



**UCSF Benioff Children's Hospitals**

# A Model for Curriculum Development for Low-Resource Settings: Improving Pediatric Emergency Care with the African Federation for Emergency Medicine

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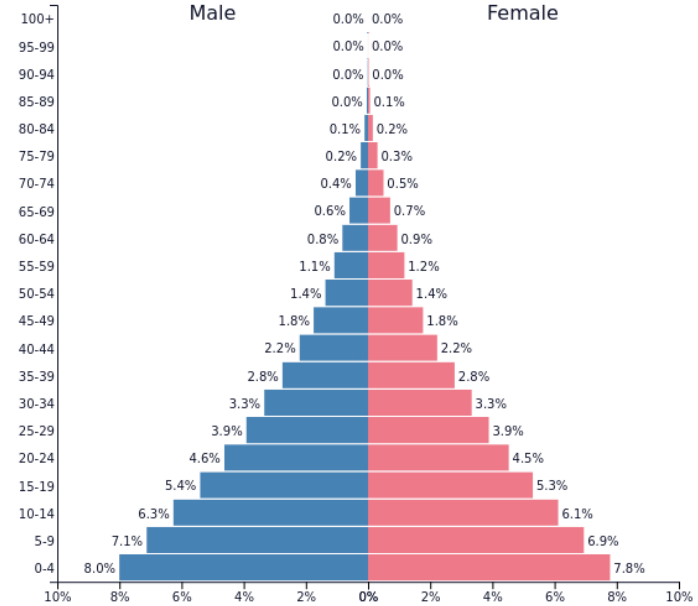
# Disclosures

No financial COI to disclose

# Outline

- **Background**
    - State of (pediatric) emergency care training and education in Africa
    - African Federation for Emergency Medicine (AFEM)
  - **Project**
    - Curriculum development process
    - Timeline
  - **Results**
    - Needs assessment
    - Development of learning objectives
    - Tier 1 curriculum and pilot
    - Tier 2 curriculum and pilot
- 
- **Future plans**

# Background



PopulationPyramid.net

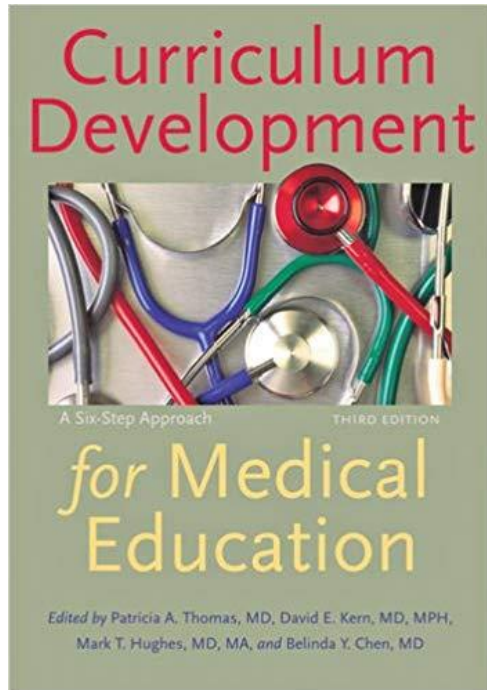
Sub-Saharan Africa - 2019  
Population: 1,068,092,348



## Our Vision

We envision an Africa where high-quality emergency care is realised for all

# Project – Curriculum Development Process



## Six Steps

1. Problem identification and general needs assessment
2. Targeted needs assessment
3. Goals and objectives
4. Educational strategies
5. Implementation
6. Evaluation and feedback

## Tier 1

Nurses  
Pre-hospital  
providers

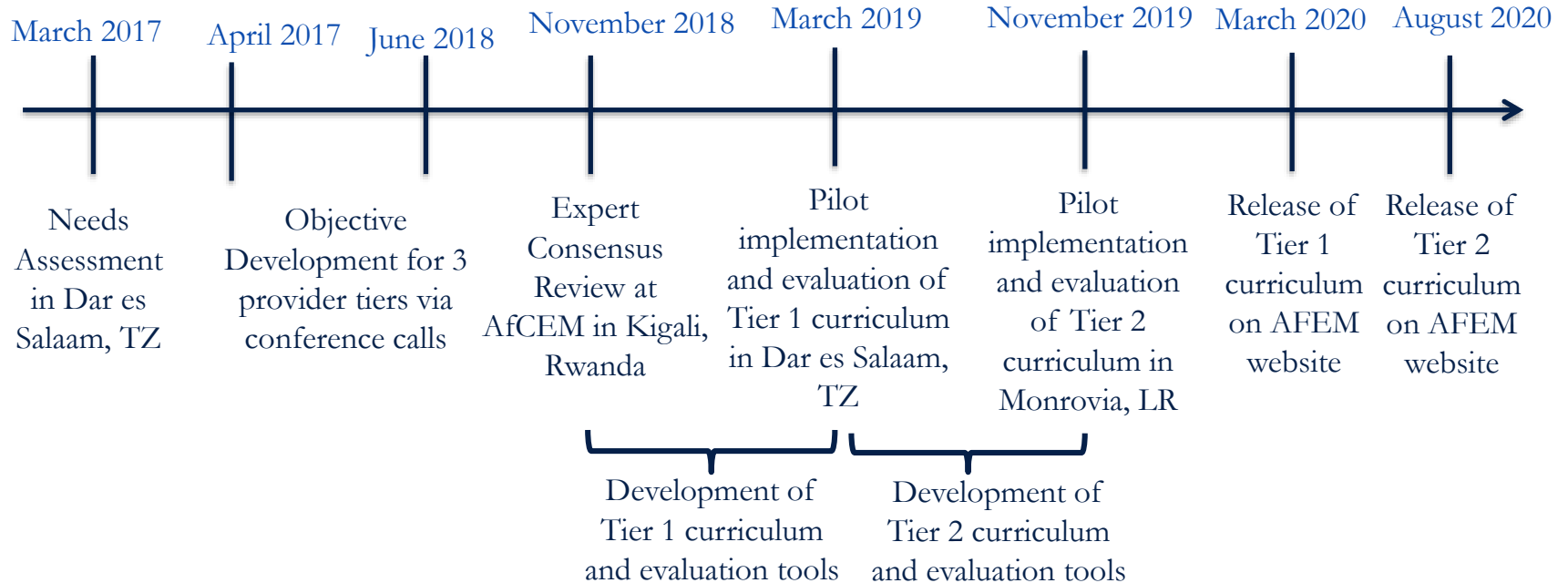
## Tier 2

Medical Officers  
Senior Nurses

## Tier 3

Specialists  
Residents

# Project - Timeline



# Needs Assessment

- Goals
    - What to teach
    - How to teach it
    - Attitudes and perceptions about challenges of caring for children in these settings
  - Format – mixed methods
    - Qualitative – interviews, focus groups (19)
    - Quantitative – cross-sectional, retrospective analysis of most common pediatric ED visit diagnoses in 1 year (16,005 visits)
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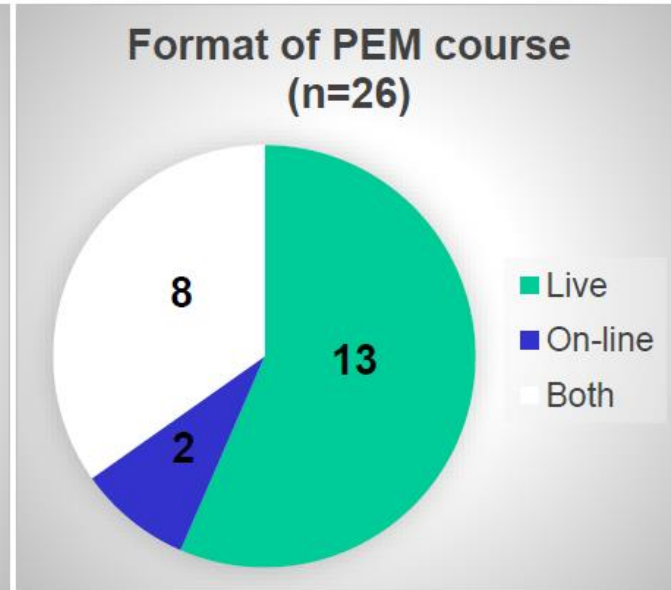
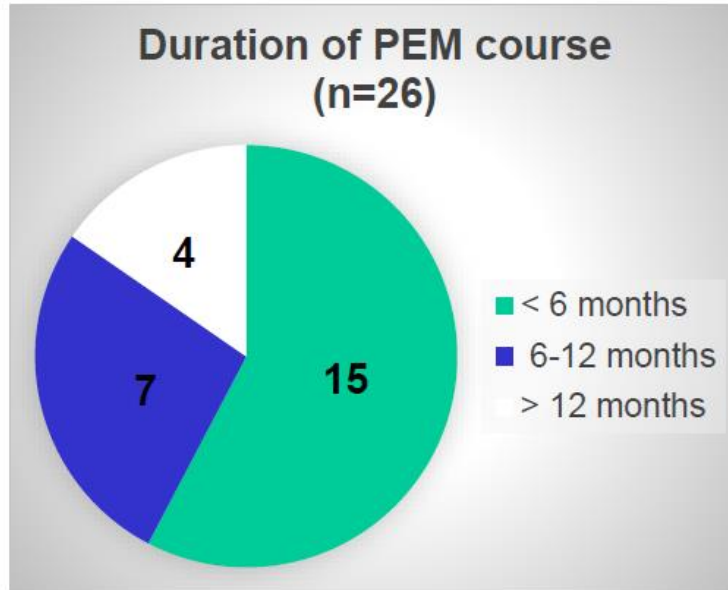


# Needs Assessment

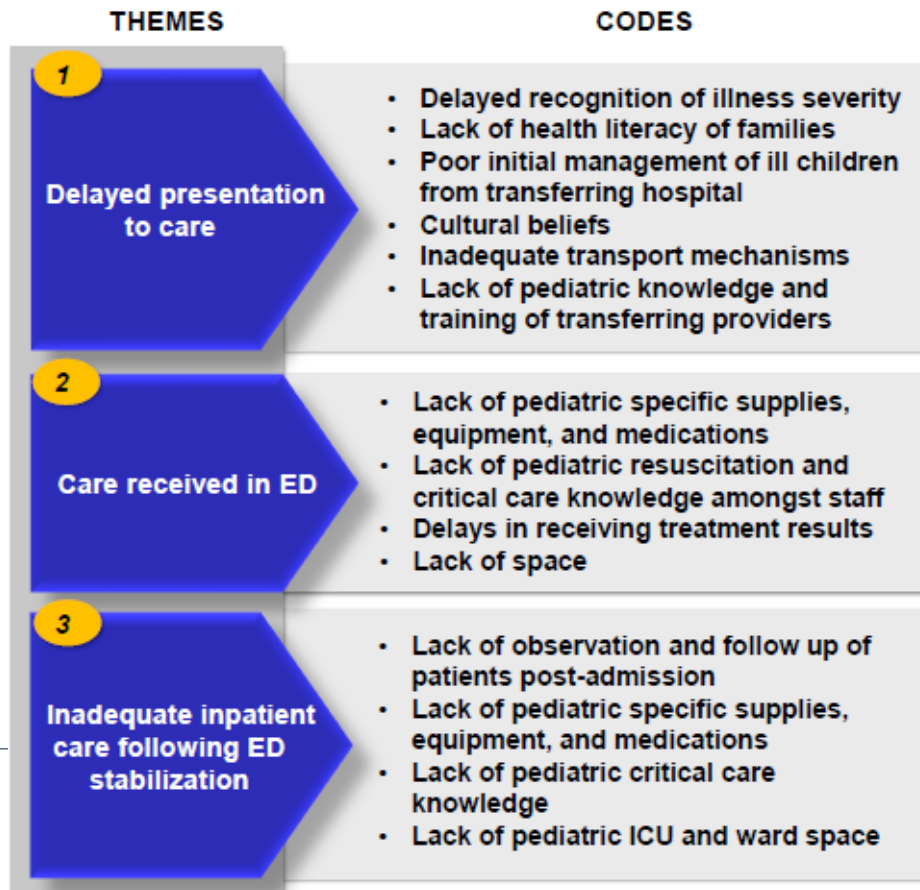
**Eight of the 15** top diagnoses from the quantitative data were shared with the top 15 most important topics identified by providers from the qualitative study

QUALITATIVE		QUANTITATIVE	
TOPICS	TOTAL	TOPICS	TOTAL
Electrolyte imbalances	19	Malaria	1644
Sepsis	15	Pneumonia	1239
Trauma	15	Fractures	985
Respiratory distress	13	Upper respiratory infection	926
Anemia	12	Congenital heart disease	876
Malnutrition	12	Sepsis	797
Congenital heart disease	11	Urinary tract infection	682
Pneumonia	11	Anemia/Sickle Cell Disease	639
Burns	10	Diarrhea, gastroenteritis	443
Malaria	9	Burns	435
Advanced Life Support Skills	8	Seizures, Epilepsy	432
Basic Life Support Skills	8	Malnutrition	426
Diabetic Ketoacidosis	8	Foreign body	350
Procedures	8	Hernia	296
Seizure disorders	8	Dehydration	274

# Needs Assessment



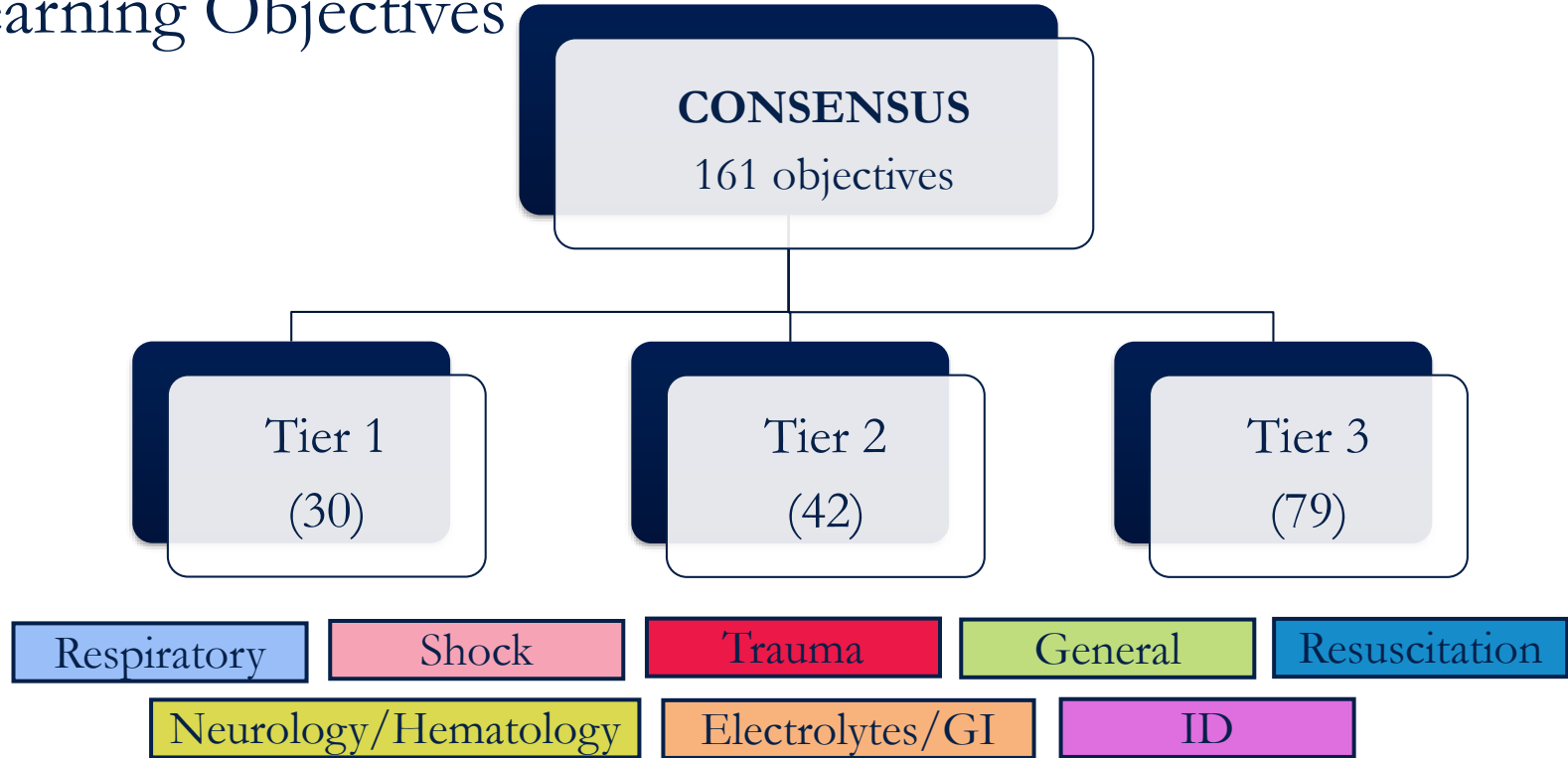
# Needs Assessment



# Development of Learning Objectives

- Modified Delphi process
- Semi-anonymous format for balanced input
- Iterative process for self validation
  - Consensus was defined as  $>70\%$  agreement
  - Open discussion and repeat voting

# Learning Objectives



# Learning Objectives: Example

- *Tier 1:* Recognize different etiologies and initial management of altered mental status; recognize indications for transfer
- *Tier 2:* Understand etiologies for and initiate medical management of altered mental status
- *Tier 3:* Recognize acute encephalopathy and understand differential diagnosis; describe different types of intracranial hemorrhage; describe common presentations for brain tumor/mass by age; manage increased intracranial pressure

# Tier 1 Pilot Implementation and Evaluation

## ■ Training

- Conducted over 2.5 days in the Emergency Medicine Department of Muhimbili National Hospital in Dar es Salaam, Tanzania
- Fifteen nurses participated; matched to controls
- Lectures, skills stations, simulation scenarios

## ■ Evaluation and Feedback

- Self-efficacy surveys (pre- and post-)
  - Knowledge tests (pre- and post-)
  - Performance of critical actions during observed resuscitations (post- only)
- 
- Interviews of participants

# Tier 1 Pilot - Training

Time	Activity
8:00 am	Introduction
8:30 am	Pre-tests
10:00 am	Tea break
11:00 am	General Principles Module I
11:30 am	General Principles Module II
12:00 pm	Skills Practice and Simulated Scenarios focused on General Principles
1:00 pm	Lunch
2:00 pm	Respiratory Module
2:30 pm	Skills Practice and Simulated Scenarios focused on Respiratory
3:30 pm	Break
4:00 pm	Shock Module
4:30 pm	Review with Question and Answer session <ul style="list-style-type: none"> <li>• Additional practice as needed</li> </ul>
4:30 - 5:30 pm	Adjourn

Time	Activity
8:00 am	Review of previous day
8:30 am	Neurology – Seizure Module
9:00 am	Skills Practice and Simulated Scenarios focused on Seizure
9:30 am	Neurology – Altered Mental Status Module
10:00 am	Tea break
11:00 am	Hematology – Anemia Module
11:30 am	Hematology – Sickle Cell Module
12:00 pm	Review with Question and Answer session
12:30 pm	Lunch
1:30 pm	Resuscitation – CPR and Teamwork Skills Module
2:00 pm	Resuscitation - Neonatal Resuscitation Module
2:30 pm	Skills Practice and Simulated Scenarios focused on Resuscitation and Teamwork Skills
4:00 pm	Break
4:30 pm	Electrolytes and GI Module
5:00 pm	Review with Question and Answer session <ul style="list-style-type: none"> <li>• Additional practice as needed</li> </ul>
5:00 - 6:00 pm	Adjourn



# Tier 1 Pilot - Training



# Tier 1 Pilot - Training



# Tier 1 Pilot - Training



# Tier 1 Pilot - Evaluation

## ■ Kirkpatrick's Levels of Evaluation of Training

- |             |                            |
|-------------|----------------------------|
| 1. Reaction | Self-efficacy surveys      |
| 2. Learning | Knowledge tests            |
| 3. Behavior | Critical action checklists |
| 4. Results  | (48-hour mortality)        |

## ■ Study Design

- Non-randomized, controlled
  - Comparison of pre- and post- both within and across groups
    - Exception: unable to collect pre-pilot checklist or 48-hour mortality data
-

# Tier 1 Pilot – Evaluation of Self-Efficacy

	Not at all comfortable	Slightly Comfortable	Somewhat comfortable	Very comfortable	Extremely comfortable
Identifying the early signs of respiratory failure in a pediatric patient	1	2	3	4	5
Treating a child in hypovolemic shock	1	2	3	4	5
Recognizing the signs of hypoglycemia in a child	1	2	3	4	5
Recognizing severe malaria and what signs would suggest transfer to a hospital	1	2	3	4	5
Starting the evaluation and treatment for a seizing child	1	2	3	4	5
Starting fluid management for a malnourished child with signs of shock	1	2	3	4	5
Performing effective bag- valve mask ventilation for an apneic infant in the first minute of life	1	2	3	4	5

# Tier 1 Pilot – Evaluation of Self-Efficacy

Overall median self-efficacy rating (scale 11-55), and within cohort p-value comparison of change in self-efficacy ratings pre and post-training

Cohort	Self-Efficacy Assessment	Median Rating	Interquartile Range	P-value
Control	Pre-	46	41 - 48	0.55
	Post-	45	43 - 49	
Intervention	Pre-	45	39 - 48	0.002
	Post-	54	54 - 55	

# Tier 1 Pilot – Evaluation of Self-Efficacy

P-value comparisons at pre-training and post-training time points between cohorts (intervention versus control)

Time point	Self-Efficacy
Pre-training	$p = 0.79$
Post-training	$p < 0.001$

# Tier 1 Pilot – Evaluation of Learning

Overall median knowledge score (scale 0-20), and within cohort p-value comparison of change in knowledge scores pre- and post-training

Cohort	Knowledge Test	Median Score	Interquartile Range	P-value
Control	Pre-	14	14 – 17	0.54
	Post-	15	13 – 17	
Intervention	Pre-	16	14 – 17	0.016
	Post-	17	17 – 19	



# Tier 1 Pilot – Evaluation of Learning

P-value comparisons at pre-training and post-training time points between cohorts (intervention versus control)

Time point	Knowledge
Pre-training	$p = 0.53$
Post-training	$p = 0.014$

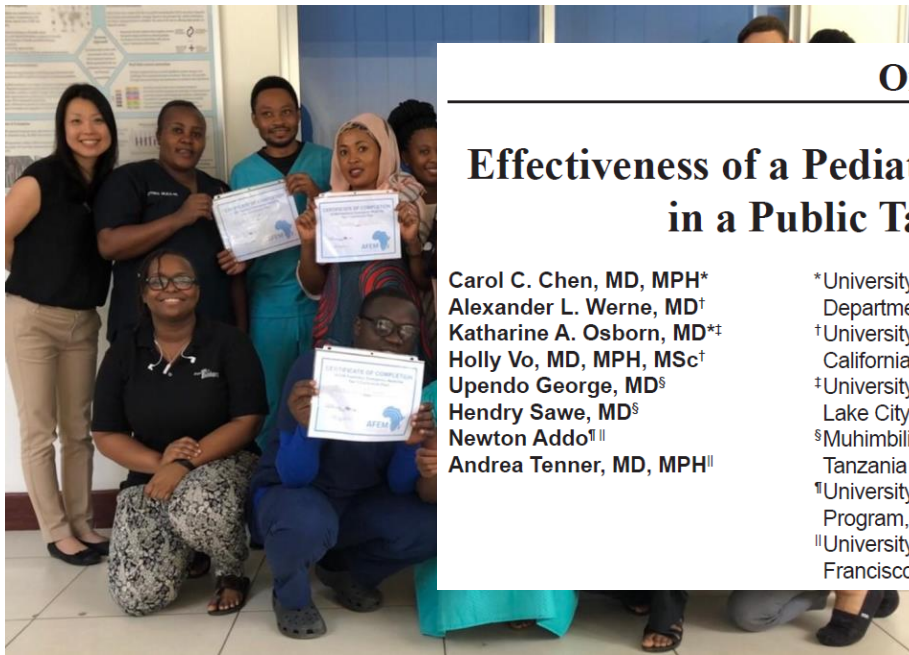
# Tier 1 Pilot – Evaluation of Behavior

- Three pediatric resuscitation types were observed and evaluated using a binary (yes/no) checklist of critical actions
  - Septic shock
  - Trauma
  - Respiratory distress
- Only post-training resuscitations were observed (no pre-training) so the only comparison that could be made was post-training intervention group vs post-training control group

# Tier 1 Pilot – Evaluation of Behavior

	Intervention Observations	Control Observations	Actions with Significant Difference
Septic shock	117	279	States whether the child is or is not anemic. Attempts to place IV or IO (if available).
Trauma	115	279	None
Respiratory distress	121	281	States that the child is in respiratory distress.

# Tier 1 Curriculum - Updates



## ORIGINAL RESEARCH

### Effectiveness of a Pediatric Emergency Medicine Curriculum in a Public Tanzanian Referral Hospital

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**Holly Vo, MD, MPH, MSc<sup>†</sup>**  
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# Tier 2 Pilot Implementation and Evaluation

## ■ Training

- Conducted over 2 days x 3 at JFK Medical Center in Monrovia, Liberia
- Thirty-six interns and residents participated; no controls
- Lectures, small group work, skills stations, simulation scenarios

## ■ Evaluation and Feedback

- Self-efficacy surveys (pre- and post-)
  - Knowledge tests (pre- and post-)
  - Performance of critical actions during observed resuscitations
  - 48-hour mortality
-

# Tier 2 Pilot - Training



# Tier 2 Pilot - Training





# Tier 2 Pilot - Training





# Tier 2 Pilot - Evaluation



# What next? Tier 3? Implementation considerations?



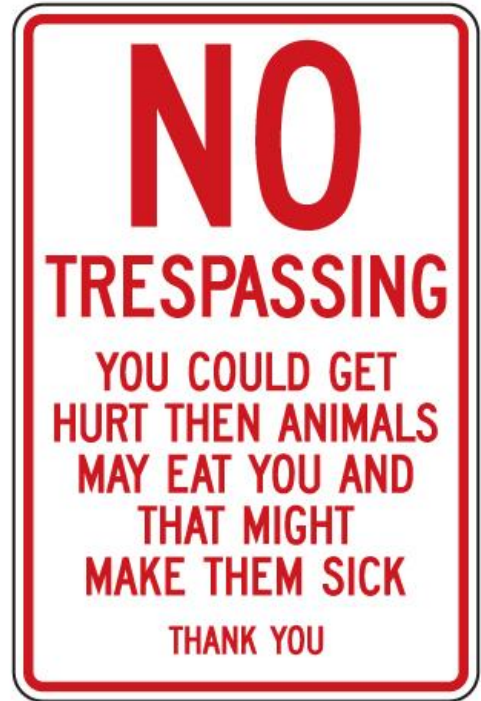
# Final thoughts – Tips on working in global health

- Partnerships are paramount
  - Strive for bi-directional partnerships
    - Are YOUR priorities THEIR priorities? Why or why not?



# Final thoughts – Tips on working in global health

- Remember that “low resource” often refers to human resources as well
  - Your local counterpart is probably working twice as many jobs
- Plan ahead but be flexible
- Do not make vulnerable people more vulnerable (A. Tenner)



Thank you!

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1/31/2020