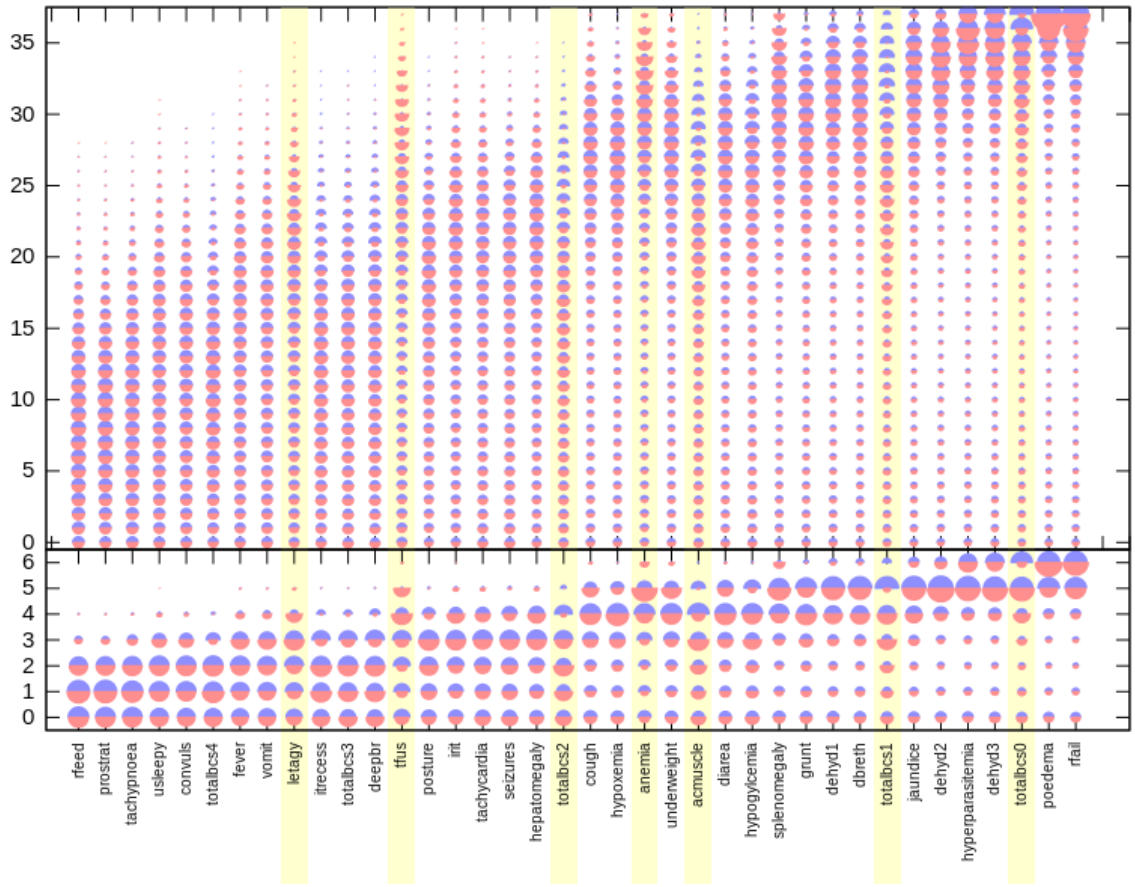
Supplementary Materials

Precision identification of high-risk phenotypes and progression pathways in severe malaria without requiring longitudinal data

Iain G. Johnston, Till Hoffmann, Sam F. Greenbury, Ornella Cominetti, Muminatou Jallow, Dominic Kwiatkowski, Mauricio Barahona, Nick S. Jones and Climent Casals-Pascual

Feature	Coding	Definition	Missing
cough	binary	Coughing	2.61%
hbtotal	numeric	Haemoglobin on admission derived from HB and PCV (g/dL)	2.13%
totalbcs	ordinal	Total coma score on admission	0.17%
deepbr	binary	Deep breathing	64.77%
agemth	numeric	Age in months	0.38%
convuls	binary	Reported convulsions prior to admission	5.45%
coma	binary	Coma	3.33%
comatime	numeric	Duration of coma in hours	49.71%
diarea	binary	Diarrhea	2.30%
vomit	binary	Vomiting	2.06%
usleepy	binary	Unusually sleepy	1.75%
irit	binary	Restless or irritable	4.22%
dbreth	binary	Breathing difficulty	2.81%
letagy	binary	Lethargy	4.05%
rfeed	binary	Reduced feeding	2.30%
pallor	1 - conjunctiva, 2 - palms, 3 - tongue, 4 - all	Pallor (pale appearance)	32.08%
jaundice	binary	Jaundice (yellowing of the skin)	2.16%
grunt	binary	Grunting	2.54%
acmuscle	binary	Use of accessory muscles of respiration	2.26%
dehyd	0 - not assessed, 1 - nil, 2 - mild, 3 - moderate, 4 - severe	Dehydration	21.17%
temp	numeric	Temperature (C)	1.10%
hrate	numeric	Heart rate (bpm)	0.31%
sao	numeric	Oxygen saturation	66.07%
resprate	numeric	Respiratory rate (#/min)	0.51%
spleen	numeric	Spleen size (cm)	1.23%
liver	numeric	Liver size (cm)	1.23%
rfail	binary	Renal (kidney) failure	5.93%
poedema	binary	Pulmonary oedema	5.93%
posture	0 - not assessed, 1 - Yes, 2 - No	Abnormal posturing	22.33%
prostrat	0 - not assessed, 1 - Yes, 2 - No	Prostration (extreme weakness)	23.26%
nofseizs	numeric	Number of seizures	40.51%
waz	numeric	Weight z-score controlling for age	29.43%
convadm	binary	Convulsions during admission	65.42%
itrecess	binary	Intercostal recession	70.46%
hypogl	binary	Hypoglycemia (glucose deficiency)	29.95%
parmcl	numeric	Parasite count ($\#/\mu L$)	2.09%
death	binary	Death	0.38%
cluster_idx	categorical	Cluster as inferred by the networks method	0.00%
who_type	1=CM, 2=CMRD, 3=RD, 4= CMSMA, 5=CMRDSMA, 6=RDSMA, 7=SMA and 8=other	Malarial type (CM=cerebral malaria, RD=respiratory distress, SMA=severe malarial anaemia)	0.00%

Supplementary Table 1. **List of clinical features analysed.**



Supplementary Figure S1. **HyperTraPS inference of malarial disease progression with transfusion included as a feature.** As in Fig 2A, the HyperTraPS algorithm (see text) was used to infer the ordering with which malarial symptoms are likely acquired across patients. Unlike Fig 2A, blood transfusion ("tfus") is here included as a disease feature, despite its interventional nature. Horizontal axis records symptoms; vertical axis records ordering from low (early acquisition) to high (late acquisition). This ordering axis is grouped into 6 longer "ordering windows" in the lower subsection of the figure, to display broader trends in addition to specific features of the dynamics. The size of a semicircle denotes the posterior probability that a given symptom is acquired at a given ordering in progression of malaria. Red semicircles are posteriors from the dataset of patients who died; blue semicircles inferred from patients who lived. Highlighted symptoms display a greater KS distance between posteriors from survival and death pathways than between either posterior and the uninformative prior. The inferred ordering of symptom acquisitions is almost identical to the case when transfusion is omitted, and the transfusion "symptom" appears as a strong predictor of survival.