Ultrasound Research in Global Health: Insights from Recent Publications and Projects

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First look: a cluster-randomized trial of ultrasound to improve pregnancy outcomes in low income country settings
Hypotheses

Introduction of antenatal ultrasound screening will improve a composite of maternal mortality, maternal near-miss, stillbirth, and neonatal mortality

Ultrasound will increase the rate of prenatal care utilization and delivery in a health care facility
Design

Cluster-randomized control trial

Rural settings in 5 low income countries

58 clusters – 29 intervention sites

Intervention: 2 pre-natal ultrasounds
    18-22 weeks
    32-36 weeks

All women presenting for an initial antenatal care visit eligible

Outreach to engage surrounding community
Design

Obstetrical ultrasounds will be performed by non-physician health workers

Comprehensive training program

Outcome data obtained from Global Network’s Maternal Newborn Health registry

Funding: Gates Foundation, NIH, industry support
Problem selection
Millennium Development Goals

1. Eradicate extreme poverty and hunger
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria and other diseases
7. Ensure environmental sustainability
8. A global partnership for development
Clear & measurable outcomes
Collaboration
Leverage
Sonographer development
Training program

2 week initial sonographer skills training at study site
  Training at referral hospitals

Standardized written and practical test

3 month pilot
  Image QA at referral hospital

Study begins
  Images uploaded to web for remote QA
  Local QA at referral hospital

6 month follow up training
Funding
Ultrasound findings and 72-hour outcomes of adult trauma patients who undergo FAST at Muhimbili National Hospital Emergency Department (MNH EMD), Tanzania.

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Design

Prospective sample of trauma patients with FAST performed

Setting: ED in Tanzanian teaching hospital

New emergency medicine training program

FAST performed by ED physician

FAST findings and patient outcomes reported
Results

417 patients over 5 months

35 (8.4%) had a positive FAST

Increased mortality in FAST positive group: 20 vs 3.2%

88.6% of those with positive FAST went directly to OR
Problem selection
Site selection

- Established training program
- Local user-driven project
- Relevant to local needs and capacity
Machine availability
Registry-Based Data Collection
Value of Interactive Scanning for Improving the Outcome of New-Learners in Transcontinental Tele-Echocardiography (VISION-in-Tele-Echo) Study

Manish Bansal, MD, DNB, FASE, Shaanemeeet Singh, MBBS, Punet Maheshwari, MD, David Adams, RCS, RDMS, FASE, Marti L. McCulloch, MBA, RDMS, FASE, Tanuj Dada, MD, Shantanu P. Sengupta, MD, FASE, Ravi R. Kasliwal, MD, DM, Patricia A. Pellikka, MD, FASE, and Partho P. Sengupta, MD, DM, FASE, for the VISION-in-Tele-Echo Study Investigators, Gurgaon, Sirsa, and Nagpur, India; Durham, North Carolina; Houston, Texas; Rochester, Minnesota; New York, New York

Design

17 physicians provided with 6 hours of echocardiographic education – 9 on site, 8 remotely

POC echo with hand held unit performed on elderly patients undergoing cataract surgery

Images saved and uploaded to cloud server for expert review
Results

968 studies performed; 89% fair image quality or higher

Major abnormalities in 136 patients (14.2%); 32 prohibitive to surgery

Higher quality images achieved for on-site training group

Both training groups satisfied with their experience
Strengths
Point-of-care ultrasound use over six-month training period in Rwandan district hospitals

Patricia C. Henwood, Joshua S. Rempell, Andrew S. Litaplo, Megan M. Leo, Alice F. Murray, David Mackenzie, Samuel Vaillancourt, Stephen Rulisa, Anthony J. Dean, Vicki E. Noble

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Design

17 physicians from district hospitals took a 10 day introductory ultrasound course – 10 applications

Subsequent 6 months: periodic on-site education and OSCE at base hospital

Trainees free to use ultrasound clinically; images and interpretations uploaded to cloud for remote QA

Trainees recorded whether and how US altered clinical decision making
Results

1158 ultrasounds by 16 trainees

51% had matched images and interpretations available for review

Mean image quality on QA review 2.5 (0-4 scale)
Results

Ultrasound frequently changed clinical decision making

Medication administration (42%)
Admission (30%)
Transfer (28%)
Procedures (23%)
Expect the **unexpected**
Establish expectations
Attention to detail

MAKE IT HAPPEN
Themes in successful projects
Site selection
Site selection

Ultrasound program established

Ultrasound machine physically present

Broad stakeholder support
  Ministry of Health
  Hospital & departmental administration
  Sonographers & clinicians
Continuity

Ninety per cent of success is showing up

...and then sticking around
Partnerships
Funding Sources

Federal & major foundation grants

Subcontractor role for NGO

Institutional support – is yours global health-friendly?

Small foundation grants

Note funding sources in published articles
Review departmental CVs
Review early career & CV of successful researchers

Self-funding; friends & family
Logistics
Questions?

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