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A Methodological Evaluation of Emergency Care Systems in Rwanda

A Multilevel Regression Analysis of Clinical Outcomes

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ABSTRACT

Background: Emergency care systems in low-resource settings are critical for reducing preventable mortality, yet robust methodological frameworks for evaluating their clinical performance are lacking. This gap impedes the development of evidence-based improvements in service delivery and patient outcomes.

Purpose and objectives: This case study aims to methodologically evaluate the performance of hospital-based emergency care units by developing and applying a multilevel regression model to analyse clinical outcomes. The objective is to quantify the influence of system-level factors on patient survival.

Keywords: *Emergency Medicine, Sub-Saharan Africa, Multilevel Modelling, Health Systems Evaluation, Clinical Outcomes, Low-Resource Settings, Rwanda*

Article Highlights

- Shift-level staffing ratios accounted for ~18% of variance in patient survival outcomes.
- Dedicated triage officer presence associated with 42% higher odds of 48-hour survival.
- A three-level hierarchical model disentangles nested patient, shift, and hospital effects.
- Demonstrates a framework for evaluating emergency care in low-resource settings.

Analytical Note

The core model was a three-level hierarchical logistic regression: patients nested within shifts, nested within hospitals.

This study provides a methodological framework for health systems evaluation.