Skin-to-skin Contact and Risk of Culture-positive Sepsis and All-Cause Mortality in Very Preterm Newborns Admitted to a Level III NICU

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BACKGROUND

- Skin-to-skin (STS) care, in which a baby is held directly against a caregiver's bare chest, has health benefits.
- Early STS reduces adverse outcomes such as life-threatening sepsis (due to systemic infection) and all-cause mortality in low-resourced settings.
- Evidence on STS in high-resourced neonatal intensive care units (NICUs) is limited.

OBJECTIVE

Investigate associations between time of STS care initiation and odds of severe adverse health outcomes of sepsis and all-cause mortality in a level III NICU.

STUDY DESIGN

- Retrospective medical record review.
- Study population: very preterm newborns born <32 weeks' gestation, admitted and discharged from St. Joseph Medical Center (SJMC), a level III NICU in Tacoma, WA.
- Skin-to-skin is defined as medical record documentation of "skin to skin" or "kangaroo" care.
- Culture-positive sepsis is defined as a positive blood culture and sepsis diagnosis after exposure period of 1 week.
- All-cause mortality defined as date of death after period of 1 week.
- To evaluate demographic and clinical differences, newborns were categorized into 2 groups based on: (1) STS within the first week or (2) no STS within the first week.
- Comparisons between groups were performed: Fisher's Exact Test and Kruskal-Wallis Rank Sum Test, as well as univariate logistic regression to model association of STS and health outcomes.

RESULTS

Table 1. Maternal and Infant Characteristics by Time Until First Skin to Skin (STS)

Variable	No STS in 1st Week (N = 24)	STS in 1st Week (N = 72)	p-value
Any Antenatal Corticosteroids	21/24 (87.5%)	64/72 (88.9%)	0.71
Maternal Race: Indian American or Alaskan Native	0/20 (0%)	1/69 (1.4%)	1.00
Maternal Race: Asian	2/20 (10%)	9/69 (13%)	1.00
Maternal Race: Black	5/20 (25%)	11/69 (15.9%)	0.51
Maternal Race: Native Hawaiian or Pacific Islander	4/20 (20%)	11/69 (15.9%)	0.74
Maternal Race: White	7/20 (35%)	39/69 (56.5%)	0.13
Maternal Ethnicity: Hispanic or Latino	4/21 (19%)	9/71 (12.7%)	0.49
Small for Gestational Age	2/24 (8.3%)	10/72 (13.9%)	0.72
C-Section	14/24 (58.3%)	55/72 (76.4%)	0.06
Inborn	24/24 (100%)	68/72 (94.4%)	0.57
Gestational Age (weeks)	26.1 [24.2 - 29.2]	29.8 [27.4 - 31]	**< 0.01**
Maternal Age (years)	31.7 [28.8 - 35.7]	31.8 [25.7 - 35.5]	0.81
Birth Weight (grams)	830.5 [628.5 - 1123.5]	1172 [969 - 1501]	**< 0.01**
1-minute APGAR	5 [2.5 - 6.5]	6 [4.2 - 7]	**0.04**
5-minute APGAR	7.5 [6 - 8]	8 [7.2 - 9]	**0.01**
Mean Parenteral Fluid Intake (mL/(kg birthweight*day)): Week 1	52 [38.1 - 95.1]	32.6 [21.1 - 51.4]	**< 0.01**
Mean Enteral Fluid Intake (mL/(kg birthweight*day)): Week 1	76.5 [55.1 - 93.8]	94.2 [82.3 - 108.7]	**< 0.01**

Table 2. Health Outcomes by Time Until First Skin to Skin (STS)

Variable	No STS in 1st Week (N = 24)	STS in 1st Week (N = 72)	p-value
Composite: Sepsis or Mortality	8/24 (33.3%)	4/72 (5.6%)	**< 0.01**
Sepsis	5/24 (20.8%)	4/72 (5.6%)	**0.04**
Mortality	5/24 (20.8%)	1/72 (1.4%)	**< 0.01**

Table 1 and 2 p-values obtained via Fisher's Exact Test for categorical variables and Kruskal-Wallis Rank Sum Test for continuous variables. Categorical variable data presented in proportion (%). Continuous variable data presented in median [quartile 1 – quartile 2].

Table 3. Univariate Logistic Regression Model

Predictor	Outcome	Estimate [95% CI]	p-value
Age (days) at first STS	Composite: Sepsis or Mortality	1.22 [1.07 –1.40]	**< 0.01**

Table 3 evaluates day of first STS as a continuous metric in its relationship to the composite outcome of all-cause mortality or sepsis occurring after the first week.

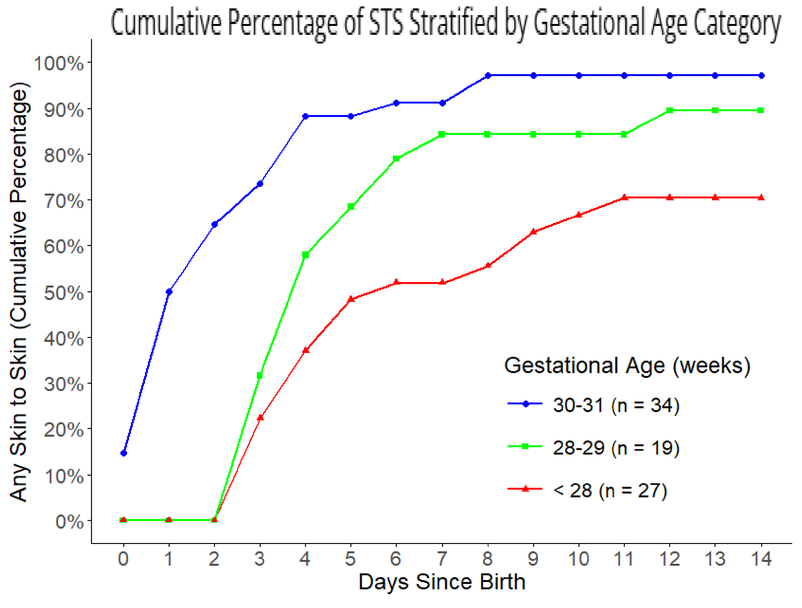

Figure 1. Percent of patients who received any skin-to-skin plotted against days since birth and grouped by gestational age at birth.

CONCLUSIONS

- STS is strongly associated with sepsis and all-cause mortality among premature neonates at SJMC.
- Lower gestational age, lower birthweight, lower APGAR scores, lower enteral intake and higher parenteral fluid intake are all strongly associated with lack of timely initiation of STS.
- Multivariate regression models accounting for severity of illness and degree of prematurity are needed to adjust for these known confounders.

IMPLICATIONS

- Limited current sample size reduces the statistical power to determine statistically significant differences in multivariate regression models.
- STS appears strongly associated with improved outcomes, although interpretation of findings is currently limited until further larger studies with multivariate models are conducted.

FUTURE DIRECTIONS

- Currently, we are expanding the database to enable multivariate regression models to address potential confounders influencing the study results.
- Future studies should address socioeconomic and medical barriers in accessing STS.

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