

Neonatal Hydrotherapy: Implications for Infant Feeding and Movement

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- **Objectives:** At the completion of this presentation, the participant will be able to:
 - 1) identify indications and medical prerequisites for selecting infants for hydrotherapy in the NICU setting;
 - 2) describe equipment, water temperature, and hydrotherapy procedures for medically stable neonates;
 - 3) discuss the benefits of hydrotherapy for feeding, behavioral organization, and movement.;
 - 4) identify potential risks or adverse events which might occur with the use of hydrotherapy for neonates in the NICU setting.

- **Historical Perspective:** Hydrotherapy in Health Care

- **Hydrotherapy for Neonates**
 - 1) original case: Madigan Army Medical Center, Tacoma, WA (1981)
 - 2) pilot study: physiological effects (Sweeney, 1983)
 - 3) current study: feeding and physiological effects
abstract: Feeding proficiency in preterm neonates following hydrotherapy in the NICU setting
 - 4) clinical guidelines for neonatal hydrotherapy
chapter in Umphred's Neurological Rehabilitation, 5th edition (Sweeney, 2007).

- **Indications for Referral**
 - 1) tone/movement abnormalities
 - 2) joint/muscle ROM limitations
 - 3) behavioral state abnormalities: lethargy; irritability
 - 4) feeding impairment
 - 5) examination of active assisted movement with buoyancy of water: spinal muscular atrophy; profound hypotonia (Prader Willi Syndrome)
 - 6) cases

- **Prerequisites for Hydrotherapy**
 - 1) medical stability
 - 2) discontinuation of intravenous lines and ventilatory support

- 3) resolution of apnea and bradycardia episodes
- 4) resolution of temperature instability
- 5) absence of umbilical cord or covered with transparent dressing (e.g. op site)
NANN & AWHONN guidelines on skin & wound care (immersion acceptable; 2001)

- **Equipment**

- 1) bassinette without mattress
- 2) overhead radiant heater
- 3) neonatal vital signs monitor: plastic cuff can be immersed in water
 - a) mean arterial pressure
 - b) mean heart rate
- 4) digital thermometer or floating spa thermometer: water temperature at 99-101 degrees F depending on size of tub and duration of hydrotherapy session (not more than 10 minutes)

- **Technique**

- 1) swaddled body in flexed posture with head and extremities at midline
- 2) optimal: 2 caregivers: one at head/shoulder region and one at lumbar/pelvis region
- 3) adjustment to water
- 4) graded, controlled movement at one area (e.g.. pelvis/trunk) while stabilizing at opposite end (e.g. head/shoulders)...allowing movement from a point of stability
- 5) buoyancy effectunweighted environment supports spontaneous and guided movement
- 6) guided movement: based on which movement components appear to be “missing”; often insufficient flexion and rotation
- 7) guided by behavioral state stability and interaction quality
- 8) guided by physiological stability
- 9) duration 10 minutes maximum; shorter if water cools or if desired effects achieved earlier

- **Clinical Outcomes** (observations)

- 1) increased extremity movement
- 2) increased visual and auditory interaction
- 3) increased feeding proficiency
- 4) enhanced parent participation in therapeutic bathing

- **Research Outcomes**

- 1) feeding effects: more efficient; absence of fatigue
 - a) decreased mean duration of feeding ($p < .004$)

- b) 100% of required volume
- c) increased mean daily weight gain ($p < .026$)
- d) design: prospective, within subjects, randomized crossover
- e) subjects: 31 neonates at 32-36 wks PCA
- f) 4 phases: baseline, hydrotherapy or rest period, feeding, recovery

2) physiological effects: current study

- a) HR, O2 saturation, MAP, temperature
- b) not fully analyzed

3) physiological effects: pilot study (1983)

- a) 7% increase in mean arterial pressure during and in 20 minutes after hydrotherapy
- b) 7% increase in mean heart rate

4) future research

- a) uncoupling stimuli (visual; auditory; kinesthetic; tactile)
- b) swaddling vs no swaddling
- c) hydrotherapy effects on breast feeding proficiency
- d) duration of hydrotherapy

- **Summary**

- **Questions / Discussion**

References

Sweeney JK (1983): Neonatal hydrotherapy: An adjunct to developmental intervention in an intensive care nursery setting. Physical & Occupational Therapy in Pediatrics 3(1): 39-52.

(pilot study)

Sweeney JK (2003): Feeding proficiency in preterm neonates following hydrotherapy in the NICU setting. Pediatric Physical Therapy 15(1): 63

(abstract)

Sweeney JK, (2007): Neonates and infants at neurodevelopmental risk. In DA Umphred (ed.) Neurological Rehabilitation, 5th ed, pp 303-356. St. Louis: Mosby.

(hydrotherapy clinical guidelines described in chapter)

Research Abstract

FEEDING PROFICIENCY IN PRETERM NEONATES FOLLOWING HYDROTHERAPY IN THE NICU SETTING

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Purpose: This is a prospective, within subjects study designed to evaluate the effects of neonatal hydrotherapy on feeding in preterm neonates in a NICU.

Research Question: What differences exist in the feeding performance of preterm infants after hydrotherapy compared to feeding after a rest period?

Methods: Thirty one subjects (13 female; 18 male) were studied in a crossover design with each subject serving as his own control. The sample included 22 low-risk and 9 high-risk neonates born prematurely at 32 to 36 weeks post-conception. In random order, each subject received both hydrotherapy treatment and the rest period / control condition, separated by a 24 hour period. The study included four consecutive phases: initial baseline (10 minutes); hydrotherapy or rest period (10 minutes); bottle feeding (40 minutes maximum); recovery baseline (10 minutes). Hydrotherapy was conducted by an experienced neonatal physical therapist, and the infants were bottle fed by a neonatal nurse blinded to the order of the treatment phase. The hydrotherapy technique included preparing the water at 101degrees F, using an overhead radiant heater, submerging the swaddled, semi-flexed infant in the water, eliciting behavioral adaptation to the water, and introducing slow, guided movement gradually and intermittently over the 10 minute session. The rest condition was a 10 minute period before feeding during which each infant remained in a supported right sidelying position under radiant heat without physical handling. Daily weight was calculated over 4 days (1 day before; 2 treatment days; 1 day after).

Data Analysis: Crossover analysis of variance was used for feeding duration and weight change following each of the two treatment conditions with period (day) and treatment crossed with the factor of infant risk category.

Results: All infants ingested 100 % of the required feeding volume after both the rest condition and the hydrotherapy treatment. Mean duration of feeding was significantly decreased ($p < .004$) after hydrotherapy compared to the rest condition (702 seconds versus 912 seconds). Mean daily weight gain after hydrotherapy (47.2 grams) was significantly higher ($p < .026$) than after the rest condition (30.1 grams). Weight gain and feeding performance between high and low risk infant groups were not significantly different.

Implications: Hydrotherapy, a traditional physical therapy treatment modality, can be adapted for use in neonatal intensive care settings for preterm infants. In addition to its historical use in neuromotor intervention (buoyancy assisted movement of the limbs in infants with restricted mobility), hydrotherapy can also be considered as a preparation for feeding. Scheduled immediately before feeding, hydrotherapy is an effective intervention for improving feeding efficiency in preterm infants and may also be useful for infants with feeding impairments. Potential post-hydrotherapy adverse effects of compromised feeding or weight loss from overstimulation or fatigue were not found. On a short-term basis, weight gain was enhanced and may contribute to earlier discharge.