Introduction to Point of Care Ultrasound in the Developing World

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Disclosures

- I have no financial conflicts or disclosures
- Verbal permission to show (for teaching purposes) all photos of patients, nurses, doctors has been obtained, or face has been obscured to protect identity.
Today’s Agenda

- Shah: Introduction to POCUS in resource limited settings
- Muruganandan: Cases from the field
- Levine: Approach to Research
- Harris: Telesonography options
- Panel Discussion: including Bill Marks
Aims

• The Biggest Challenge for US in the Developing World = Trained Operators
• Background of POC US in the developing world
• Step by Step: how to set up a sustainable program in a developing country
• Resources: AIUM Community, Courses, Readings, Equipment, Training Tools
Consider giving the gift of ultrasound knowledge!
Why Point-of-Care ultrasonography?

- Increasing use of US by non-radiologists/non-sonographers in the western world in all disciplines of medicine
- Lack of formal sonography schools and radiologists = radiographers and doctors/nurses are the ones performing the ultrasounds
Advantages of POCUS

- Avoid long delays for information and long transfers for patients on dangerous roads to get a formal ultrasound exam far from a rural clinic.
- Aids in effective use of operative resources and transportation for transfers.
- Boosts capacity of a rural district hospital to that of a city level when partnered with other services (e.g., OR, blood products, surgical capacity).
US is the Ideal Imaging Modality

- Increased access is possible now...
  - Durability
  - Portability
  - Affordability
  - User friendly interface; simplified knobology
  - Internet communication for back up
  - Maintenance easier if hand-carried
  - Ongoing costs are low
  - Increased focus on patient safety for procedural guidance and lower radiation exposure
ISSUES in POC US

• How do we implement a program that the local clinicians are invested in?

• Where do we put the technology: health center vs district hospital, city vs rural?

• Who does the training? do the Trainers or Trainees travel? WFUMB Approach...Centers of Excellence.

• Who do we train- doctors, nurses, Xray technicians? US =only as good as the operator

• How can we make this sustainable? QA? Ongoing CME?

• How can this be tailored to local disease processes and altered to fit the needs of the unique community?
Practical Tips for Ultrasound Training in the Developing World
Cultural & Safety Considerations

- Teaching ALARA is important
- Consider how probes will be cleaned
- Is there fear of the technology?
- Topics to consider not teaching - eg. Gender identification
Ideal Equipment

• Durability: heat, moisture
• Hand carried: benefits and drawbacks
• Price point: <15K, service contract a must!
• Simplified knobology
• Consider refurbished machines when possible: but don’t accept someone else’s garbage!
• Ability to switch between power sources, long battery life, quick charge, no software updates
• B mode, M mode, Doppler/Color, Cardiac and OB calculations. Probes: Curved, phased, linear, ?ICT
Needs Assessment

• Should be done before any training intervention to maximize the use of the equipment

• Look at what patients are admitted for, causes of death, maternal mortality, discharge diagnoses, common chief complaints to see where ultrasound can be integrated
Developing a Curriculum:
What are the big killers?
How can US be used?
• TB: Effusions, Safer procedures, r/o cirrhosis
• HIV: Heart failure, kidney failure, skin/soft tissue infections
• Malnutrition/Dehydration from Diarrhea (Under 5): Assessment of dehydration status using Inferior Vena Cava
• Maternal Health: Prevention of hemorrhage (previa and ectopic), prevention of labor-related fetal death (breech lie), prevention of premature delivery (early dx of multiple gestation), retained products of conception
• Obstetric (Ectopic, Estimating Gestational Age, Fetal lie, Fetal heart rate, Placenta previa, Cervical insufficiency, AFI)
• Trauma (eFAST)/Ruptured Ectopic
• Ascites, Liver, Gallbladder
• Renal for HIV nephropathy, hydronephrosis and CRI
• Vascular access and procedural guidance
• IVC/volume, Deep Venous Thrombosis
• Echo (heart failure, rheumatic valve disease, TB effusion
• Advanced: Pedi, Testes, Joints, Fracture, Skin
Training Model

- Best practice is to include both didactic lectures and hands-on scanning practice
- Integration of ultrasound into common patient scenarios, rounding on wards is ideal
- Course Length not established (few days to few weeks)
Gel

- Can be a source of bacteria
- Difficult to obtain in certain rural low resource settings
- Ensure a supply chain before training period ends
- Home made approach:
  - Riguzzi et al. 1 part cornstarch:10 parts water, simmer 3-5 min, cool and use!
Leadership and Infrastructure

• Pick a local ultrasound champion whose responsible for the program/equipment
• Hospital leadership needs to be supportive
• Set goals for training standards and establish requirements for refresher training
• Use a “train the trainer” approach
Challenges we have faced...

- Optimum trainings/refreshers? Retention of staff who are trained
- Battery/Power cord /Energy issues
- Theft
- Public Relations/ Perceptions of greater community
- Funding
- Training materials/resources for free
Future Directions

• Interdisciplinary approach
• Large scale implementation of US programs in district hospitals, as part of residency training programs, medical education, nursing education for midwives
• Creation of Sonography schools
• Certification for training, standardizing training
• Assessment of sustainability long term
• Specific research on impact of ultrasound
Information Resources

- 400+ page color text
- Free for Download
- www.pih.org
- Available on Amazon
- Primarily OB, written for generalist care provider
- Includes trauma, fluid collections, hydrenephrosis, liver and small parts
Resources

- courses: Lima Peru, and Pavia Italy
- [http://www.georgiahealth.edu/ems/COM/InternationalMed/Peru.html](http://www.georgiahealth.edu/ems/COM/InternationalMed/Peru.html)
- [www.tropicalultrasound.org](http://www.tropicalultrasound.org)
- US in other manuals (IMAI, NCD, Oxford Handbook of Disaster Medicine, AFEM)
- [www.sonoguide.com](http://www.sonoguide.com)
- [www.sonoworld.com](http://www.sonoworld.com)
- WINFOCUS [www.winfocus.org](http://www.winfocus.org)
- International Society for US in Ob GYN (ISUOG) [www.isuog.org](http://www.isuog.org)
- Organizations: WFUMB, AIUM (global health community), iRadX, Hope Imaging, Imaging the World
References

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Questions?
Thank you!