Serial Brain Imaging and Targeted Neuropromotive Intervention for Very Preterm Infants in the NICU - Study Protocol and Preliminary Outcomes

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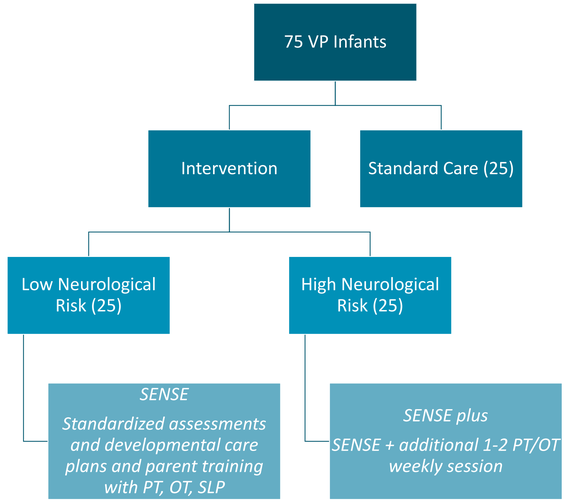
Background and Aims

- Babies born preterm undergo rapid brain growth and development prior to term age while hospitalized in the NICU,[1] which represents a critical window for developmental intervention.
- This study aims to enhance our understanding of early brain development and injury in very preterm (VP) infants and use this information to tailor intensive neuropromotive care.
- The Supporting and Enhancing NICU Sensory Experiences (SENSE) program is a sensory-based intervention with tailored weekly multisensory plans[2,3] intended to be implemented by parents with support from staff and developmental therapists.[4]

Methods

- Prospective study aiming to enroll 75 infants born < 33 weeks gestational age (GA), weighing 0.5-4.5 kg and without congenital infections or anomalies.
- Infants whose parents are willing to enroll in the intervention group are stratified into low- and high-risk groups based on early MRI (Figure 1).
- Serial MRIs obtained at least three times: as soon as clinically possible, at 34-36 corrected gestational age (CGA) and at term-equivalent age (TEA).
- Neurodevelopment is assessed by the Test of infant motor performance (TIMP) and the Hammersmith neonatal neurological exam (HNNE) at TEA.[5]

Figure 1: Study design



Results

- To date, 35 infants have been enrolled and discharged from the NICU: 14 intervention (8 low-risk and 6 high-risk) and 21 standard care (15 low-risk and 6 high-risk).
- Average percentages for the touch and hearing components of the SENSE intervention are in table 1 and results from the TIMP and HNNE at TEA are in table 2.
- 103 MRI scans have been completed with 33 at TEA.
- Early MRI scans identified 11 high-risk infants while only 7 of these infants were identified as high-risk based on cranial ultrasound (CUS) only.
- Enrollment and data collection is ongoing as we continue to investigate the benefits of serial brain imaging and early neuropromotive intervention.

Table 1: Demographic data and SENSE intervention

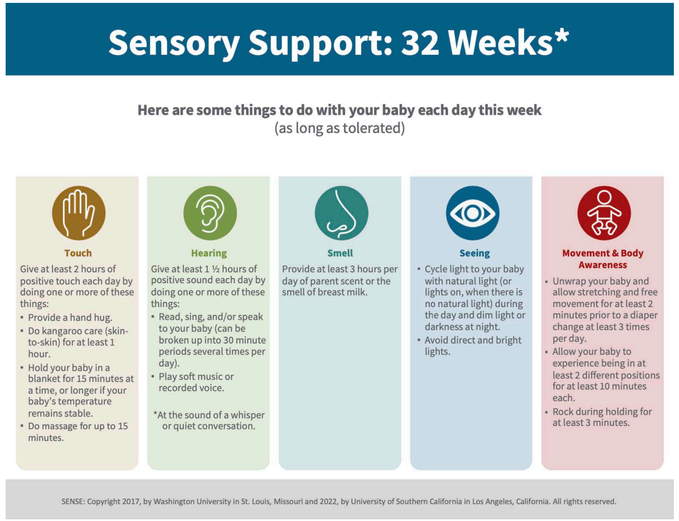
	Intervention Group		Standard Care Group	
	Low risk (n=8)	High risk (n=6)	Low risk (n=15)	High risk (n=6)
Gestational age (weeks)[a]	28.7 ± 1.7	28.4 ± 3.0	28.0 ± 2.4	29.7 ± 3.0
Birth weight (grams)[b]	1198.8	1263.3	1117.1	1448.3
SENSE Intervention[c]				
Touch	126%	181%	*	*
Hearing	146%	185%	*	*

Table 2: Short term outcomes

TIMP at TEA[d]	Average 8(100)	Average 4(67) Low average 1(17) Below average 1(17)	Average 8(80) Low average 2(20)	Average 4(67) Low average 2(33)
HNNE at TEA[a]	32.0 ± 1.6	31.7 ± 1.4	31.3 ± 2.7	**

a Mean ± SD
b Mean
c Mean taken of percent of recommended
d n(%)
* No data due to non-intervention group
** No data from this group has been obtained yet

Figure 2: Sample of weekly neuropromotive plan (SENSE program)[3]



Conclusions

- Serial imaging provides valuable insight into the pattern of brain growth and neurodevelopment in VP infants.
- The impact of implementing targeted interventions in the NICU setting on improving the outcomes in VP infants with and without neurological injury continues to be investigated.

References

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