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Feasibility Trial of an Electronic Adaptive Learning Curriculum for Pediatric Healthcare Workers in Tanzania

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Presenting Author Disclosure Information

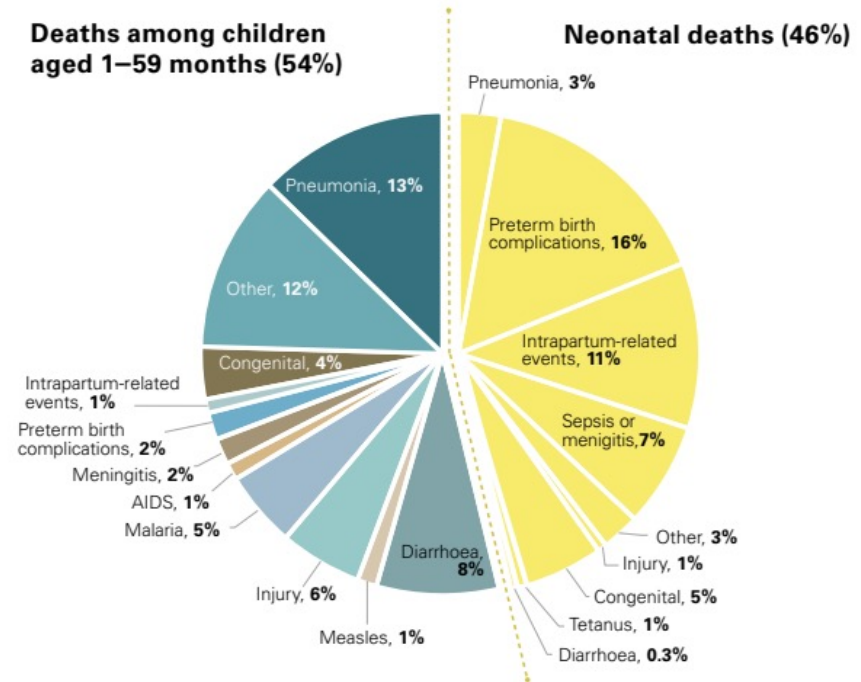
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Preventable Under-5 Mortality Remains High

- 5.2 M children U5 die each year
 - Majority in Low- and Middle-Income Countries
 - Large percentage due to preventable, treatable illness

Deaths among children aged 1–59 months (54%)



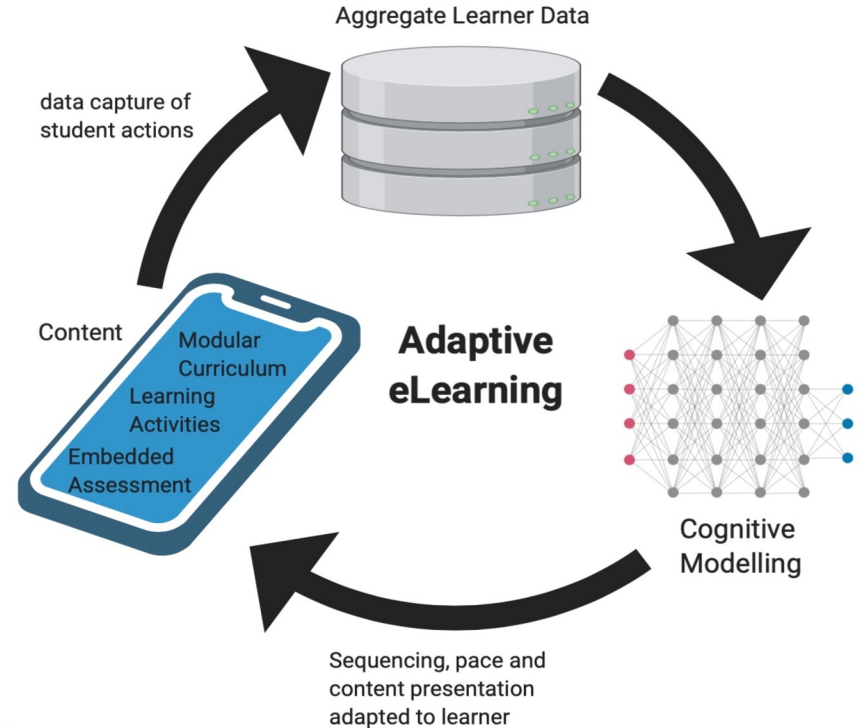
Evidence-Based Practice (EBP) Training: Strengths & Limitations

- Adherence improves outcomes
- In-person training (WHO & AHA)
 - Increase knowledge and initial adherence
- Limitations
 - Labor intensity
 - Cost (\$80-\$300 USD)
 - Loss to Follow-Up
 - "One Size Fits All"

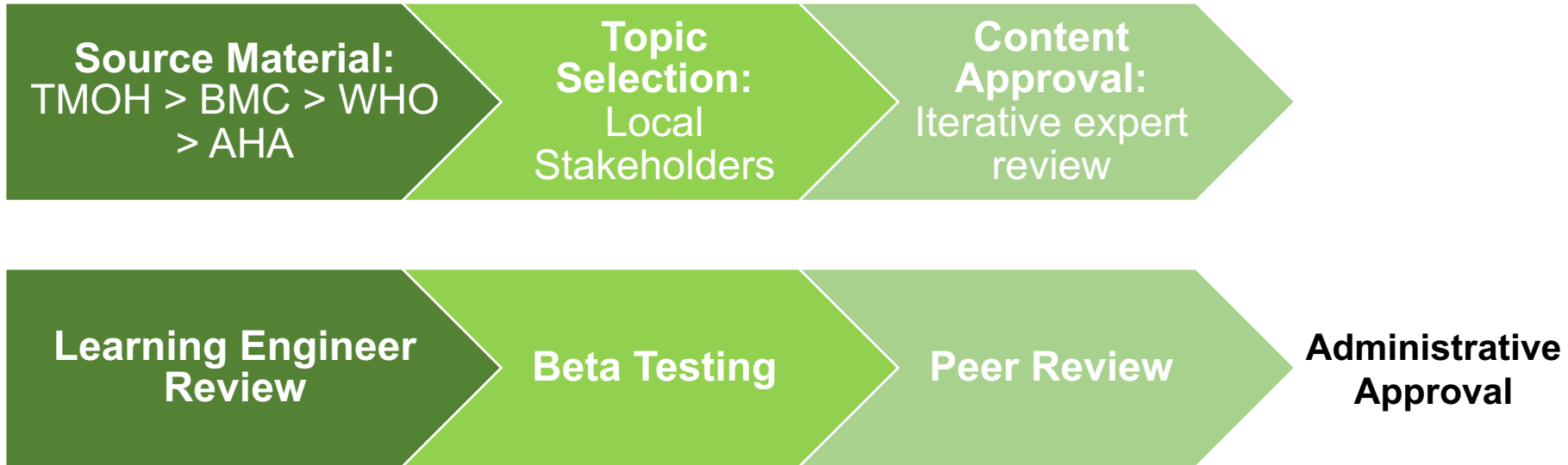


Possible Solution: Mobile Health and Adaptive Learning

- Mobile Health
 - Broad, rapid dissemination
 - Leverages increasing mobile technology
 - Real-time updates
 - Funding priority for WHO
- Adaptive Learning
 - Digital algorithms for customized learning
 - Increased and *more* rapid acquisition of mastery
 - Outperforms in-person teaching in high-resource settings



Development: Content



Development: Structure

Pediatric Acute Care Education (PACE): Introduction	Systematic Approach	
	Triage: Emergency and Priority Signs	
Problem	Respiratory: Lung Tissue Disease	Circulatory: Hypovolemic Shock
Assessment	Airway and Breathing	Circulation, Disability & Exposure
intervention	Oxygen Therapy, Antibiotics	Fluid Therapy, Blood Transfusion
Total	11 Modules	

Development: The Platform

The screenshot shows a mobile application interface for a medical assessment. At the top, the Stanford Global Health logo is on the left, and the user's name 'Zachary Smith' with initials 'ZS' and a back arrow is on the right. A progress bar indicates '100% PROGRESS: Hypovolemic Shock'. The main content area is titled 'WHO DIAGNOSTIC CRITERIA FOR SEVERE ACUTE MALNUTRITION (SAM)'. On the left, a 'Coach' section features a profile picture and text explaining the importance of SAM and listing diagnostic criteria: weight-for-length/height <math>< -3\text{ SD}</math>, mid-upper arm circumference <math>< 115\text{ mm}</math>, or edema of both feet. Below the text is an 'Autoplay' toggle set to 'Off' and a 'HIDE TEXT' button. The central part of the screen shows a line drawing of a child with skin lesions, captioned 'Child with severe acute malnutrition oedema'. To the right of the drawing, three criteria are listed: 'Weight-for-length/height' (Less than -3SD), 'Mid-upper arm circumference' (<math>< 115\text{ mm}</math> only in patients over 6 months of age), and 'Edema' (Both feet). At the bottom, there are navigation elements: a 'Self-Assessment' button, a progress indicator with '1' and '2', a 'NEXT' button, and a 'CHALLENGE US' button.

Study Site: Mwanza, Tanzania



Mwanza Region

Population: 2.7 million

U5 Mortality Rate: 57/1000

Est U5 Deaths: 28,500/YR

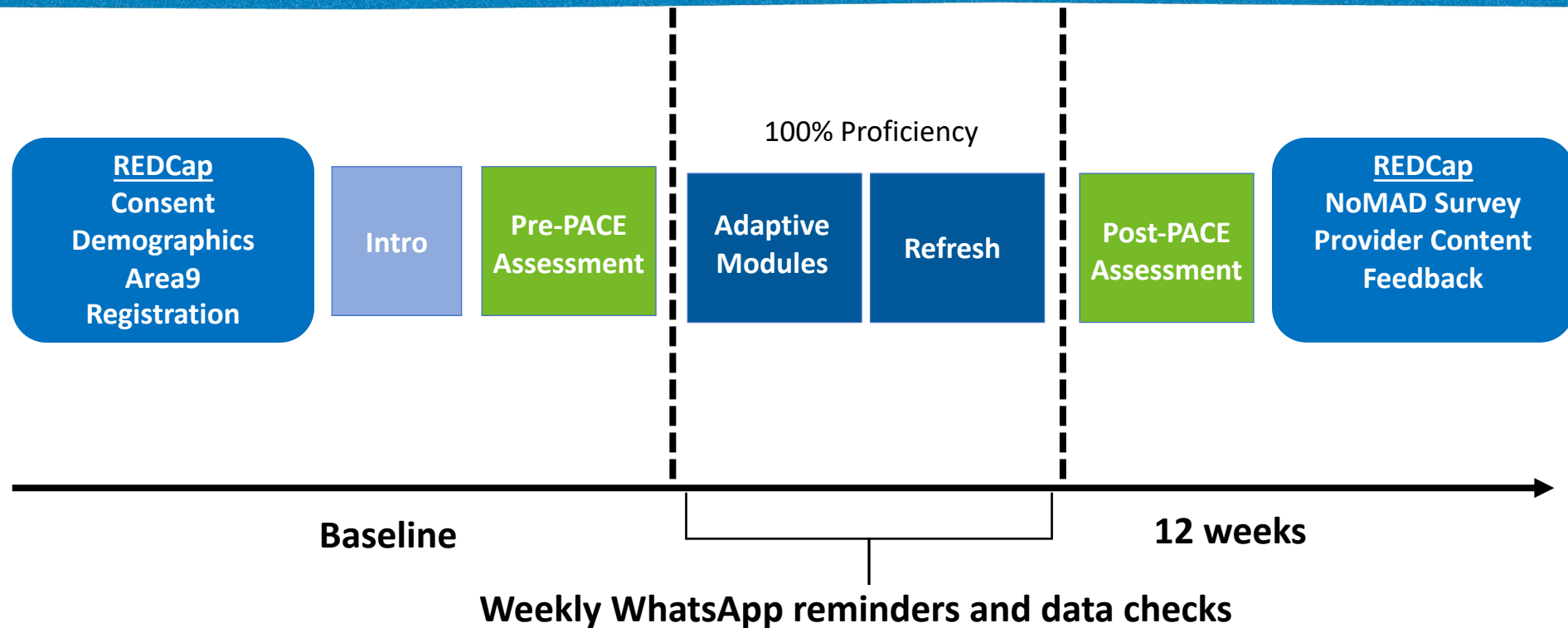
Bugando Medical Center

900 Bed Tertiary Center

Regional Teaching Hospital



Study Design: Prospective Mixed-Methods Single-Arm Feasibility Trial



Defining Feasibility: RE-AIM Framework



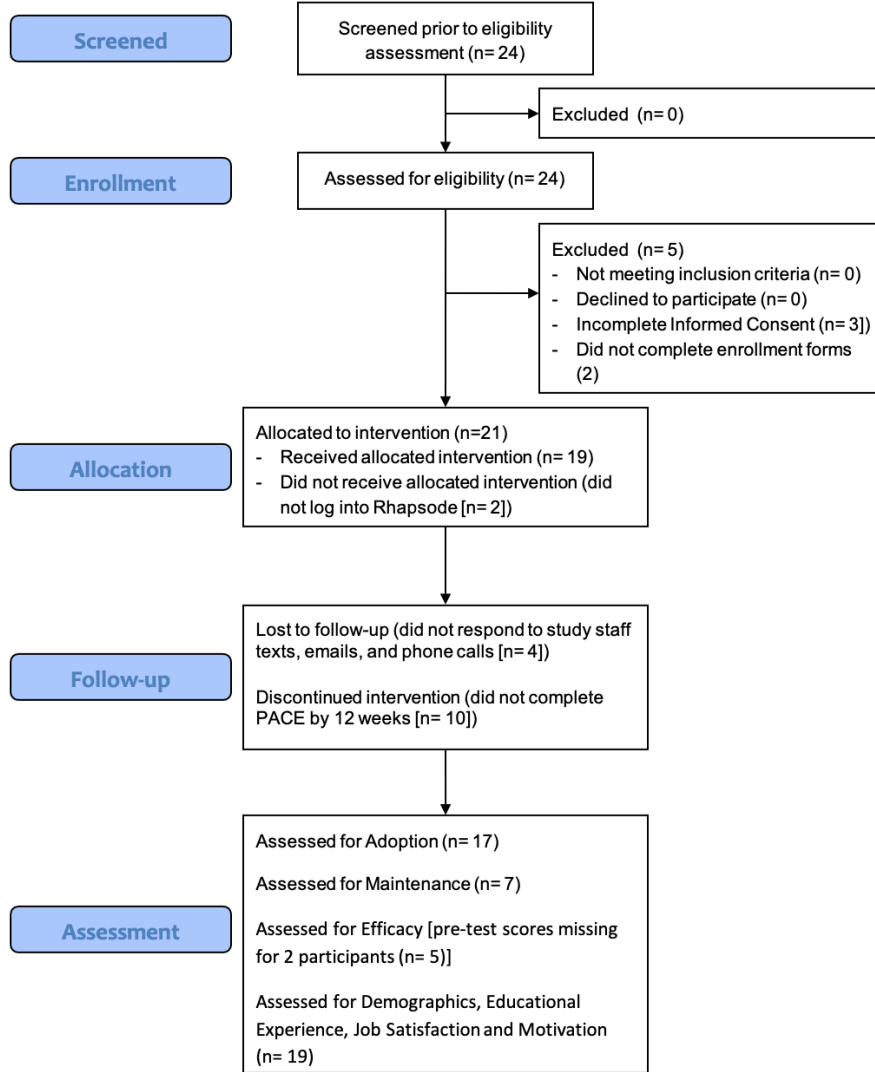
Defining Feasibility: RE-AIM Framework



Defining Feasibility: RE-AIM Framework



Modified CONSORT Diagram for Pilot & Feasibility Studies



Cohort Characteristics

Demographics	Overall	Completed Maintenance	Did not complete Maintenance
Total	21	33.3% (7/21)	66.7% (14/21)
Median Age	26	26	26
Female Gender	28.6% (6/21)	14.3% (1/7)	35.7% (5/14)
Reported English fluency:	85.7% (18/21)	85.7% (6/7)	85.7% (12/14)
Previous acute care training*	63.2% (12/19)	85.7% (6/7)	50% (6/12)
Clinical Experience (Median Years)	1	1	1
Electronic media as primary learning source			
< 25%	30% (6/20)	42.9% (3/7)	23.1% (3/13)
25-75%	45% (9/20)	28.6% (2/7)	53.8% (7/13)
>75%	25% (5/20)	28.6% (2/7)	23.1% (3/13)
Smart phone ownership (mobile phone capable of accessing internet with active data plan)	21/21 (100%)	7/7 (100%)	14/14 (100%)
Device for e-Learning			
Mobile phone	90.5% (19/21)	85.7% (6/7)	92.3% (12/13)
Tablet	4.8% (1/21)		7.7% (1/13)
Computer	4.8% (1/21)	14.3% (1/7)	

Determination of Feasibility

Screened	Enrolled	Adoption	Maintenance	Efficacy	NoMAD
24	21 (87.5%)	17 (81%)	7 (33.3%)	24.4% (95% CI 3.1-45.7)	6 (28.6%)

Conclusions

- First feasibility trial of an adaptive electronic learning curriculum of evidence-based guidelines for acutely-ill children in an LMIC
- Current implementation strategy *is* feasible for Adoption and Effectiveness
- *Not* feasible for Maintenance
- Initial deployment notable for similar efficacy to conventional education interventions
- Results will inform future implementation

Limitations

- Small n at a single facility with one cadre of healthcare providers
- NoMAD data only collected on those who completed PACE
- Definition of feasibility based on thresholds from prior educational studies rather than site-specific contextual data

Future Directions: Phase I Implementation Trial

- 8 healthcare facilities throughout Mwanza Region
- Multiple cadres of providers
- Additional qualitative data collection
 - Focus Group Discussions
 - Individual Interviews
- 181 participants enrolled thus far

Acknowledgements



Questions?



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KEMRI
Wellcome Trust



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For more information on this subject, see the following publications:

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