

# Maternal Fluids During Parturition, Neonatal Output, & Newborn Weight Loss: An Observational Study to Determine Associations



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## The Research Question



What is the relationship between the **intravenous fluids** administered to a woman during childbirth and **her infant's weight loss** during the first 72 hours postpartum?



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## Background from Literature



Newborn Weight Measurements:

- Indicator of breastfeeding adequacy
- Assume weight loss d/t lack of food or feeding
- Birth weight is used as baseline
- Reference loss is disputed in the literature - i.e. 7% vs 10%
- **Gap in the literature re: relationship between maternal IV fluids and newborn weight loss**



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## The Hypotheses

In the first 72 hours postpartum, there is a **positive association** between:

1. the amount of **IV fluid** given to a woman during parturition and **the amount of weight her infant loses**;
2. the amount of **IV fluid** given to a woman during parturition and **the amount her infant eliminates**; and
3. the **amount an infant eliminates** and the **infant's weight loss**.

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## Methods - Design

- Observational, prospective cohort design
- Convenience sample of expectant women
- Followed participants from labour (or prior to a c-section) to 2 wks pp
- Ethics approval from University of Ottawa Research Ethics Board & 4 hospital REBs

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## Methods - Inclusion Criteria

- Expecting a fullterm, single, healthy infant
- Planning birth at a participating hospital or a home birth
- Planning to breastfeed
- All parities included
- Able to read and write in English
- Owned a telephone

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### Data Collection - Prebirth



- IV and oral fluids in 12 hr increments from admission to birth (i.e. through labour or prior to c-section)
- Determined IV fluids in 2 hours before birth - audited data, reported by nurses in final 4 months

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### Data Collection - Postbirth



- Newborn weight q 12 hours x 72 hours
- All neonatal output (i.e. diapers) for 72 hrs - weighed individually in 24 hour increments
- Feeding category -
  - supplemented in hospital - yes or no

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### Description - The Mothers



- 32 yo; committed relationship; some postsecondary ed.
- 42% percent were first-time mothers
- Median breastfeeding experience - 1 yr
- 83% planned exclusive breastfeed 6 months
- 76% planned to breastfeed for 1 year+
- Mean gestation - 39.8 weeks (37-42 wks)
- 82% OB, 12% family physician, 6% midwife
- Vaginal - 75%
- C-sec - 25% (12% planned c-sec)
- Epidural/spinal - 64% vaginal birth
- IV - 78%

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### Description - The Newborns



- 55 female / 54 male
- Mean birth weight - 3619 grams (SD 446)  
(range - 2185 to 4707)
- 27% supplemented in hospital
- No significant difference in weight loss between supplemented and exclusively breastfed newborns

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### Summarize the Data Fluid r/t Weight Loss



- Oral fluids alone do not correlate to newborn weight loss
- All forms of IV fluids correlated to nadir of weight loss with bivariate analysis
- 2 hour pre-birth IV amounts shows trend but not sig. at 72 hrs (?power)

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### Summarize the Data



- Only output on Day 1 is related to fluids
- Only 2-hr prebirth fluid r/t output
- Seems to confirm theory that fetus takes on fluid & fetus can also "let go" of fluid, over time, fluid settles
- Data is normally not collected, so timing of fluid not readily thought about
- Results suggest more research re: timing

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## Summarize the Data



### Neonatal output & newborn weight loss

- Output in first 24 hrs – positive relationship  
↑ output = ↑ weight loss
- Output in second 24 hrs - no correlation at all
- Output in third 24 hrs – negative relationship  
↓ output = ↑ weight loss  
↑ output = ↓ weight loss
- Corroborates the fluids r/t first 24 hrs of output

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## Compared Two Groups



- Data for all fluids
  - divided into  $\leq 1200$  mls &  $> 1200$
  - compared 60-hr weight loss between groups
- Sample size
  - $\leq 1200$  mls,  $n=21$ ;  $>1200$ ,  $n=53$
- Mean weight loss (SD)
  - $\leq 1200$  mls, 5.51% (2.3);  $>1200$ , 6.93% (2.5)
- Difference = 1.42%,  $p = 0.03$

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## Discussion



- Confirmation of diuresis in first 24 hours as evidenced by:
  - wt loss r/t output in 1st 24 hrs
  - ↑ output in 1st 24 hrs r/t 2-hr prebirth IV fluids
- Suggests weight loss in first days is r/t a **fluid correction** - iatrogenic loss
- Clinicians should question birth weight as baseline (i.e. birth weight is a goal to achieve)
- Continued weight loss after the first few days would be a concern

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## Recommend Clinicians Reconsider Birth Weight as Baseline



- Intuitively, clinicians and parents want to see neonate back to birth weight
- If birth weight is inflated, then expectations for return to birth weight are unjustified
- Need to account for the fluid correction
- **Recommend the 24-hr weight as baseline to assess newborn weight changes**

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## Clinical Implications



1. Change baseline to assess loss
  - recognizes iatrogenic weight loss (i.e. correction)
  - requires a major shift in thinking
  - it does not matter how much fluid mothers receive - give all newborns time to correct
2. Use weight loss as an indicator
  - continue to monitor weight
  - after allowing time for fluid correction, continued weight loss is a red flag

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## Limitations



- Sample bias - ↑ levels of education, ↑ family income, all in committed relationship, ↑ breastfeeding plans
- Missing data - complex study
- 2-hr pre-birth IV fluids were not collected until last few months - n = 43

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## Strengths

- Prospective study
- Data collection post hospital discharge
- Planned a thorough collection of data
  - weights q 12 hours
  - all diapers were weighed
- Comparable to provincial statistics on key variables - generalizable?
- Findings are relevant to clinicians

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## Future Research

- Need further evidence regarding iatrogenic newborn weight loss
- Need more evidence about effect of the timing of maternal fluids on neonatal output
- Need longitudinal studies to determine health outcomes related to weight loss

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