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Post-discharge mortality prediction in under 5s with acute infectious diseases: a prospective cohort study

M Wiens, E Kumbakumba, M Ansermino, N Kissoon, J Singer, H Wong, A Ndamira, J Kabakyenga, J Kiwanuka, G Zhou, C Larson

Abstract

Background Acute infectious diseases are an important contributor to under-5 mortality. Mortality following discharge is an important but poorly recognised contributor to overall mortality. The identification of at-risk children is critical in developing efficient and effective post-discharge interventions. The objective of this study was to derive a model of post-discharge mortality after acute infectious illness.

Methods This prospective observational cohort study was conducted at two hospitals in Mbarara, Uganda, between March, 2012, and December, 2013. We included children aged between 6 months and 60 months who were admitted with a proven or suspected infection. Baseline clinical, laboratory, and sociodemographic variables were collected at admission. Children received usual care during their admission and received follow-up to 6 months after discharge to determine vital status. Primary outcome was death at 6 months. We modelled candidate predictor variables against the outcome of death at 6 months using logistic regression. The most promising ($p<0·05$) candidate predictors were incorporated into a multivariable logistic regression model using a stepwise backwards selection process balancing Aikaike's information criterion, area under the receiver operator curve (AUC), and parsimony.

Findings We enrolled 1307 consecutive participants over the study period. During hospitalisation, 65 (5·0%) participants died, thus there were 1242 live discharges. During follow-up we noted 61 deaths (4·9%), of which 31 (51%) occurred within the first 30 days. The follow-up rate was 98·5%. Age, mid-upper arm circumference, admission temperature, admission oxygen saturation, admission systolic blood pressure, length of hospital stay, previous hospitalisation within 7 days, abnormal Blantyre coma score, duration of illness before admission, parasitaemia, and HIV status were identified in the univariate analysis as being associated with post-discharge mortality. The final adjusted model included the variables mid-upper arm circumference (OR 0·95 [95%CI 0·94–0·97] per 1 mm increase), time since last hospitalisation (0.76 [0·61–0·93] for each increased period of no hospitalisation, categorized as <7 days, 7–30 days, 30–365 days, and never), oxygen saturation (0·96 [0·94–0·99] per 1% increase), abnormal Blantyre coma score (2·41 [1·19–4·87]), and HIV positive status (2·67 [1·19–6·00]). This model produced a receiver operating characteristic curve with an AUC of 0·815 ($p<0·0001$). Using a probability cut-off of 3·5%, our model would have a sensitivity of 80% (95% CI 70–90) and specificity of 65% (95% CI 62–68). Approximately 35% of children would be identified as high risk (10% mortality risk) and the remaining would be classified as low risk (1·5% mortality risk), in a cohort similar to this study cohort.

Interpretation A simple prediction tool that uses five easily collected admission variables could be used to identify children at high risk of death after discharge. Improved discharge planning and post-discharge care could be provided for these high-risk children. Further external validation of this model is required before implementation.

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Declaration of interests
We declare no competing interests.

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