

Comparative Performance of Four Osteomyelitis Classification Systems in Children

ULS São José – Lisboa, Portugal

Authors: Sofia Miguel; Inês Alturas; Joana Barreto; Vera Vaz; Catarina Gouveia; Joana Arcângelo; André Grenho

Introduction:

No validated classification system exists for paediatric osteomyelitis.

Several systems are used in adults but performance in children remains unclear.

The BACH classification has shown strong predictive value in adult populations, but has not been validated in paediatrics nor compared with other commonly used classifications in this age group.

Materials and Methods:

A retrospective cohort study of 159 paediatric patients with osteomyelitis treated at a tertiary centre was conducted.

Classified according to four systems: **BACH, Beit CURE, Cierny-Mader, and Roberts radiological classification.**

Primary outcomes: surgical burden (≥ 2 surgeries) and prolonged hospitalization (>30 days).

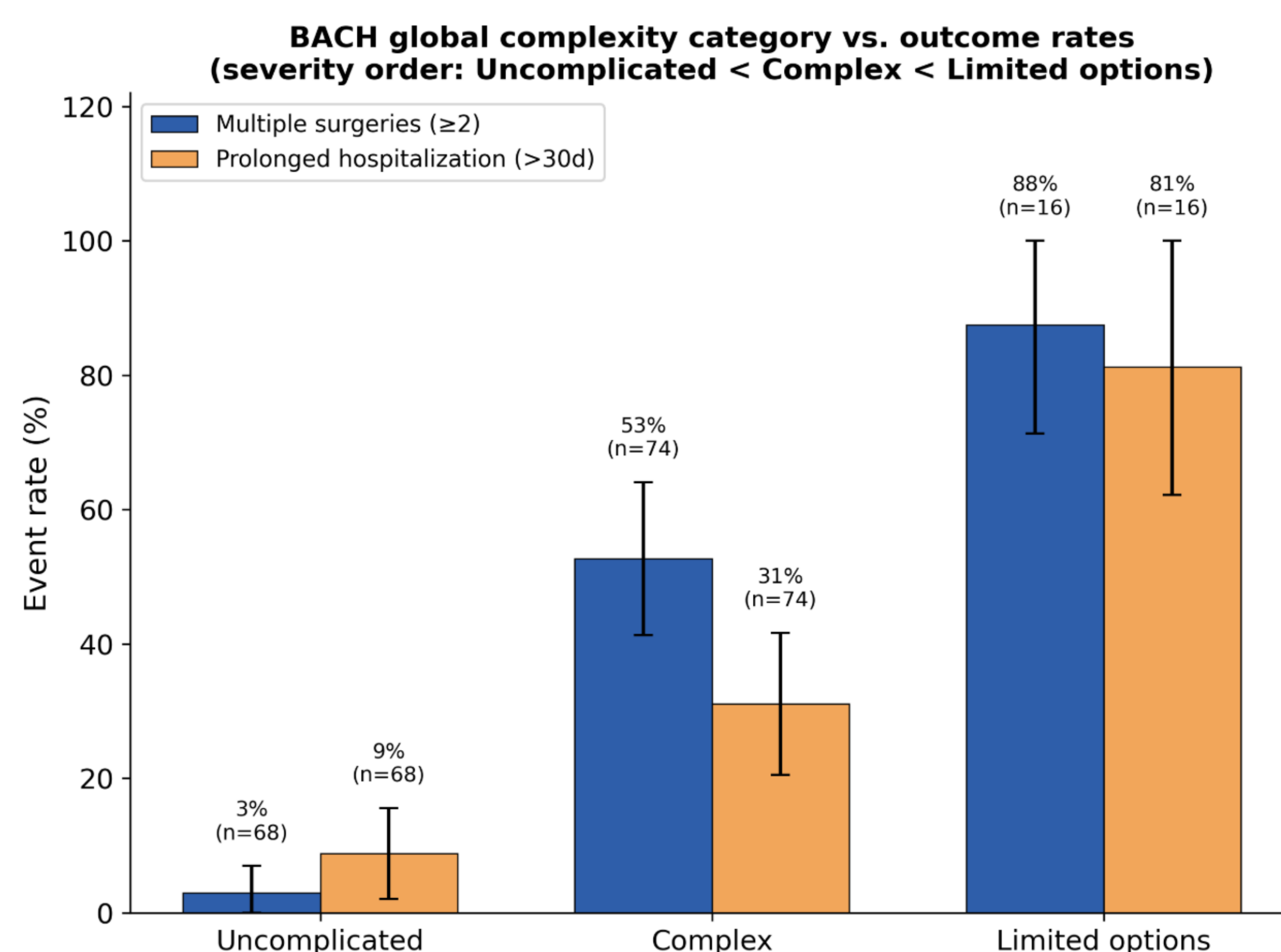
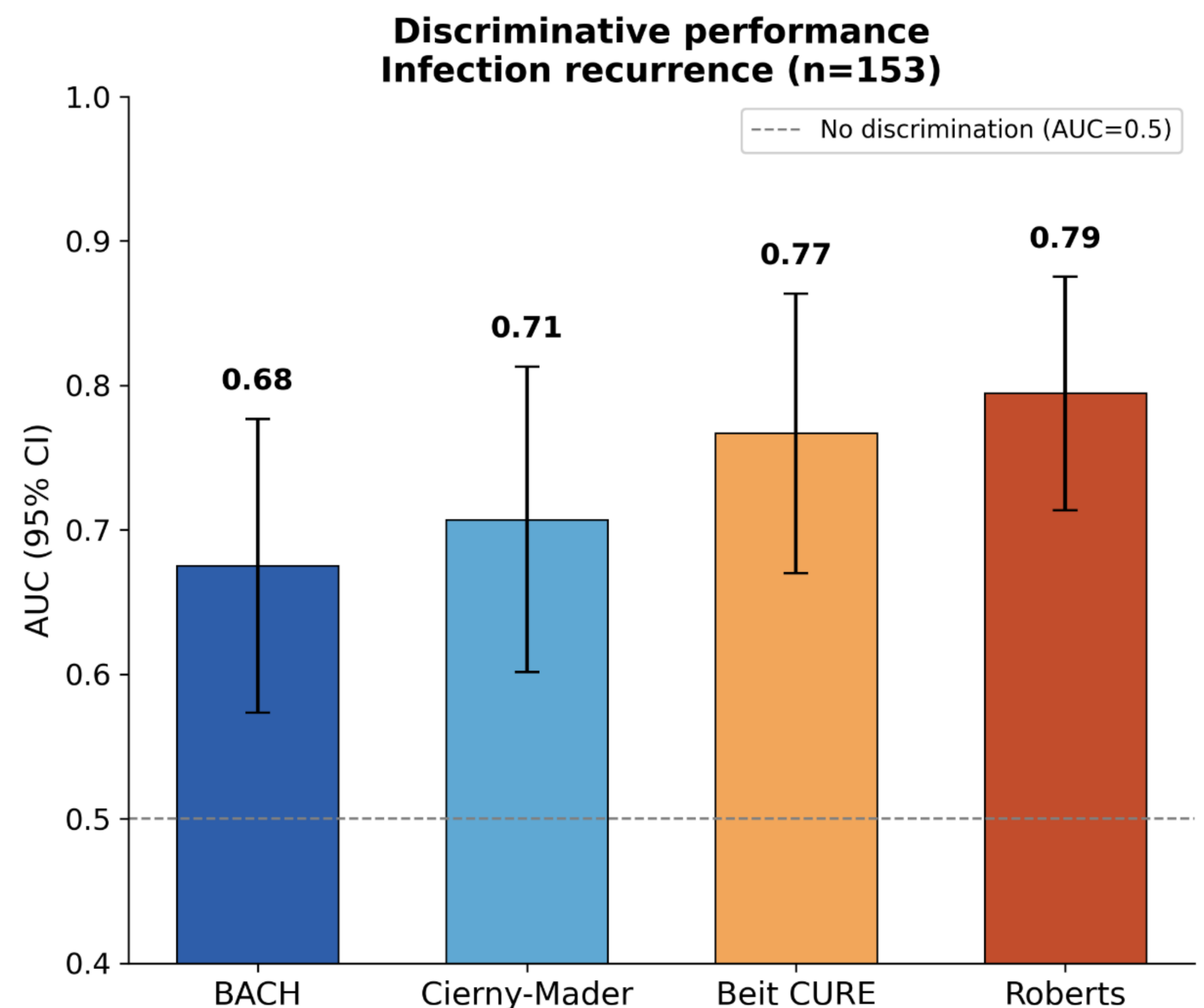
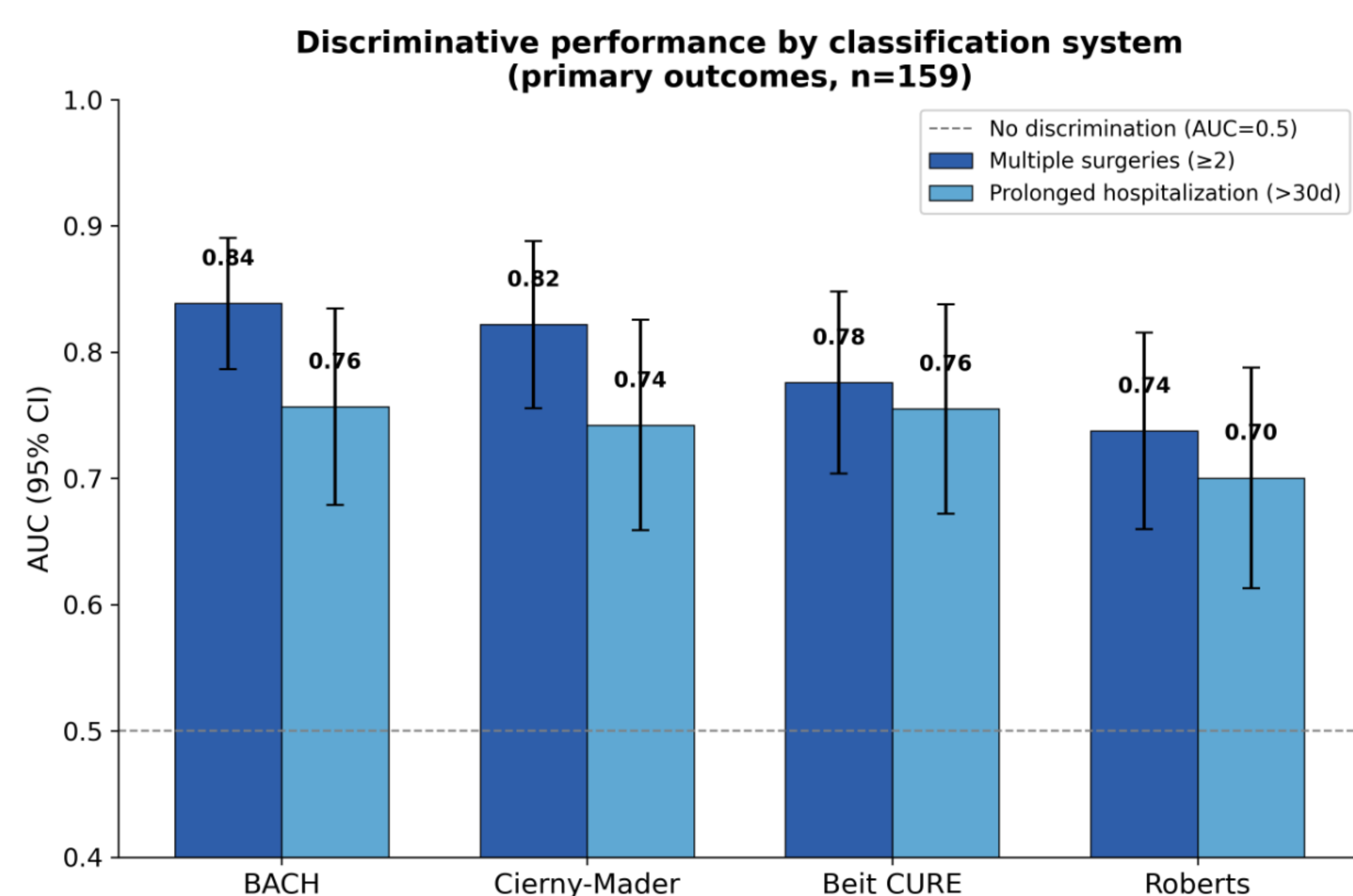
Secondary outcomes: infection recurrence and severe outcome.

Comparative performance was assessed using association tests, multivariable logistic regression, and receiver operating characteristic (ROC) curve analysis.

Results:

A total of 159 children with osteomyelitis were included.

Multiple surgeries (≥ 2) occurred in 55/158 patients (34.8%), **prolonged hospitalization** (>30 days) in 42/158 (26.6%), **infection recurrence** in 26/153 (17.0%), and a **severe outcome** in 5/153 (3.3%).



Conclusions:

All four classification systems were significantly associated with surgical burden and length of hospitalization. No single system was statistically superior across all endpoints.

BACH and Cierny-Mader - strongest and closely comparable discrimination for primary outcomes.

BACH showed relationship with outcomes across its three severity tiers, supporting multidimensional severity construct in this population.

Multidimensional and radiological systems each capture clinically relevant information in children.

Classification choice guided by the specific outcome of interest than by a single system judged universally superior.

Severe-outcome events were too rare in this cohort to draw firm conclusions about that endpoint.