

# Behavioural and Physiological Responses of Infants Post-Surgery During Nurse-Delivered Caregiving

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## Aim

To evaluate the immediate physiological and behavioural responses of infants during routine nurse-delivered caregiving in the surgical neonatal intensive care unit (NICU)

## Methods

A prospective observational study was conducted in a surgical NICU. Paired physiological and behavioural data were collected to evaluate surgical infant responses during routine nurse-delivered caregiving (diaper change). Continuous heart rate (HR) data were reviewed to explore variation in the mean HR pre-, during-, and post-nurse-delivered caregiving. Physiological stress was defined by the study team as a change in the HR of 10bpm or more.<sup>1</sup> Videos of infant caregiving were captured by a web camera. Dedicated software combined audio-visual and physiological data. Two NIDCAP Certified Professionals independently scored the video recordings, using a study-specific behavioural observation tool consisting of 43 items: 6 measure infant state; 19 measure stress responses; 7 measure self-regulation; 11 measure caregiver-support. Videos comprised three epochs: epoch one and epoch three pre- and post-caregiving of 10 minutes each; epoch two nurse-delivered caregiving of variable timing. A tick was recorded when a behaviour, state or support was observed, and item scores were summed. Inter-rater reliability was calculated using the Intraclass Correlation Coefficient (ICC).

## Results

Forty infants participated in the study, physiological data was analysed for 40 infants and behavioural data was scored for a sub-group of 10 infants. The sample had a mean gestational age of 36.9 weeks (SD 2.2) and participated in the study at a mean of five (SD 2.9) days postoperative. Twenty-two infants (55%) had gastrointestinal (GIT), ten (25%) cardiac, and eight (20%) respiratory/oesophageal surgery.

### Physiological results

A total of 74,880 data points were reviewed. All groups showed significant changes in heart rate (HR) between pre-caregiving and during caregiving; Mean change (bpm) of 15.4 (SD 13.3) in GIT, 6.3 (SD 4.0) in cardiac, and 16.1 (SD 9.2) in respiratory/oesophageal groups. Effects of caregiving were seen beyond the caregiving period across all groups with HRs not returning to the pre-caregiving baseline within 10 minutes of caregiving completion.

### Behavioural results

Four-hundred and thirteen minutes of video data were analysed; epoch one - 106 minutes, epoch two – 207 minutes, epoch three – 100 minutes. The ICC's were good to excellent across all components of the behavioural assessment tool (Table 1).

The most frequently observed states, stress, and self-regulation behaviours during caregiving for the sub-groups are

**Table 1:** Intra-class correlations for scale components of the observational tool, by epoch

Scale component	Epoch 1 Pre-caregiving	Epoch 2 Caregiving	Epoch 3 Post-caregiving
Infant state	0.72	0.71	0.53
Stress responses	0.91	0.84	0.78
Self-regulation behaviours	0.90	0.90	0.74

ICC agreement grading: Poor <.40, Good to moderate .41 to 0.75, Excellent >.76<sup>2</sup>

reported as median scores. For infant states: GIT infants - drowsy/alert/crying (4.2); cardiac infants - drowsy (5.5). Stress responses: GIT infants - extend legs (8), splay fingers/toes (6), squirm (6); cardiac infants - splay fingers/toes (8) and squirm (7.5). Self-regulation behaviours were similar for both groups; GIT infants - hand to face (5), suck/foot clasp/leg brace (3); cardiac infants - hand to face (4), suck/hold on/leg brace (3.5). The most offered support during caregiving was, in descending order - supportive holding, voice, patting/stroking.

### Relevance to NIDCAP

This research provides NIDCAP Trainers, NIDCAP-certified Professionals, bedside clinicians, and families with information to support infants requiring surgery in the neonatal period and specifically the application of developmentally responsive caregiving.

### Conclusion

To our knowledge, there is no published research on surgical infants' physiological and behavioural responses during nurse caregiving. We found that infants post-surgery demonstrate physiological stress during nurse-delivered caregiving. Differences were observed between groups and may represent the differing physiological effects of congenital anomalies. It appears that infants post-surgery express similar repertoires of behavioural stress cues and self-regulation behaviours.

Ongoing analysis of the study sample will add to these preliminary results and the findings may assist bedside clinicians.

### References

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