

Clinical Outcomes and Healthcare Resource Utilization in Moderate to Late Preterm Infants with Respiratory Distress Syndrome, Northern California from 2019 to 2023

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BACKGROUND and OBJECTIVES:

- Respiratory distress syndrome (RDS) in preterm infants account for significant clinical and economic burden, with most research focusing on extremely or very preterm infants
- To address gaps among more mature preterm infants, this study evaluates clinical outcomes and healthcare resource utilization (HCRU) in this population

METHODS:

- Design and Data Source:** Retrospective cohort study using electronic health record data from Kaiser Permanente Northern California, 2019–2023
- Population:** moderate (32-33 weeks) and late (34-36 weeks) preterm infants with RDS (ICD-10-CM code P22.0 and requiring >12 hours of respiratory support during birth hospitalization) with 1 year follow-up
- Variables:** HCRU was evaluated one-year post-discharge including emergency department (ED) visits, hospitalizations, and use of respiratory medication
  - Respiratory conditions include wheezing, dyspnea, COPD, and other chronic respiratory conditions
  - Infectious conditions include pneumonia, bronchitis, whooping cough, and other respiratory infections
- Analysis:** multivariate analyses were used to estimate associations with surfactant and gestational age (GA) using adjusted relative risks (aRRs) and 95% CIs, accounting for respiratory support duration and GA or surfactant

CONCLUSION:

- Differences in HCRU by surfactant use and gestational age were more apparent in unadjusted analyses; after adjustment, associations persisted only for surfactant with any ED visit and hospitalization post-discharge, and for gestational age with any hospitalization
- These findings may reflect greater severity among surfactant-treated infants and the complex medical needs of those born earlier, highlighting the importance of targeted post-discharge care strategies for more mature preterm infants with RDS

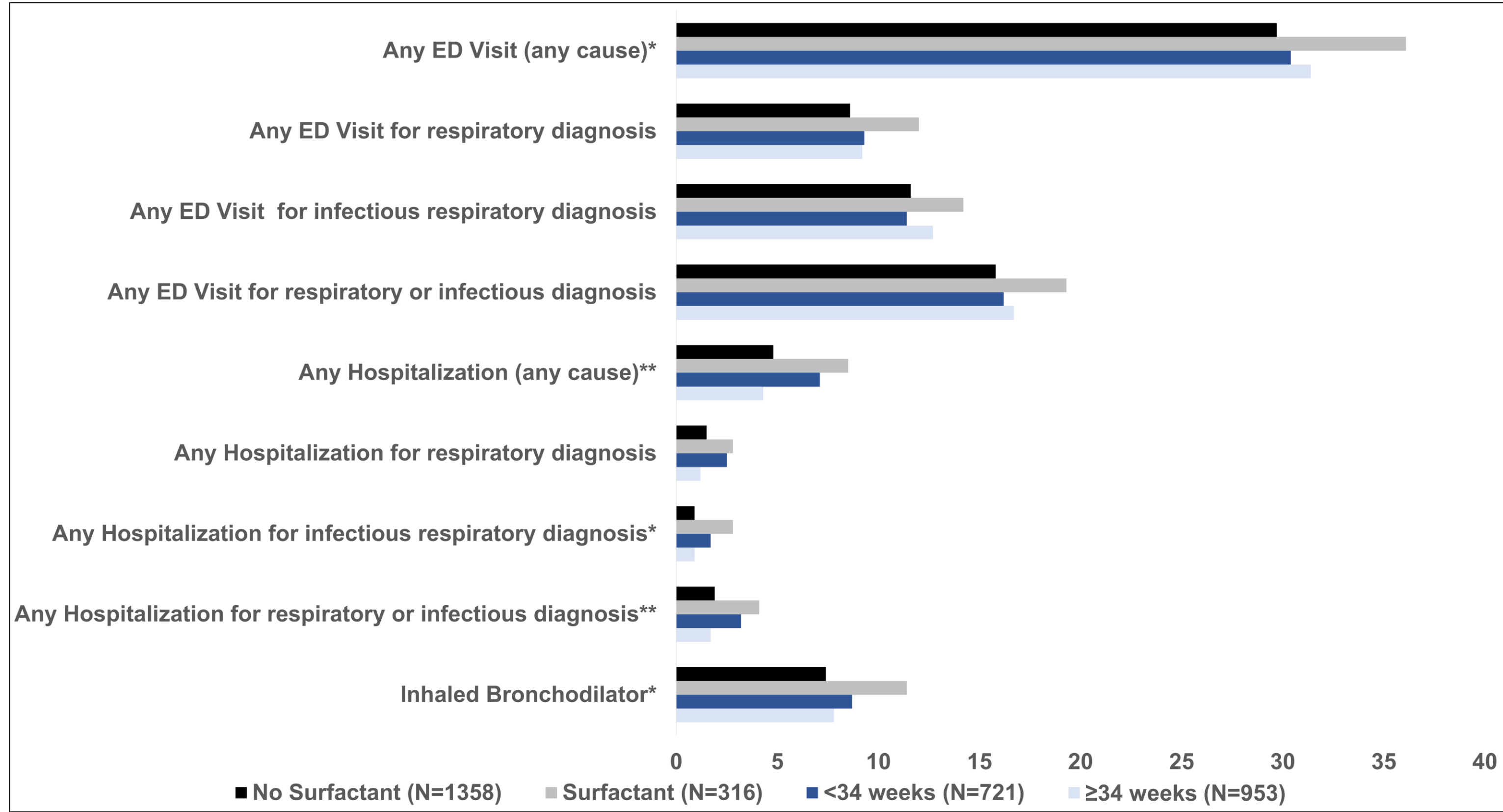
RESULTS:

- Among 1,674 infants included, 43.1% were moderate preterm and 18.9% received surfactant (**Table 1**)
- Characteristics were similar across surfactant administration and GA except for respiratory support
- LOS also differed by GA

Table 1. Infant clinical characteristics by GA and surfactant administration							
Variables	Total (N=1674)	No Surfactant (N=1358)	Surfactant (N=316)	P Value	<34 weeks (N=721)	≥ 34 weeks (N=953)	P Value
Infant Sex							
Female	683 (40.8)	572 (42.1)	111 (35.1)	0.023	302 (41.9)	381 (40.0)	0.432
Male	991 (59.2)	786 (57.9)	205 (64.9)		419 (58.1)	572 (60.0)	
Gestational Age							
<34 weeks	721 (43.1)	589	132 (41.8)	0.938	721 (100)	0 (0)	<.001
≥ 34 weeks	963 (57.0)	769	184 (58.2)		0 (0)	953 (100)	
NDI Quartile							
NDI Q1 (Least deprived)	251 (15.0)	200 (14.7)	51 (16.1)	0.666	121 (16.8)	130 (13.6)	0.477
NDI Q2	501 (29.9)	401 (29.5)	100 (31.6)		211 (29.3)	290 (30.4)	
NDI Q3	496 (29.6)	403 (29.7)	93 (29.4)		213 (29.5)	283 (29.7)	
NDI Q4 (Most deprived)	423 (25.3)	351 (25.8)	72 (22.8)		175 (24.3)	248 (26.0)	
Race/Ethnicity							
Asian	291 (17.4)	251 (18.5)	40 (12.7)	0.163	137 (19.0)	154 (16.2)	0.049
Black	124 (7.4)	97 (7.1)	27 (8.5)		55 (7.6)	69 (7.2)	
Hispanic	375 (22.4)	303 (22.3)	72 (22.8)		174 (24.1)	201 (21.1)	
Other	256 (15.3)	206 (15.2)	50 (15.8)		114 (15.8)	142 (14.9)	
White	628 (37.5)	501 (36.9)	127 (40.2)		241 (33.4)	387 (40.6)	
Respiratory Support							
<33 hours	549 (32.8)	519 (38.2)	30 (9.5)	<.001	194 (26.9)	355 (37.3)	<.001
33-94 hours	568 (33.9)	485 (35.7)	83 (26.3)		240 (33.3)	328 (34.4)	
≥94 hours	557 (33.3)	354 (26.1)	203 (64.2)		287 (39.8)	270 (28.3)	
Infant Length of Hospital Stay (days)							
Median (IQR)	15.6 (9.7-21.8)	15.4 (9.3-21.5)	16.4 (10.9-23.6)	0.154	21.0 (16.5-27.9)	10.6 (6.7-15.7)	<.001
Infant Length of NICU Stay (days)							
Median (IQR)	15.4 (9.6-21.6)	15.3 (9.2-21.4)	16.4 (10.9-23.6)	0.143	21.0 (16.5-27.9)	10.5 (6.6-15.6)	<.001

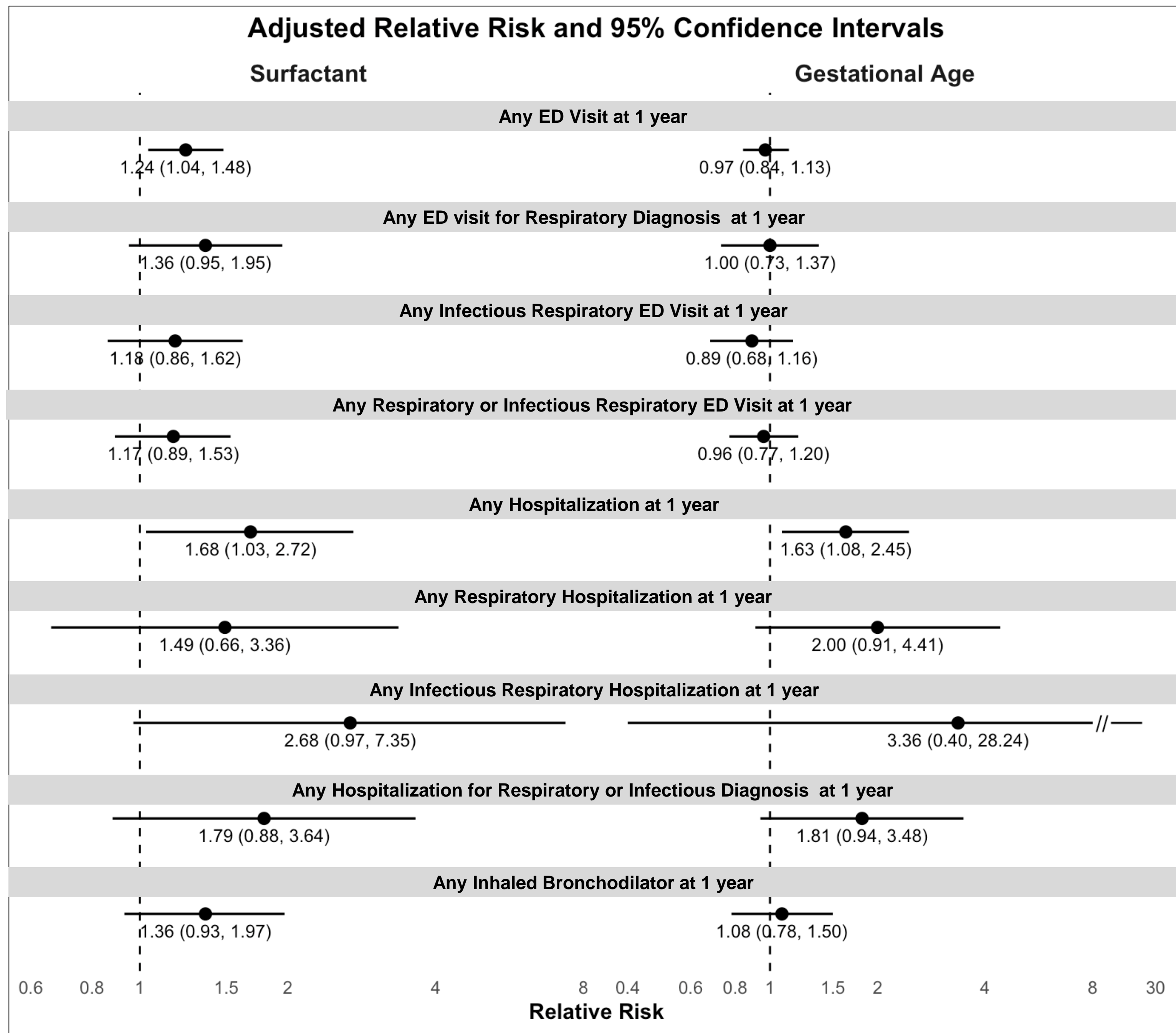
- After discharge, 30.9% of infants had an ED visit and 5.5% were hospitalized
- Surfactant-treated infants had higher rates of ED visits, hospitalizations (any and respiratory/infectious) and inhaled bronchodilator use while moderate preterm infants had higher hospitalization rates (any and respiratory/infectious) than their counterparts (**Figure 1**)
- Adjusted analyses showed surfactant was significantly associated with increased risk of overall ED visits and hospitalizations at 1 year; early GA was associated with increased hospitalization risk at 1 year (**Figure 2**)

Figure 1. Proportion of cohort with long-term healthcare resource utilization outcomes by GA and surfactant administration



\*Outcome differed significantly by surfactant administration  
\*\*Outcome differed significantly by surfactant administration and gestational age

Figure 2. Adjusted association between surfactant administration, gestational age and healthcare resource utilization



Surfactant models adjusted for respiratory support and gestational age; gestational age models adjusted for respiratory support and surfactant administration