

## Introduction

- ❑ Determining whether surgery is unlikely to produce the desired outcome of rescuing a patient from mortality is a complicated, ethically challenging endeavor.
- ❑ Among adult medical patients, the concept of medical futility, defined as a situation when medical care is ineffective at producing the desired physiologic effect on or benefit for the patient, is well described in the bioethics literature (1).
- ❑ Surgical futility is a relatively less examined and intensely debated subject (2).
- ❑ The purpose of this study was to examine factors associated with early (within 48 hr.) postoperative mortality among neonates classified as American Society of Anesthesiologists (ASA) physical status  $\geq 4$  who underwent a surgical procedure.

## Methods

- ❑ Following IRB approval, we assembled a retrospective cohort from the NSQIP-P (2012 – 2019) of neonates who underwent an inpatient surgical procedure.
- ❑ Extreme risk was defined as ASA physical status  $\geq 4$  and surgical futility was defined as death within 48 hr. of the index surgery in these high-risk patients.
- ❑ We estimated the incidence and examined factors associated with surgical futility.

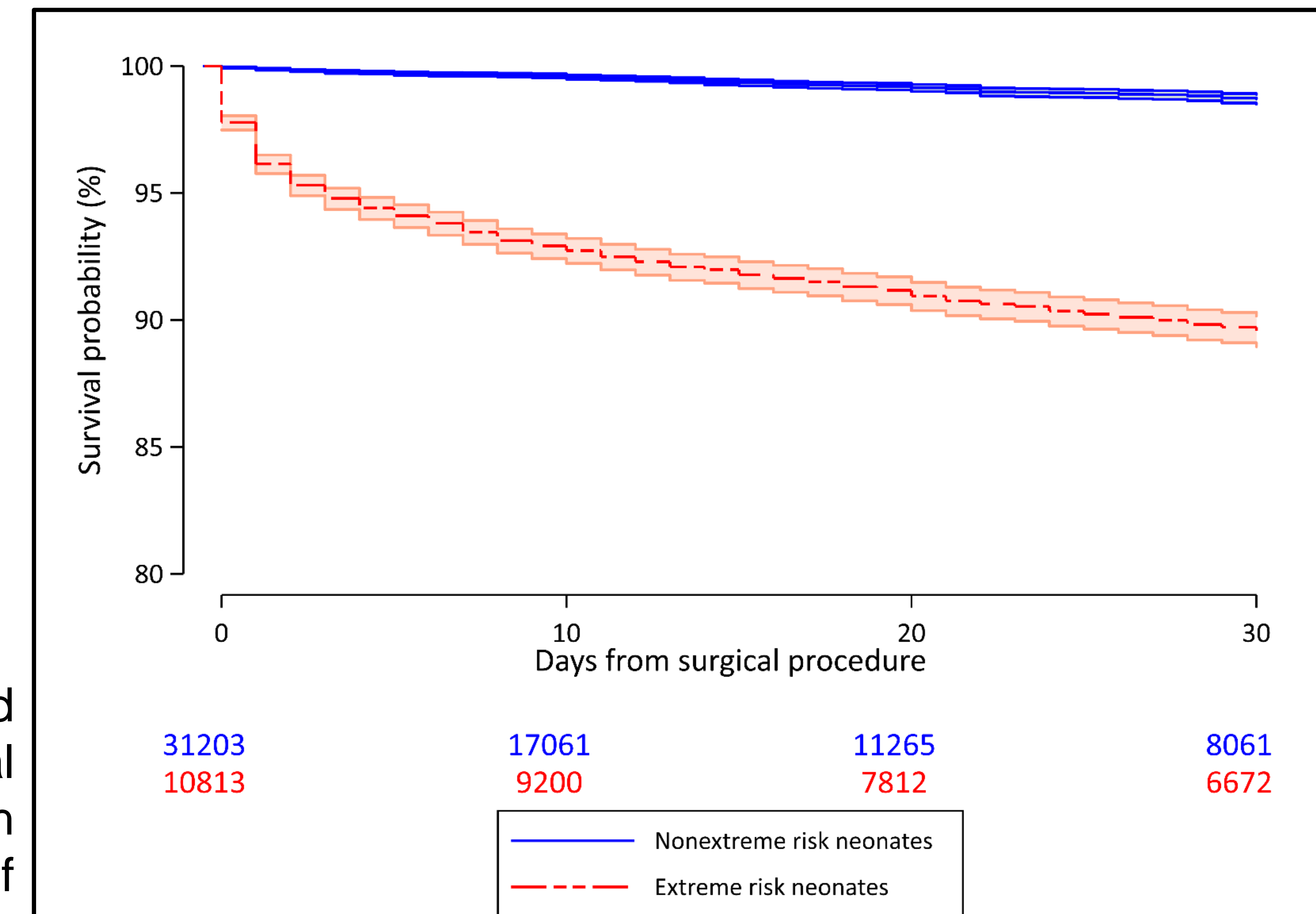
Characteristics	$\beta$ coefficient	Odds ratio (95% confidence interval)	P-value	Score
Weight at the time of surgery, per kg increment	-0.14	0.87 (0.77–0.98)	0.02	-1
ASA class 5 vs. 4	1.30	3.66 (2.82–4.73)	<0.01	13
Ventilation support	0.97	2.63 (1.80–3.84)	<0.01	10
Inotropic support	1.17	3.22 (2.54–4.09)	<0.01	12
Transfusion prior to surgery	0.37	1.45 (1.14–1.84)	<0.01	4
Emergency case status	1.22	3.39 (2.57–4.46)	<0.01	12
Gastro-intestinal disorder	0.49	1.64 (1.24–2.16)	<0.01	5
Preoperative sepsis	0.72	2.05 (1.62–2.59)	<0.01	7
Prematurity	0.47	1.61 (1.15–2.24)	0.01	5

## Results

- ❑ Among a cohort of 42,016 neonates, 10,813 (25.7%) were classifiable as extreme pre-surgical risk. Of these 10,813 extreme pre-surgical risk neonates, 12.4% (n=1048) died within 30 days of surgery. Almost half of the mortality cases occurred within 48 hours of index surgery (47.7%, n=500).
- ❑ We derived and validated a scoring system that demonstrated an excellent discriminant ability to predict neonatal surgical futility (cross-validated AUC=0.911; 95%CI: 0.895, 0.922– Fig.1).

## Discussion

- ❑ Although discussing surgical futility can be a difficult and emotive endeavor, we found, using a set of simple clinical and operative variables, that it is possible to predict with excellent discrimination neonates who died within 48hr of surgery. Our data may be used for preoperative risk profiling and counseling of parents and caregivers.



**Figure 2.** Time to mortality among extreme risk neonates (ASA classification  $\geq 4$ ), who underwent inpatient surgery in hospitals participating in the National Surgical Quality Improvement Program (2012–2019).