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Developmental Intervention Patters in a Level IV Neonatal Intensive Care Unit (NICU)

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Background/Rationale

- Premature infants are at risk for neurodevelopmental disorders, developmental delays, and behavioral difficulties.
- There are no evidence-based standards regarding NICU-based developmental intervention practices or benefits.
- A thorough descriptive investigation of current developmental intervention practices is necessary to:
 - Support future prospective studies evaluating the neurodevelopmental benefits of NICU-based services.
 - Standardize protocols for developmental interventions in the NICU.

Objective

- To provide information in the identified knowledge gap that exists regarding rates and patterns of developmental interventions (physical therapy [PT], occupational therapy [OT], speech/language therapy [SLP], music therapy [MT], and child life [CL]) in high-risk infants in the NICU by retrospectively examining the variables associated with these interventions.

Methods

- Electronic records for known high-risk infants (extreme and very preterm; 23 0/7 to 31 6/7 weeks gestation) discharged from our institution's NICU over a 3 year period (January 2014 to June 2017) were manually reviewed to extract demographic and medical variables and therapy patterns.

Acknowledgements

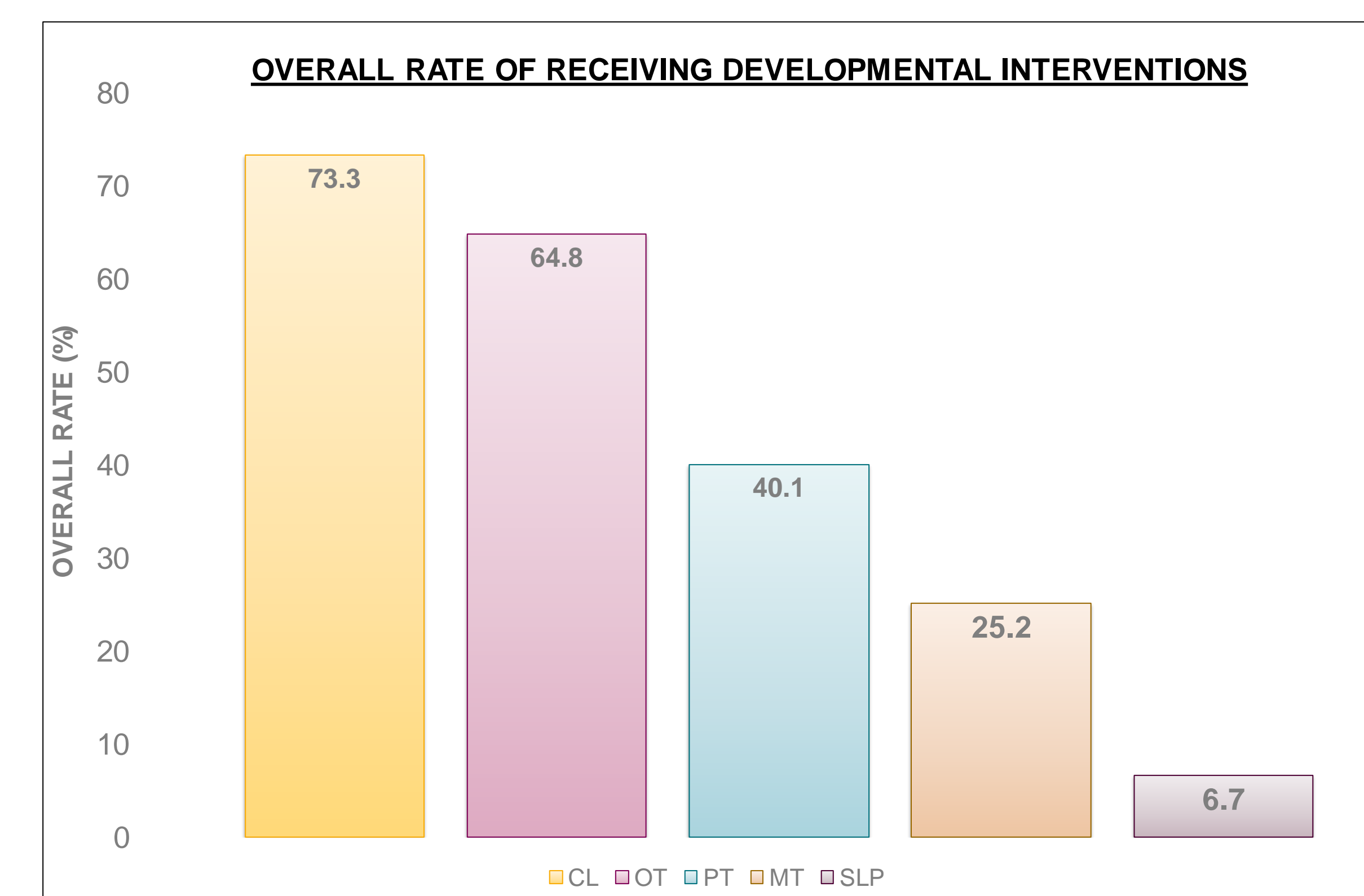
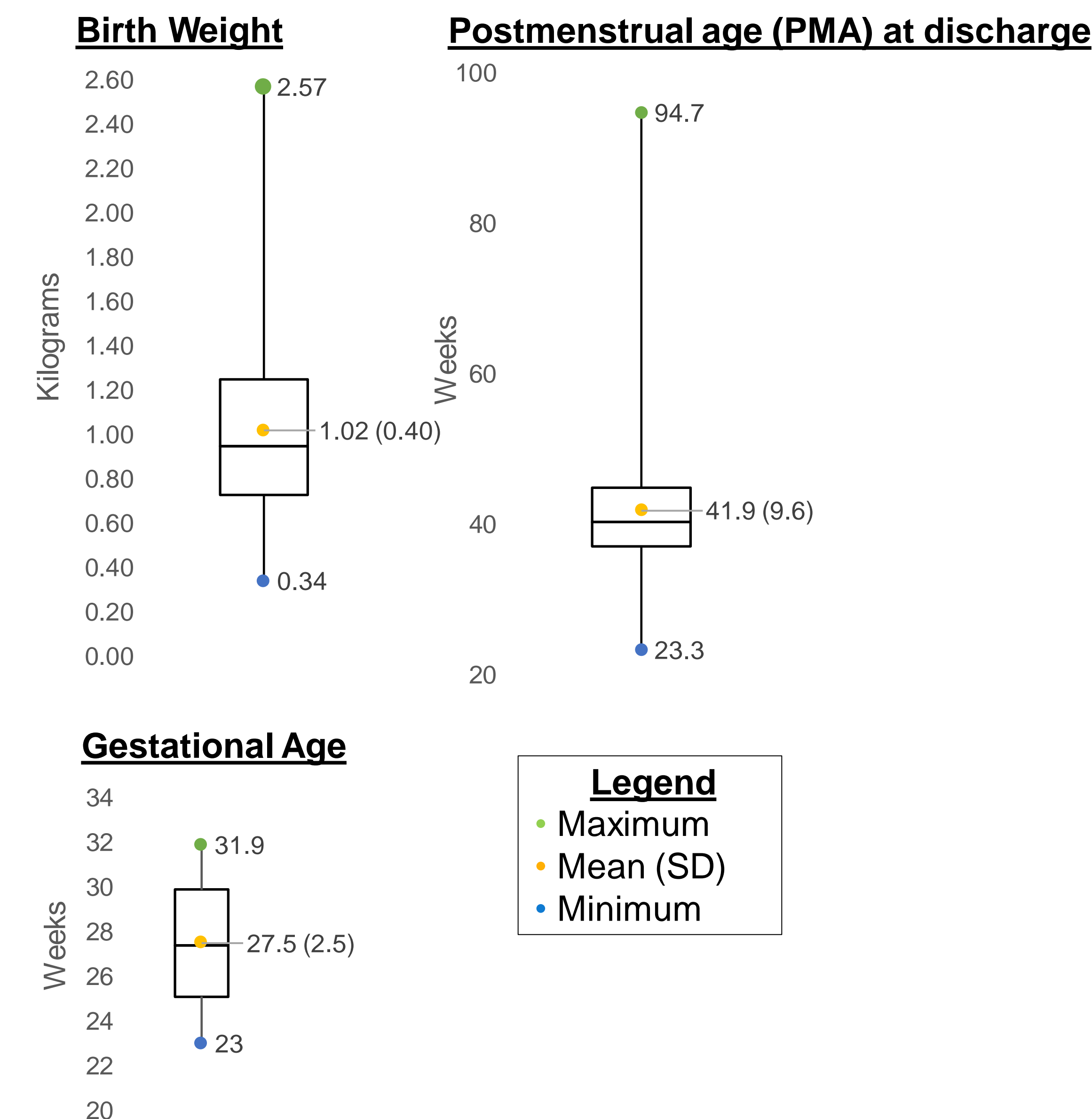
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Patient Demographics		
Characteristics		N = 449
Infant	Male	250 (55.7%)
	Female	199 (44.3%)
Family	Primary insurance	
	Public	286 (63.7%)
	Private	154 (34.3%)
	Other	9 (2%)
Primary language	English	423 (94.2%)
	Spanish	18 (4.0%)
	Other	8 (1.8%)
Race	Caucasian	252 (56.1%)
	African American	103 (22.9%)
	Hispanic	41 (9.1%)
	Other	39 (8.7%)
	Missing Data	14 (3.1%)

Medical Variables			
Characteristics		N = 449	
Tracheostomy		36 (8.0%)	
Gastrostomy Tube (G-tube)		81 (18.0%)	
Intraventricular hemorrhage (IVH Grade) ^a			
	1	52 (11.6%)	
	2	20 (4.5%)	
	3-4	14 (3.1%)	
	No IVH	354 (78.8%)	
Cystic Periventricular Leukomalacia (PVL) ^a		12 (2.7%)	
Surgical Necrotizing Enterocolitis (NEC) ^a		17 (3.9%)	
	Lower Quartile	Upper Quartile	Median
Length of hospital stay (days)	19.0	100.0	55.0
Ventilator duration (days) ^{b, c}	4.0	36.5	14.0

^a 2% of data was missing at home institution

^b at home institution

^c 30% of infants (132 patients) were not ventilated


* The rates are all significantly different from one another; using McNemar's test for each pairing, every p-value is <0.0001 except for CL/OT pair which p-value 0.0006.

Results

- Infants with a tracheostomy or G-tube were more likely to receive any of the interventions ($p < 0.05$).
- Infants with tracheostomy receiving SLP:
 - Higher birth weights and longer hospital stays ($p < 0.05$), irrespective of gestational age
- For each intervention, infants receiving the therapy had:
 - Longer hospital stays ($p < 0.0001$).
 - Longer duration on ventilators ($p < 0.0001$).
- The average PMA of initiation varied: 35.5 weeks (CL) to 53.1 weeks (SLP).
- Intervention pattern was not significantly influenced by IVH, PVL, gestational age, gender, race, or language.

Conclusions

- This study reveals varying rates and PMA of initiation of developmental interventions in < 32 week gestation infants.
- Longer hospital stays and longer ventilator duration were associated with higher rates of interventions.
- SLP was the least utilized modality and initiated on average at the oldest postmenstrual age, possibly reflecting low provider familiarity with potential SLP benefits.
- Standardizing timing of intervention may benefit individual patients by:
 - Providing therapies during crucial periods of development
 - Providing opportunities for caregiver education.
- Limitations: retrospective analysis conducted at a single academic institution; unmeasured variables related to the infant's care and/or medical complexity that impacted trends in intervention use
- Further research on NICU-based service trends is needed to demonstrate the benefits of standardized therapy timing.