

CRIMSON

Evaluating the effect of implementing the Responses to Illness Severity Quantification (RISQ) System on mortality in acutely malnourished children treated in Chad: the CRIMSON cluster randomised trial

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RISQ

Responses to Illness Severity Quantification System

System of care to improve clinical practice and child survival in resource-limited settings

1) Validated 7-item RISQ Score:

- Heart rate; respiratory rate; respiratory effort; oxygen saturation; oxygen use; temperature; level of consciousness

2) Score-matched care recommendations

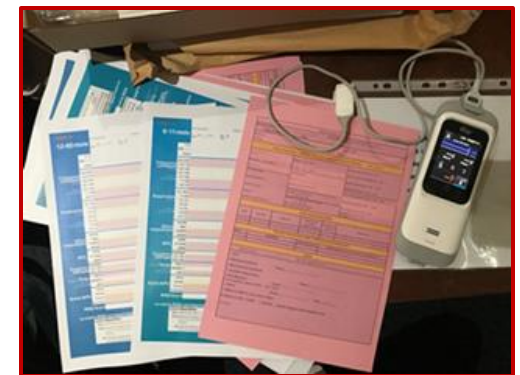
- Frequency of observation, consideration of secondary review, guidance on level of care required

3) Age-specific documentation record

- 6-11 months; 12-59 months

4) Implementation training program

- Theoretical, practical, score-calculation, case studies



* To be used as an adjunct to usual care

Background

Aim: To evaluate the effect of implementation of the RISQ System on mortality and processes of care in a nutritional program

The study **addresses child mortality** associated with acute malnutrition

- Hospital mortality remains high
- Strategies needed to identify/manage care of high-risk children

Ngouri, Chad

- Population of study area is 210,000
- Children aged 6-59 months is 40,000 (~ 25% admitted to OptiMA)

Optimizing Acute Malnutrition Treatment (OptiMA)

- Mid-upper arm circumference (MUAC) based inclusion
- Dose-adjusted therapeutic food for treatment
- Management of acute illness with current guidelines



Methods

Design: Cluster randomized trial

Setting: Ngouri Health District, Chad

Clusters: Health centers (HC) **n=34**

Participants: Aged 6-59 months enrolled in OptiMA; health centre staff

Intervention: RISQ System

Comparator: 'Usual care'

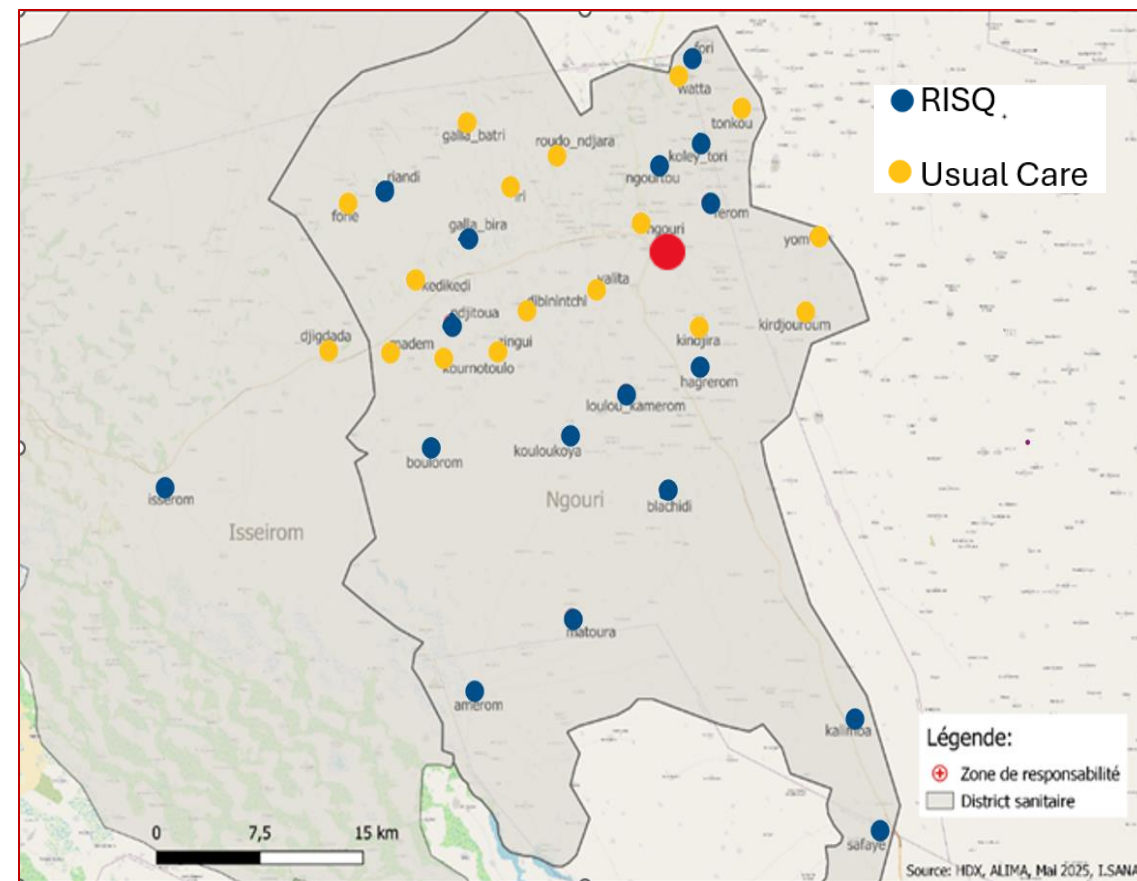
Randomization: 1:1 (Usual care: Usual care + RISQ System)

Sample size = number of children treated in the program (~20,000)

Primary Outcome: mortality occurring during the period of treatment for up to 60-days after programme admission (if child is not yet discharged).

Secondary Outcomes: Processes of care, Implementation fidelity, Acceptability

Health Centres Randomized, Ngouri, Chad



Protocol Registered: Clinical Trials: CT 1000080735; **Published:** Trials, 2025

Research Ethics Board Approval: SickKids # 1000080735/Comité National de Bioéthique du Tchad

Methods

Period 1: Baseline (June 30, 2022- July 1, 2023)

- 12-month enrollment
- pulse oximeters introduced /7 items measured as usual care

Period 2: Intervention (September 11, 2023 – September 10, 2024)

- 12-month enrollment
- data collection /refreshers/ questionnaires

Analysis

- Bayesian model (blinded interim analysis with DSMB)
- posterior probability of mortality reduction, relative risk, 95% credible interval
- main unit of analysis was program admission
- primary analysis adjusted for cluster-specific mortality baseline period
- 95% probability of reduction in mortality judged sufficient to conclude benefit



Two health care workers examine a child as part of the OptiMA project in Ngouri.
Credits: Denis Sassou Gueipeur, Ngouri. January 2023.

Results: Enrollment

Overall

- **34** clusters
- **10,846** individual patients
- **68** eligible staff
- **14677** program-admissions
- **6** primary outcome unknown

Participant characteristics

- **Age: 17.1 (9.2) months** Mean (SD)
- **Males: 6363 (43.4%)** Number (%)
- **MUAC: 118 (6) mm** Mean (SD)
- **Oedema: 275 (1.9 %)** Number of children (%)
- **Length of stay in the program: 29 (29-43) days** Median (IQR)
- **In program more than 60 days: 1672 (11.4%)** Number (%)

*Manuscript currently under peer review

Results: **Primary outcome**

	RISQ	Usual Care
Program Admissions N	7497	7174
60-day in-program Mortality N(%)	35 (0.47)	59 (0.82)

Odds Ratio (95% CrI) 0.58 (0.30,1.07)

Posterior Probability of Benefit 96.1%

Results: Secondary Outcome

Hospitalization

	RISQ	Usual Care
Program Admission N	7497	7174
Any Hospitalization N (%)	293 (3.9)	430 (6.0)

Odds Ratio (95% CrI) 0.66 (95% CrI 0.39–1.07)

Posterior Probability of Benefit **95.7%**

Fidelity Assessments

- RISQ scores were documented on **99.9%** of the forms
- Errors in 171 (**2.8%**) of the 6606 visits where RISQ score calculations were checked.

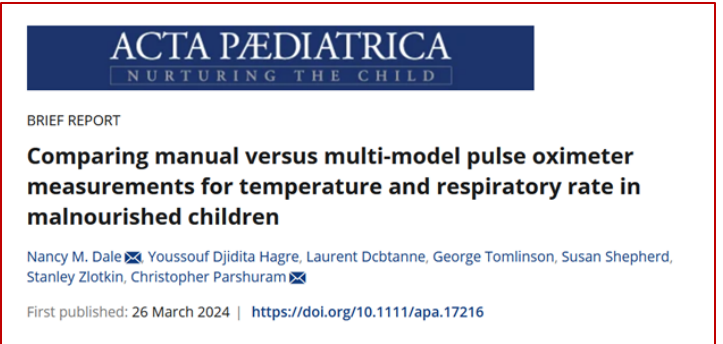
Implications and Impact

Mechanisms of effect:

- Rapid identification and prioritization in **outpatient settings**
- Integrated simplified approaches to severity of illness assessment and management
- Potential for longitudinal monitoring of clinical trajectory

Impact:

- Evidence- based
- Applicability across the healthcare team
- Operationally feasible
- Potential for more efficient care (**reduction of cost for hospital care**)
- May reduce preventable deaths and hospitalisation (**lives saved per 1000 children admitted**)



What's next?

- Expanding implementation
- Exploring automated versions
- Further evaluation in inpatient care/other contexts/populations



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SickKids Research Institute

RISQ

ALIMA

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RISQ Study Nurses

SickKids Centre for Global Child Health and Centre for Safety Research

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[RISQ Score: A vital tool for treating children in emergencies - ALIMA](#)