS: Education

- Clinician sonologists need to learn a completely new skillset
 - ✓ Cognitive
 - ✓ Visual pattern recognition
 - ✗ Psychomotor



World Interactive Network for Critical Ultrasound (WINFOCUS)

- "Improving Primary, Emergency, and Critical Care Medicine, by incorporating 'point-of-care' Ultrasound into Clinical Practice".
- "Critical" = decision-determining role in patient care
- Primarily directed to Point-of-Care users.
- Multi-national group at inception and on Board
 - Incorporated in Italy
 - Regional and national chapters: France, Spain, Argentina, India, China, Indonesia, Saudi Arabia ...



www.winfocus.org

Minas Gerais project

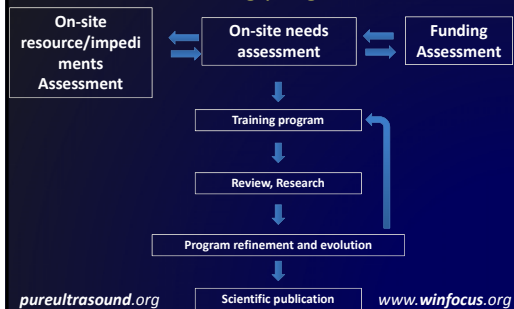
- 226K mi² Area the size of Texas / France
- 20 M inhabitants
 - 80/sq mile (Texas 100/Sq mi; France 280/Sq mi)
- Capital Belo Horizonte, Pop: 5.5M
 - 85% of population urban
- Mean per capita income 18,000 Reais = 7,600 U\$D
- Health System "Hubs and spokes"



www.winfocus.org

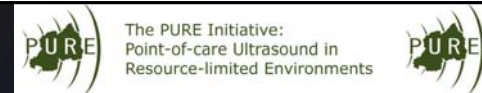


Approach to an in-country ultrasound training program



Training structure – Minas Gerais

- 450 Volunteer enrollees
 - 15% on "trainer track"
- All post-grad practitioners
 - 80% no prior ultrasound
 - Preponderance intensivists, EPs and "SAMU"
- 2-day initial training sessions
 - Lecture and hands-on
- 1-day refresher a few weeks later
 - Cases and visual pattern recognition for trainee group
 - Educational technique and practices for trainers
- Goal of approximately 175 proctored/reviewed exams
- Proctorship on-site and by tele-ultrasound
 - Pre-existing Tele-med infrastructure accessible for US
 - Satellite link-up already in place
- Funding by Minas Gerais state health system



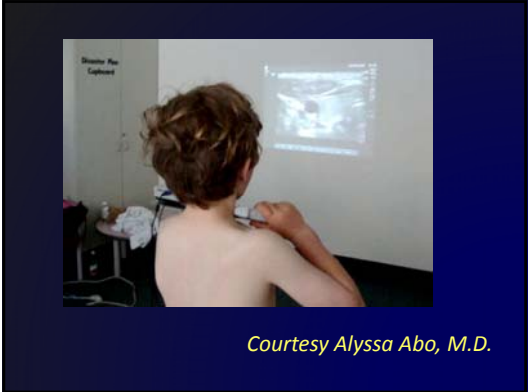
- 15 trainees, intensive initial 10-day program with lecture, workshops & proctored exams at central training site identified in Kigali
- 10 PoCUS applications taught:
 - FAST basic echo, lung, renal, liver, spleen, Ob/Gyn, gallbladder, soft tissue, IVC
- Longitudinal proctoring
 - Trainees saved video clips of all exams for review
 - On-site vs internet
 - Trainers in country for 2 weeks/ month x 6 months
 - Geography: government committed to in 3-4 "superuser" sites
- Funding: volunteerism, shoestrings

www.pureultrasound.org



The challenge of training practicing HC workers in PoCUS:

- it takes them away from their practice
- learning is harder with age



The ultimate goal

- PoCUS is a tool that is likely to be useful to any doctor who wants to “see” what’s going on inside his/her patient
- Not “owned” by any specialty
- Why not teach it in medical school?



Ultrasound in medical education

- In addition to its power in clinical practice, ultrasound is a (preclinical) educational tool
 - Anatomy
 - Physiology
 - Physical exam
- Currently integrated programs in at least 5 medical schools



Global visions for PoCUS

- Ultrasound is widely available and accessible
- Uses in almost all practices
- Uses in diverse geographic settings
- Useful for many common illnesses
- Especially useful for the sickest patients
- **Training practicing clinicians is resource intensive**

“Give me the child and I’ll give you the man”



Questions?