

Bundled Caregiving in the NICU: A RCT

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Significance

- Excessive stimulation.....sensory overload and altered infant brain development
- High risk infants require stimulation from life-sustaining caregiving activities
- One neuroprotective strategy is grouping care activities. Known as “clustering” or “bundling care”
- Individualized developmental care is the norm
- Even routine care activities can cause physiological stress

Mörelis E, Hellström-Westas L, Carlén C, Norman E, Nelson N. (2006). Is a nappy change stressful to neonates? *Early Human Dev.* 82, 669-676.

Bundled Care Knowledge Gaps

- Time required for bundled care
 - Physiological impact of bundled care
 - Necessity of routine care activities
 - Duration between bundled care necessary to facilitate rest and sleep.
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- Care delivery systems impact on bundled care

Purpose

We sought to describe the type and sequence of care provided during BCEs and explore the impact of bundling nurse caregiving on infant physiologic status.

Design

A descriptive mixed-methods study



Research Questions

1. What factors impact the length of time required to complete a BCE.
2. What is the relationship between activities included in BCEs and changes in infant physiological status (Δ heart rate, Δ respiratory rate, Δ oxygen saturation) during and following a BCE?

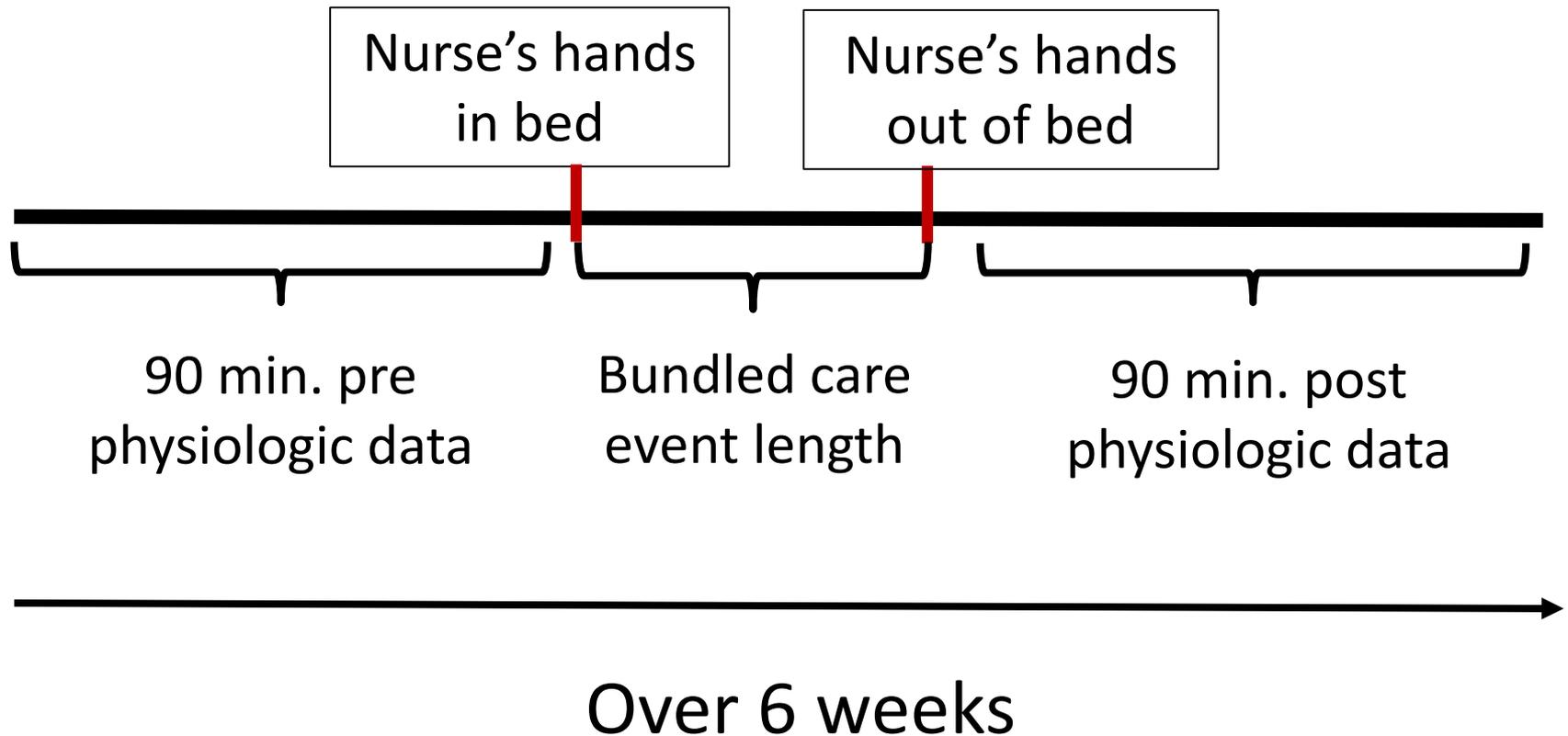
Setting and Participants

- Duke University and Duke Regional Nurseries
 - ≈ 60 infants ≤ 32 weeks gestation at birth
 - Stable
 - Receiving standard 3-hour bundled care

Exclusion criteria are:

- Neonatal Abstinence Syndrome
- Humidified incubator
- Diaper rash, pre-existing or genetic skin conditions

Data Collection Observation and Physiologic



Weight _____ Total Urine (cc) _____
 Urine Output (cc/kg/hr) _____

NSCS: _____ # Diapers 24hr _____

A _____ B _____ D _____ (Previous 24 hours)

Subject ID		Bundled Care Event	Vitals	Assessment	NG/OG/G-Tube	Diapering Feeding			
Group 3hr 6hr									
Date	Room/Bed	Start	Start	Start	Start unfastening	Stop fastening	Start	Stop	
Week	Obs.	Monitor Time	BP	Reposition	Initial Placement	Girth	OG/NG/G-Tube		
1	1	Touch (1st Time) End of Nursing Care (BC event ends when nurse completes cares)	1 2 3 4	1 2 3 4	1 2 3 4				
2	2		Temp	Auscultation	Verification	Skin Health	Bottle		
3	3		Adjustment	O2 probe	visual air measure	Cleansing	Held In bed RN Mom OT Speech		
4	4		EKG leads	Temp probe	Residual Check	Stool: YES NO	Breast		
5			1 2 3 4	1 2 3 4		Sample: YES NO			
6			1 2 3 4	1 2 3 4					
PMA									
Care Interruption	Developmentally Sensitive	Medications	Lines & Dressings	Other Cares	Blood Sampling	Respiratory			
Start	YES NO								
Stop									
Reason:	Developmental Interventions	Oral	Line Insertion	New Linens	Start	Stop	Start	Stop	
Observation Notes:	1. Pacifier 2. Flexed Support 3. Swaddling 4. 2- person assist Infant State: Sleeping Quiet, Alert Active, Alert Fussy, Irritable Other: _____	1 2 3 4	PIV PICC OTHER 1 2 3 4	1 2 3 4	Heel Stick	Oral/Nasal Suction			
		IM	Dressing Change	Bathing	Needle	ETT Suction			
		Eye	Ostomy	Weighing		Device Type: NC CPAP Vent			
		Skin	PICC/ CC	1 2 3 4					
		IV	Surgical	snuggly frog blanket repositioning					
		NG/OG/G-tube	1 2 3 4	1 2 3 4					
			Skin	Other					
			1 2 3 4	PT OT RT					
Did the baby move in the last 12 hours? Previous room + bedspace:				Speech					

TYPE of Feed: MBM DBM Formula: _____ Butt Product: Sensicare, No Sting, Stoma Powder, Aloe Vesta
 HMF Beneprotien MCT Other: _____ Criticade: Ointment, Paste Other: _____

TOTAL BC TIME: _____

PH CHEST _____ BUTTOCKS _____ TEWL CHEST _____ BUTTOCKS _____

Sample Characteristics (N=35)

Characteristics	Statistics
Gender, n (%)	
Male	17 (48.57)
Female	18 (51.43)
Race, n (%)	
Non-Hispanic White	19 (54.29)
Non-Hispanic Black	12 (34.29)
Other or > one race	4 (11.43)
Birthweight (mean; SD)	1136 (479)
Gestational Age (mean; SD)	28.11 (2.82)
PMA @ 1st obs (mean; SD)	35.29 (3.97)

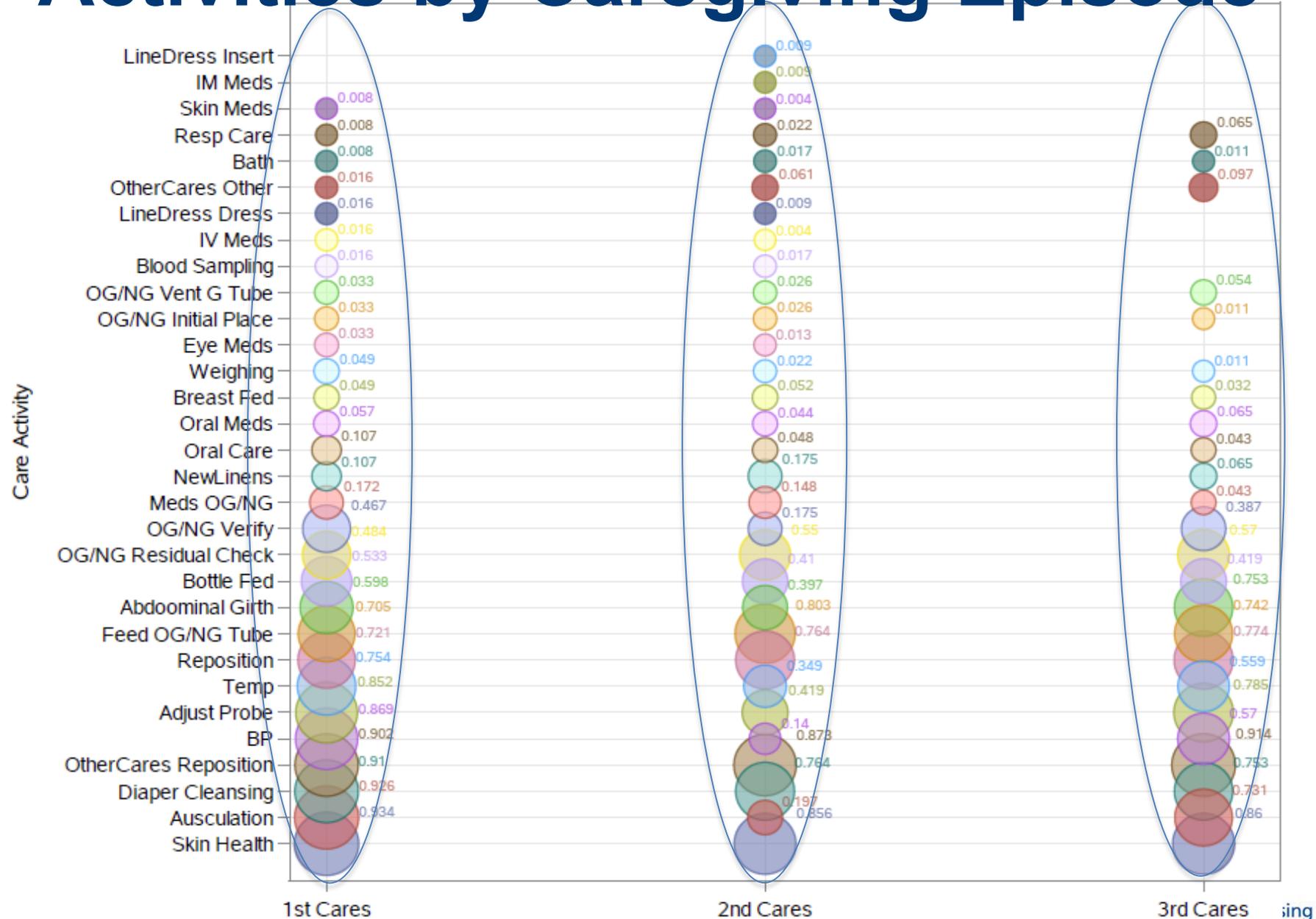
Characteristics of BC Events (N=422)

	1 st Cares, n=124	2 nd Cares, n=232	3 rd Cares, n=94
BCE Duration			
Mean (SD)	31.55 (12.8)	26.06 (13.1)	26.36 (11.0)
# Activities			
Mean (SD)	11.03 (2.3)	8.04 (2.6)	10.11 (2.7)
DSC n (%)			
Yes	109 (93.2)	190 (93.1)	79 (92.9)

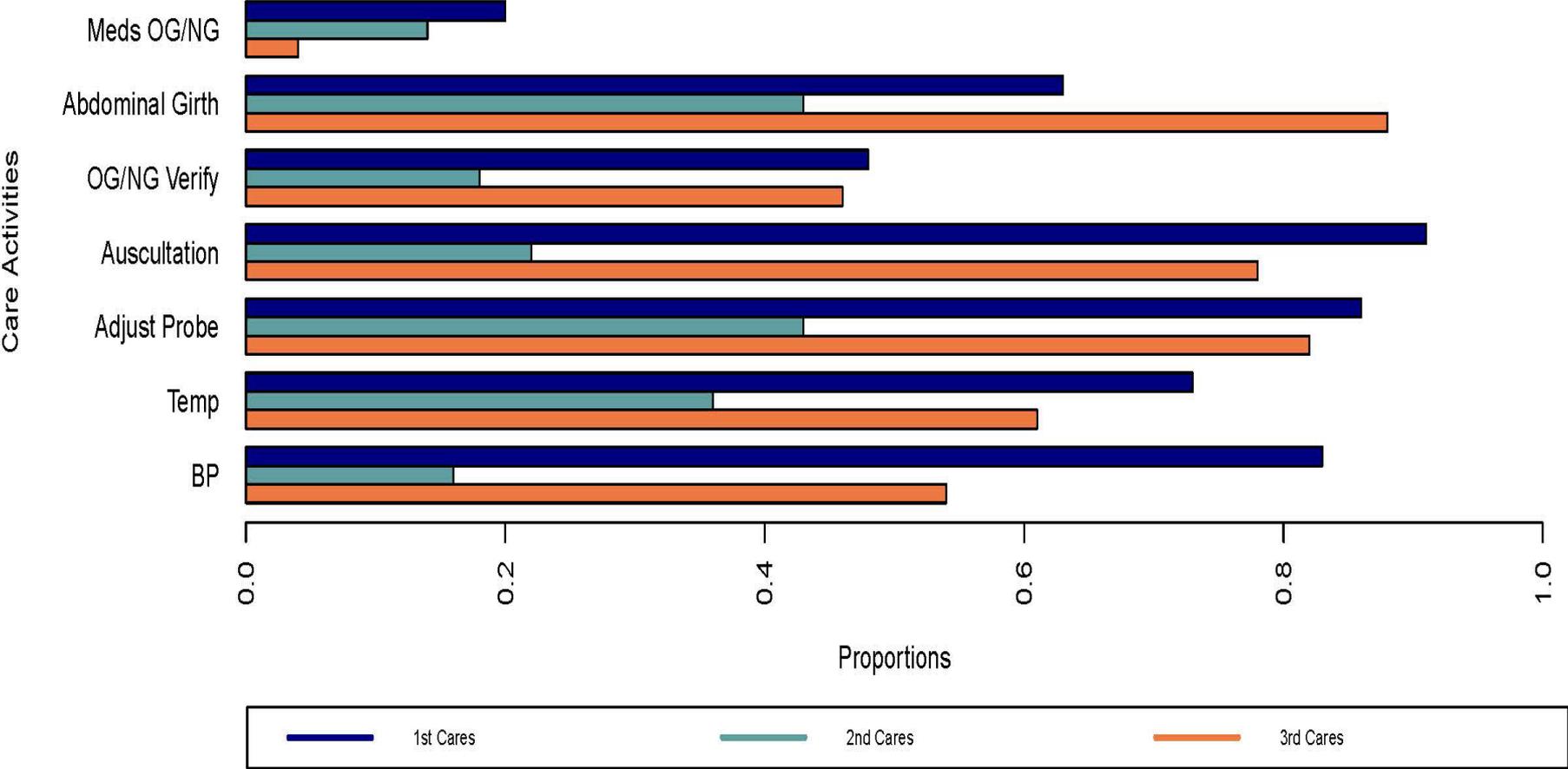
BCE=Bundled Care Event
DSC=Developmentally Sensitive Caregiving

Bonferroni adjusted
p-value < 0.05

Activities by Caregiving Episode



Distributions of Care Activities Across Care Episodes



Visual Analysis

- 4 infants purposively selected
 - Presence/absence of a diaper change
 - Developmentally sensitive caregiving
- Examined one week of observations (n=14)

Definitions

Vital Sign Change

- HR \geq 1-Standard deviation (SD) from the mean
- RR \geq 1-SD from the mean
- O₂ saturation \leq 1-SD from the mean

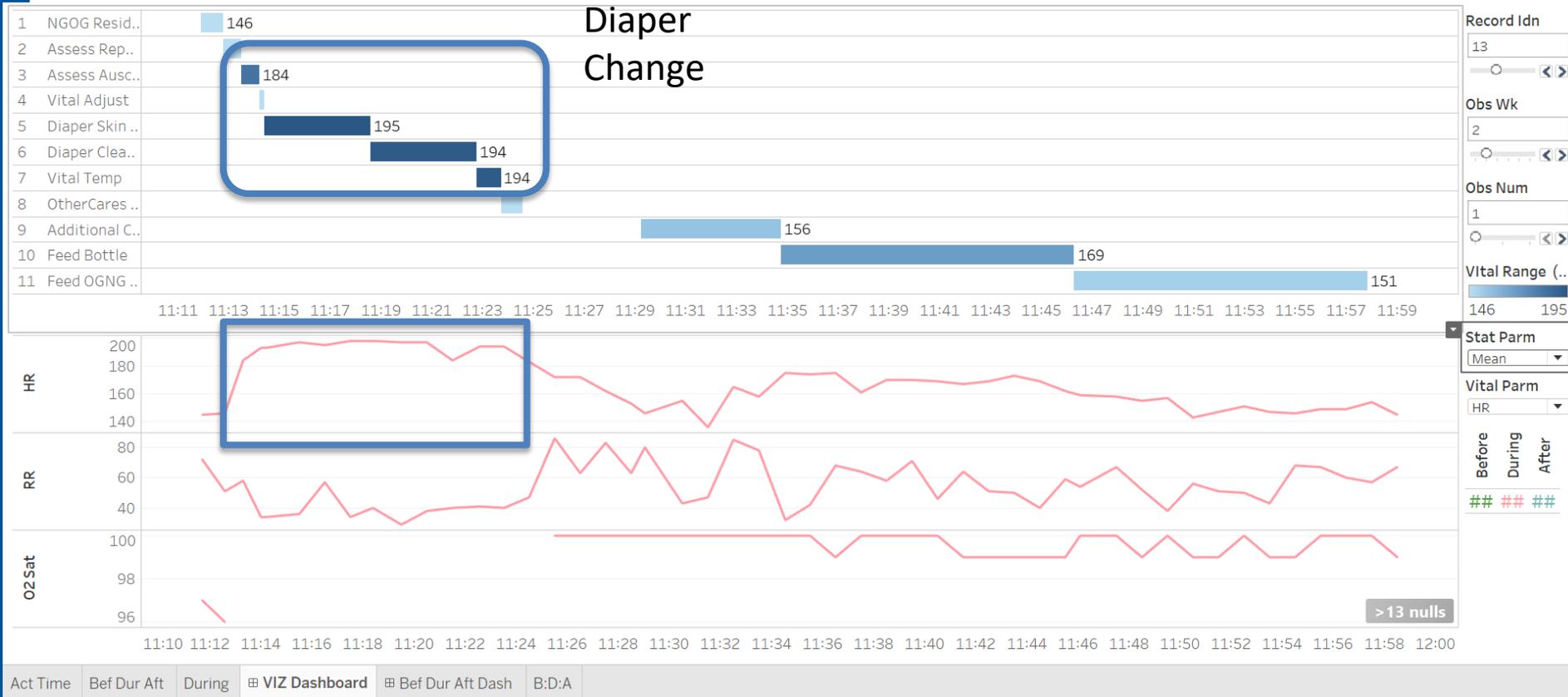
Activity Cluster—2 or more activities that impact VS change,

Baseline—longest time with no more than 3 data points for any VS variable

- HR \geq 1-Standard deviation from the mean and no HR values $<$ 100
- RR \geq 1-Standard deviation from the mean and no RR values \leq 1-Standard deviation from the mean with a O₂ saturation $<$ 90
- O₂ saturation \leq 1-Standard deviation from the mean

Return to Baseline—time from the end of BC until the baseline criteria are met for 50% of the baseline.

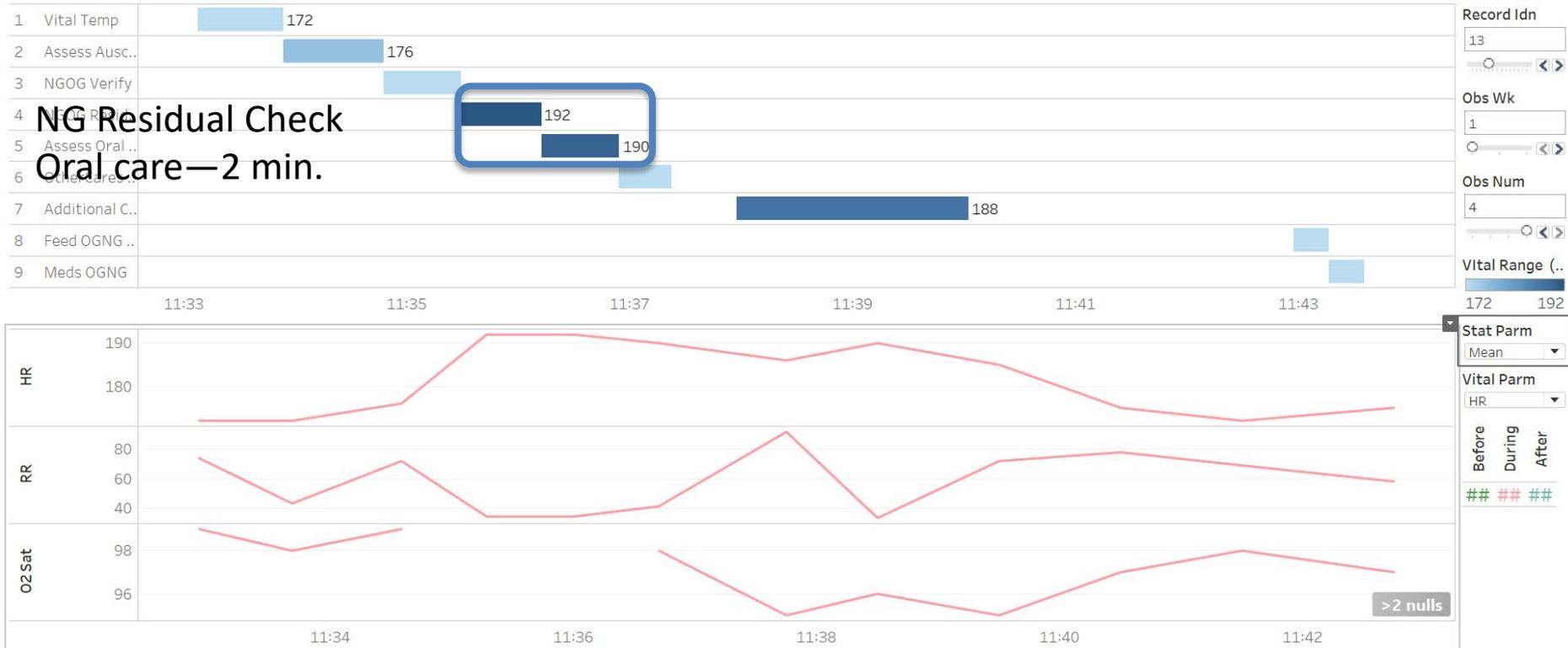
Stressful Events



Vital Sign Response



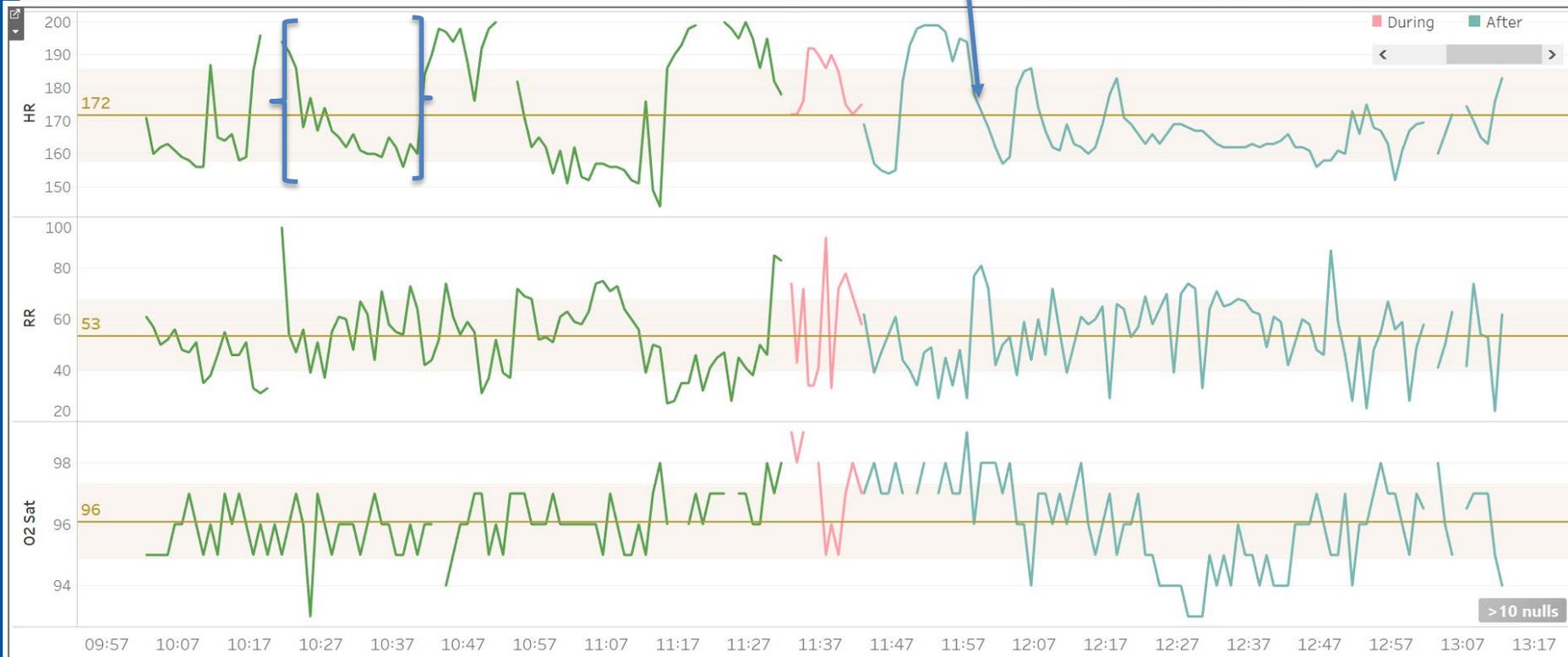
Without a Diaper Change



Vital Sign Response

Baseline=22 min.

Return to Baseline=16 min.



Physiologic Impact

- Stressful events (diaper change, repositioning, inguinal hernia reduction)
 - Change in HR and RR from baseline
 - No changes in O₂ saturation
- Time to return to baseline was variable with stressful activities and dependent on the timing of the stressful activity/cluster
- Longer BCEs were associated with longer physiologic recovery times
- HR should be monitored during feeding

Questions

Collaborators

- Angel Barnes
- Noelle Young
- Ashlee Vance
- Jane Ralphe
- Christian Douglas
- Daniel Hatch

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