The Use of Resuscitative Interventions Beyond Intubation After Extremely Early Delivery

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Problem

- Extremely premature births occurring from 22 to 24 weeks gestation are associated increased rates of death and neurodevelopmental impairment for the newborn.
- Shared decision making between clinicians and parents facing these early deliveries will determine whether resuscitation will be attempted in the delivery room or if comfort care will be provided.
- Intubation is routine in attempted resuscitation (AR) for extremely premature infants
- Resuscitative interventions such as chest compressions are part of the neonatal resuscitation program algorithm. However, some clinicians worry these measures may prolong suffering without improving survivability.
- Despite higher rates of attempted resuscitation at some gestational weeks, INDEED study group centers did not see a rise in survival to discharge from the NICU over a 10-year study period. Also, some sociodemographic factors were found to differ between babies receiving comfort care versus AR.

Goal

- We aimed to study mortality risks in extremely early newborns who did and did not receive resuscitative interventions beyond intubation to better understand the efficacy of recent guidelines encouraging shared decision making for resuscitation for newborns as early as 22 weeks.

Strategy

- This was a retrospective, cohort study of newborns and mothers delivering from 2011 through 2020 at 13 U.S. centers
- Our study only included liveborn newborns between 22 0/7 and 24 6/7 weeks gestation who were intubated in the delivery room.
- Federal census-related geocoding data were extracted using birthing parent's residential zip codes
- Survival was defined as survival to discharge or hospital transfer
- A logistic regression analysis was performed to calculate odds ratios and 95% confidence intervals

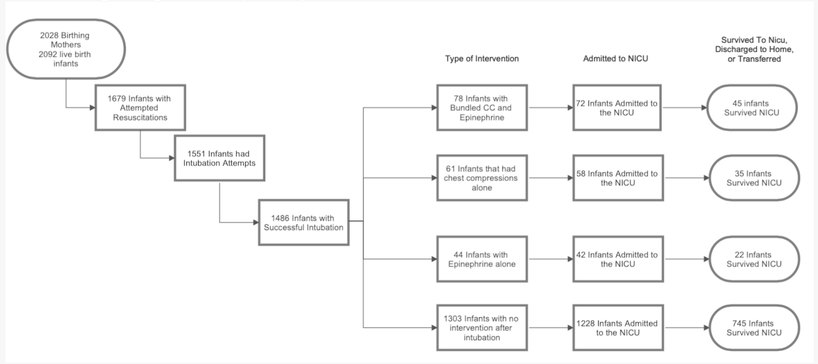

Figure 1: Exclusion Criteria Flowsheet

Results

	Delivery room disposition					
	Died in Delivery Room		Admitted to NICU		p value	Odds Ratios (95% CI) for dying in delivery room
	N	(%)	N	(%)		
Epoch 2 (Insert Years)	41	53.2	737	52.3	0.907	1.038 (.656, 1.644)
Epoch 1 (Insert Years	36	46.8	672	47.7		
Received Neonatal Consultation	54	70.1	1055	74.9	0.420	.788 (.477, 1.302)
Vertex Presentation*	29	42.0	638	49.0	0.269	.755 (.462, 1.232)
Missing n=115						
Sex	45	58.4	720	51.2	0.242	1.342 (.843, 2.136)
Chest compressions	35	45.5	104	7.40	**0.001**	**10.46 (6.40, 17.09)**
Epinephrine	35	45.5	87	6.20	**0.001**	**12.66 (7.69, 20.84)**
Chest compressions + epinephrine	31	40.3	47	3.30	**0.001**	**19.53 (11.38, 33.52)**
Mother had private insurance*	43	57.3	600	44.9	**0.042**	**1.651 (1.03, 2.64)**
Missing n=74						
Race					0.797	
African American	32	41.6	593	42.2		
Asian	27	35.1	543	38.6		
Pacific Islander	10	13.0	141	10.0		
White/Caucasian	8	10.4	129	9.20		
Hispanic ethnicity* (Missing n=59)	9	12.0	149	11.0	.849	1.10 (.538, 2.26)
Maternal transport	22	28.6	561	39.9	**0.055**	**.602 (.363, .998)**
Singleton	57	74.0	1055	74.9	0.893	.956 (.567, 1.614)
Maternal health	7	9.10	196	13.90	0.242	.619 (.280, 1.37)
Fetal health	2	2.60	120	8.50	0.084	.286 (.069, 1.18)
Gestational issue	75	97.4	1244	88.3	**0.014**	**4.97 (1.21, 20.45)**
Complete steroid course	38	49.4	701	49.8	1.00	.984 (.622, 1.56)
Any steroids received	53	68.8	1010	71.8	0.604	.866 (.527, 1.42)
Magnesium infusion for neuroprotection	42	53.5	851	60.4	0.339	.787 (.496, 1.25)
Chorioamnionitis	12	15.8	266	18.9	0.550	.805 (.428, 1.51)
Vaginal Delivery	44	57.9	794	56.6	0.906	1.06 (.661, 1.68)
	N	Mean ± SD	N	Mean ± SD		
Gestational age in weeks	77	**23.4 ± .692**	**1409**	**24.0 ± .644**	**0.001**	
Birth weight (g)	68	**547.62 ± 90.92**	**1399**	**624.92 ± 114.16**	**0.001**	
Delivery Center	Survival to NICU admission range: 3.4-14.7%				0.113	
Geocoding from Mother's Home Zip code at Time of Delivery Using the American Community Survey						
Highest educational level						
% with 9th-12th grade, no diploma	74	9.11 ± 4.62	1381	8.91 ± 4.75	0.725	
% with High school graduate	74	30.42 ± 8.41	1381	28.94 ± 8.68	0.151	
% with Bachelor's degree	74	16.13 ± 8.23	1381	16.70 ± 8.53	0.580	
% with Graduate/Professional Degree	74	9.19 ± 7.24	1381	10.25 ± 8.35	0.285	
Median income	74	51010.93 ± 20009.92	1381	52068.30 ± 23565.14	0.705	
Unemployment rate %	74	10.58 ± 5.94	1382	10.65 ± 5.94	0.923	
% with Cash Public Assistance Income	74	3.95 ± 2.50	1381	3.49 ± 2.47	0.123	
% individuals below the poverty level	74	18.45 ± 10.36	1381	19.48 ± 11.18	0.442	
% of Female Householder, single parent	70	17.23 ± 10.27	1294	17.23 ± 10.27	0.734	
% disability in children under 18 years	74	5.82 ± 2.85	1380	6.02 ± 3.37	0.622	

- Infants that received chest compressions, epinephrine, or both were more likely to die in the delivery room when compared to infants that did not receive those interventions
- Smaller, younger infants more likely to die in the delivery room when compared to larger, older babies
- Those born extremely prematurely due to preterm labor or cervical insufficiency (gestational issues) were nearly 5x more likely to die in the delivery room as compared to those delivered for maternal or fetal concerns

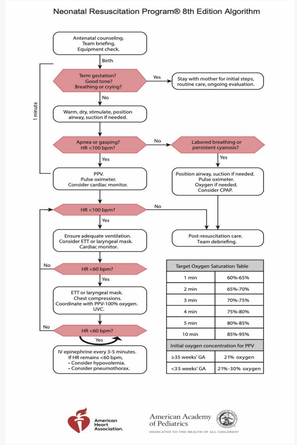

Figure 2: Neonatal Resuscitation Algorithm

Conclusions and Future Directions

- Antenatal counseling for parents facing extremely early delivery requires evaluation of risks and benefits. The 10-fold higher rates of delivery room death for those requiring chest compressions, epinephrine, or both may inform counseling regarding trials of therapy in the delivery room.
- Complete analysis of each gestational week subgroup
- Limited data was collected on NICU stay, but we will look at need for CC or epi and survival to home and complications
- Present these findings Pediatric Academic Society Meeting to spread awareness and influence standardization protocols amongst key players.

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