

## The Pediatric Critical Illness Outcomes Study - PECIOS

---

### Background

- In The Lancet earlier this year we reported the findings from the African Critical Illness Outcomes Study ([ACIOS](#)) – an international study of 20,000 adult in-patients in 180 African hospitals. The prevalence of critical illness was 12.5%, 7-day mortality was 21%, and 56% of critically ill patients were not provided with basic critical care treatments such as oxygen and IV fluids (termed essential emergency and critical care – EECC).
- Also earlier this year, the [Global-PARITY](#) study indicated that the situation may be similar for children – finding that 13% of children aged 28 days to 14 were critically ill in 46 resource-constrained hospitals. The criteria for critical illness in PARITY were more complex than in ACIOS and referred to the receipt of advanced critical care treatments, which are not always feasible in resource limited settings.
- Crucial knowledge gaps remain concerning the global prevalence of critical illness among children using pragmatic criteria such as those used in ACIOS, the provision of EECC to children, and the prevalence of critical illness and care provided to critically ill neonates (under 28days) and adolescents (14-18 years).

### Objectives

PECIOS aims to:

1. establish the proportion of pediatric in-patients aged 0 days to 18 years in hospitals globally who are critically ill using single severely deranged vital sign criteria
2. determine in-hospital 7-day mortality among critically ill and non-critically ill pediatric patients and the association between critical illness and mortality
3. estimate the proportion of critically ill children who receive EECC
4. determine the facility-level availability of resources for the provision of EECC to children
5. estimate the proportion of children cared-for outside of specialized critical care units

### Methods

**Design:** prospective, international, multicenter, point-prevalence and cohort study.

**Participating sites:** we aim to recruit as many hospitals as possible and are targeting at least 200 hospitals in 40 countries globally with a total inclusion of 16,000 children. Based on an expected in-hospital prevalence of critical illness of 12%, a sample size of 16,000 children would provide a 95% CI of 0.75% percentage points around the point estimate (ie: 11.25–12.75%).

**Population:** all pediatric in-patients (0 days to 18 years) in participating hospitals on the pre-defined census day

**Criteria for critical illness:** any single, severely deranged, age-adapted, feasible-to-collect-in-all-settings, vital sign agreed through a nominal group methodology before the start of the study (draft critical vital signs in the appendix).

### **Data Collection:**

- demographics, admission type, ward type
- vital signs and classification as critically ill or not
- provision of EECC interventions (oxygen, fluids, airway support etc)
- in-hospital 7-day outcome
- facility-level availability of EECC resources

### **Analyses:**

- point-prevalence of critical illness
- mortality among critically ill and non-critically ill children
- association of critical illness and mortality using multivariable regression models
- provision of EECC
- facility-level availability of EECC resources

Data will be presented disaggregated for neonates, children, and adolescents, by World Bank income level, and by continent. In an additional analysis, we will weigh hospitals according to global proportions of primary/secondary/tertiary facilities to reduce facility selection bias.

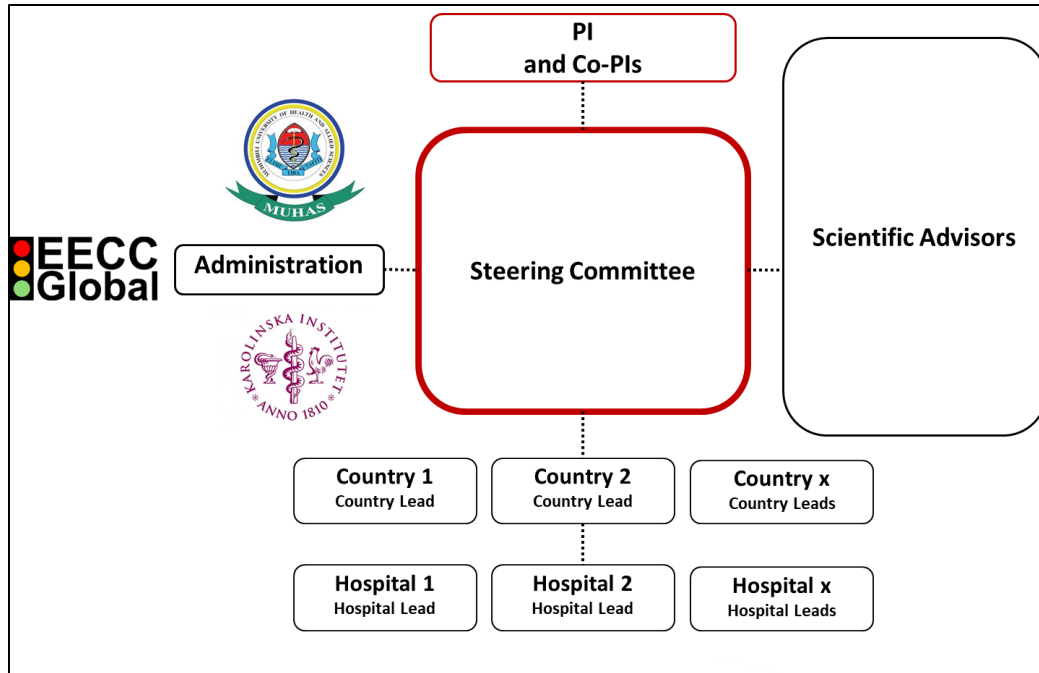
In a sensitivity analysis we will investigate a secondary definition of critical illness where we additionally include those children receiving a critical care treatment, as this could have resulted in physiological correction of a severely deranged vital sign, masking an underlying critical illness.

### **Project relevance and impact**

- PECIOS will provide the first global estimates of the burden of pediatric critical illness using pragmatic criteria, its association with mortality, and the current provision of EECC in children
- The findings can be used by decision makers, health system planners and hospital managers to allocate resources and for quality improvement initiatives, with the potential to reduce deaths among critically ill children globally

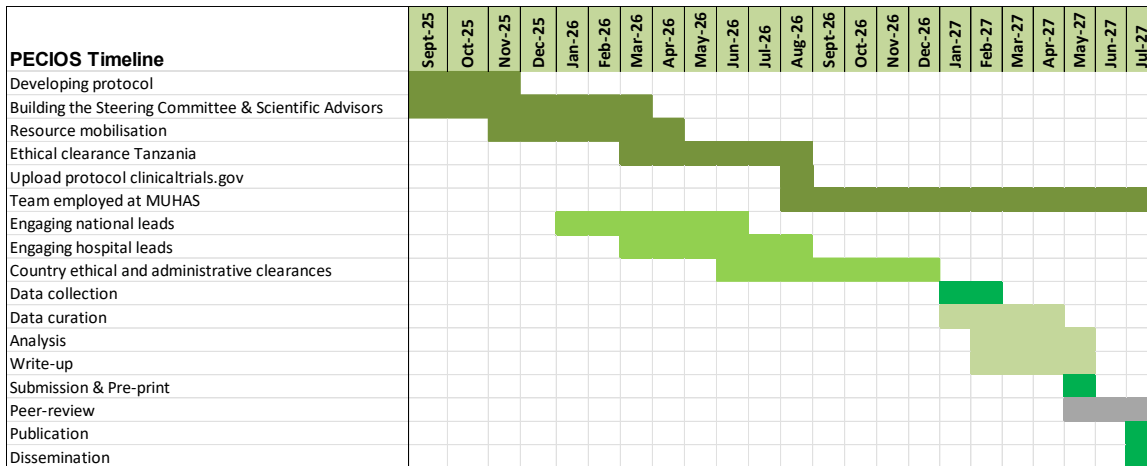
### **Our team**

- PECIOS will be run by a global collaboration of clinical and research experts at Muhimbili University in Tanzania, Karolinska Institute in Sweden, and other leading global health institutions
- It will be led by Assoc Prof Tim Baker, based at Muhimbili, who led the ACIOS study and has 20 years of experience in global critical care research
- The PECIOS Steering Committee will consist of experienced researchers with proven track records of successfully conducting global collaborative research projects
- PECIOS will have a team of senior Scientific Advisors, consisting of leading global experts in neonatology, pediatrics, emergency care, critical care, and health systems
- EECC Global, with a network of 1400 critical care experts worldwide, will provide technical and administrative support



PECIOS team structure

## Timeline



## Appendix

Draft Criteria for critical illness (criteria to be modified following nominal expert group agreement)

			Age	Danger (Red)	Danger (Red)
<b>A</b>	Airway	Airway sounds	All		Abnormal airway sounds eg. gurgling/ snoring/stridor
<b>B</b>	Breathing	Respiratory Rate / minute	<1 month 1month-<1year 1year->5years 5years-12years	<20 <20 <15 <10	>80 >60 >50 >40
		Oxygen Saturation (%)	All	<90	
<b>C</b>	Circulation	Heart Rate / minute	<1 month 1month-<1year 1year->5years 5years-12years	<90 <80 <70 <60	>200 >180 >170 >140
<b>D</b>	Conscious level	Conscious Level (AVPU)	All		Responds to Pain or Unresponsive