Inductions have Increased Dramatically

1990	2005/2006
9.5%	22.3%-41%

Two-thirds of inductions are now for non-medical reasons

THE RELATIONSHIP BETWEEN ARTIFICIAL OXYTOCIN (PITOCIN) USE AT BIRTH FOR LABOR INDUCTION OR AUGMENTATION AND THE PSYCHOSOCIAL FUNCTIONING OF THREE-YEAR-OLDS

Claire L. Winstone, Ph.D.

Pitocin Augmentation of Labor

In addition, approximately 55% of women receive Pitocin to augment labor (*Listening to Mothers*, 2006)

Increasing Prevalence of Childhood Disorders

- Attention Deficit/Hyperactivity Disorders
- Disruptive Behavior Disorders
- Attachment Disorders
- Autism Spectrum Disorders
- Sensory Processing Disorders
- Disorders of Regulation
- Learning Disabilities

Medical Indications for Induction of Labor Include:

- High blood pressure
- Premature rupture of the membranes ("premature" meaning that labor does not begin spontaneously soon after rupture)
- Maternal infection or medical problems such as diabetes mellitus, kidney disease or chronic pulmonary disease
- Suspected fetal jeopardy
- Fetal death
- Severe blood incompatibility
- Severe pre-eclampsia or toxemia
- Postdate pregnancy, where there is a proven danger to the baby (ACOG, 1999)

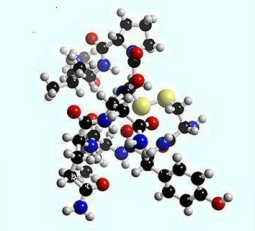
Human Pitocin Research is conflicting

- 1960s, United States (Niswander)
- 1970s, Australia (McBride); USA (Friedman)
- 1980s,The Netherlands (Out & Vierhout)
- 1990s, Denmark (Sorensen)
- 1990s, Japan (Eishima)

Measures have not been sensitive enough. . .

- Measure of adult cognitive function (Danish)
- Stanford-Binet: intelligence
- Wechsler Preschool and Primary Scale of Intelligence
- Prechtl's Neonatal Neurological Screening (2 studies)
- Brazelton Neonatal Behavioral Assessment Scale
- Porteus mazes, peg board, Graham Block Sort Test: fine and gross motor skills, conceptual ability
- "Psychomotor Development Scheme 0 – 15 months."
- Auditory and visual tests
- Physical examination
- Behavioral observation

Neuropeptide Oxytocin Molecule



Discovery of oxytocin by physiologist Sir Henry H. Dale, 1906

Oxytocin	Pitocin
•Secreted by pituitary gland and heart	•Synthesized by pharmaceutical manufacturer
•Released in pulsatile fashion, with burst firing during birth and breastfeeding	•Released by IV drip in increasingly high doses until satisfactory labor pattern achieved
•Hormone of "calm and connection"	•Does not cross blood-brain barrier, can cause increased pain and anxiety in labor
•Involved in: mother-infant attachment; parental behavior; courtship and monogamous pair bonds; and wider social relationships	•Used to start labor, to improve uterine contractions in labor and to prevent post-partum hemorrhage
•Produced by baby during labor	•Reduces newborn oxytocin levels

Pitocin Package Insert

"Since the available data are inadequate to evaluate the benefits-to-risks considerations, Pitocin is not indicated for elective induction of labor"

(Monarch Pharmaceuticals, 2004, p. 1).

Research into Birth and Psychosocial Functioning Has Been Based on Several Theories

- Obstetrical medications and drug addiction (imprinting theory)
- Birth trauma and suicide (imprinting theory)
- Obstetrical complications and AD/HD (hypoxia theory)
- Obstetrical complications/medications and schizophrenia and autism (oxytocin theory)

Eishima (1992) found a significant relationship

($p < .005$)

between

overall obstetric conditions

and

overall neurological status.

Page 13

Eishima's Conclusions

"... even a small difference in low-risk obstetric conditions is related to differences in neonatal neurological status and neonatal behavior."

Page 14

Imprinting in Animals

In the 1970s animal researchers suggest the concept of "hormonal imprinting"

(Csaba, 2004, 2008)

Page 15

Imprinting in Humans

- Movement patterns (Cheek, 1986)
- Postures, movements, belief systems, relationships, artwork and language. (Emerson, 1998)
- Sequencing patterns, movements, interactions, relationships, play/behavior. (Castellino, 1997)
- Play/behavior and sequences. (Blasco, 2006)

Page 16

The Preliminary Study

- 6 clinicians working with a prenatal/ perinatal frame of reference were interviewed about their perceptions of 3-year-old children born with the use of Pitocin.

Page 17

1. 6 clinicians answered 9 questions.
2. Content analysis of interviews yielded groups of items for survey.
3. 6 clinicians voted on best items to represent groups.
4. Survey developed from items.
5. Psychosocial items regrouped into "dimensions".

Page 18

The Dissertation Study

Page 19

A Survey on the Relationship between Pitocin Use at Birth and Psychosocial Functioning at Age Three

Methodology

Page 20

The survey contained three sets of item groups:

1. Psychosocial item groups clustered into "dimensions":
   - Sensory processing
   - Motor coordination
   - Affect/mood regulation
   - Self-esteem
   - ANS regulation
   - Interpersonal functioning
   - Mother-child attunement

Page 21

2. "Context of Birth" items relating to mother's experiences of pregnancy, labor, delivery and extended post-partum.
3. Demographic items.

Page 22

Sample Survey Item

My child strongly resists pressure, directions, being hurried:

Never						Always
○	○	○	○	○	○	○

Page 23

Criteria for Survey Participation

1. Mother was over 18 at the time of giving birth. Vaginal birth (not by cesarean) in an American hospital.
2. No immediately prior fetal/infant loss (miscarriage/abortion/stillbirth).
3. No street drugs or alcohol.
4. Child not premature (under 37 weeks) and/or low birth weight
5. No significant medical complications for mother or baby.
6. Mother in ongoing relationship with the father.

Page 24

Why Age Three?

- More social demands on child.
- Brain is essentially fully developed—with all major fiber tracts identifiable.
- Early mother-infant attunement and resulting maturation of the right hemisphere essentially completed.
- Functioning at age three is fairly predictive of functioning at school age.

Page 25

Main Hypothesis

There is a relationship between the use of Pitocin at birth and the psychosocial functioning of children at age three.

Page 26

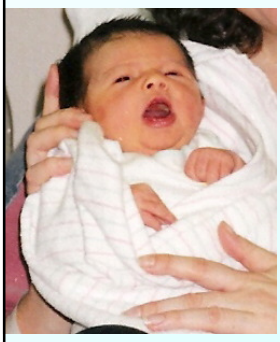
Online Survey Run

- The survey was run on a survey-hosting website (www.qualtrics.com) for one month.
- 514 completed surveys were analyzed.
- 16 participants were unsure if they received Pitocin or not, leaving 498 for the Pitocin-related analyses.

Page 27

Results

Page 28



Initial Data Analyses

Page 29

Non-significant Findings

Neither total score on psychosocial functioning, nor the individual dimensions (item groups) distinguished between children who did and did not receive Pitocin.

However, there was something interesting . . .

Page 30

Nine Items Significant For Pitocin

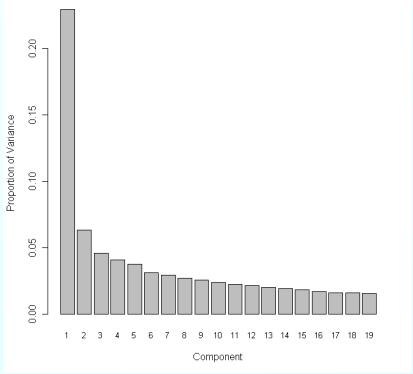
Survey Item	Dimension	Significance: 2-tailed
Reacts strongly to directions, demands	**Interpersonal Dynamics**: Responses to structure/support	.023
Strong need to be in control	**Interpersonal Dynamics**: Control/Cooperation/ Leadership	.013
Dominates other children	**Interpersonal Dynamics**: Control/Cooperation/ Leadership	.016
Communicates "yes" and "no" when needs to	**Interpersonal Dynamics**: Boundaries	.020
Mother feels she can never satisfy her child	**Interpersonal Dynamics**: Mother's Experience of Relationship	.048
Mother sees relationship as easy and cooperative	**Interpersonal Dynamics**: Mother's Experience of Relationship	.005
Rushes from one thing to next and rarely slows down	**Sequencing**: Beginnings	.011
Has/has had a pattern of self-harming behaviors	**ANS Regulation**: Activity Level	.053
As an infant, had ear infections	**ANS Regulation**: Physiological	.038

Post Hoc Analyses

t test for Independent Means: Pitocin/No Pitocin Use and Scaled Context of Birth Items

Survey Item	*t* test For Equality of Means		
	t	df	Sig. (2-tailed)
Ease of birth (Easy/Difficult)	4.971	459.955	**.000*** **
Birth reflections (Positive/Negative)	5.353	406.685	**.000*** **
Aspects of this birth still troubling or unresolved	2.132	469.510	**.034***
Mother felt she and birth team worked well together	4.261	45.058	**.000*** **
Others took control of birth: mother felt powerless	6.308	401.393	**.000*** **
Felt overwhelmed, out of control, scared by labor	1.926	465.760	**.055**
Labor/delivery was excruciating, unbearable	3.406	441.690	**.001** **
Wonders if in labor baby felt disconnected, scared	4.939	408.202	**.000*** **
Baby with Mom most of first hour post-partum	2.793	441.956	**.005** **

Principal Component Analysis: Scree Plot



Context of Birth & Pitocin Results

Pitocin mothers: *n* = 231

no-Pitocin mothers: *n* = 267

Total score for all scaled Context of Birth items distinguished between Pitocin and no-Pitocin births to a statistically significant degree (p = .000).

Factor 8: Attribute Assertiveness	Dimension in which Item was Grouped	Factor Loading
Sensitive to intrusion	**Interpersonal Dynamics**: Boundaries	0.2
Reacts strongly when things change quickly	**Mother-Child Attunement**: Transitions	0.19
Copes with transitions better when involved	**Mother-Child Attunement**: Transitions	0.25
Responds well to being allowed to self-pace	**ANS Regulation**: Timing/Pacing/Tempo	0.23
Digestive problems	**ANS Regulation**: Physiological	-0.16
Picky eater	**ANS Regulation**: Physiological	-0.55
Problems with sleeping	**ANS Regulation**: Physiological	-0.18
Baby ear infections	**ANS Regulation**: Physiological	-0.42
Baby colicky, fussy, hard to soothe	**ANS Regulation**: Physiological	-0.25

Means for factor 8: Assertiveness

Pitocin group	(*n* = 231)	1.346381
No Pitocin group	(*n* = 267)	1.858906

Pitocin ↑ Assertiveness ↓

Page 37

Relationship of Assertiveness to Context Score and Pitocin Use

Context scores ↑ = Child's Assertiveness ↑

The more negative/stressful the Context of Birth for mother, the more the child experiences internal dysregulation and needs to use Assertiveness to get help with dysregulation

Pitocin use ↑ = Child's ability to employ assertiveness ↓

Page 40

Factor 12: Attribute: Need to Control Environment	Dimension	Factor Loading
Craves firm pressure	**Sensory Processing**: Tactile/Proprioceptive	0.32
Procrastinates on starting things	**Sequencing**	0.3
Loses focus in the middle	**Sequencing**	0.15
Responds well to self-pace	**ANS Regulation**: Timing/Pacing/Tempo	0.16
Baby colicky, fussy, hard to soothe	**ANS Regulation**: Physiological	0.23
Copes with transitions better when involved	**Mother-Child Attunement**: Transitions	0.26
Resists receiving help from others	**Interpersonal Dynamics**: Responses to structure/support	0.15
Strongly resists pressure; being hurried	**Interpersonal Dynamics**: Responses to structure/support	0.18
Strong need to be in control	**Interpersonal Dynamics**: Control/Cooperation/Leadership	0.33
Aggressive	**ANS Regulation**: Activity Level	-0.19
Digestive problems	**ANS Regulation**: Physiological	-0.25
Baby hypersensitive to movement/position	**Sensory Processing**: Vestibular	-0.23
Reacts strongly when things change quickly	**Mother-Child Attunement**: Transitions	-0.18
Difficulty with others' timing/transitions	**Interpersonal Dynamics**: Responses to structure/support	-0.18
Gets upset when things don't go their way	**Interpersonal Dynamics**: Control/Cooperation/Leadership	-0.16

Significant Difference between Exclusive Breastfeeding and Other Forms of Feeding with Pitocin and No Pitocin at Birth

	Baby Fed Entirely at Breast	Combination Breast/ Bottle-feeding Plus Exclusive Bottle-feeding	Totals
Pitocin	96	135	231
No Pitocin	231	16	247
Total	327	151	478

Fisher's Exact Test: (95% CI, $p < .000$)

Page 41

Means for Factor 12: Need to Control Environment

Pitocin group	(*n* = 231)	2.481183
No Pitocin group	(*n* = 267)	2.169549

Pitocin ↑ Need to Control Environment ↑

Page 39

Discussion

Eishima's Study of Newborns

". . . even a small difference in low-risk obstetric conditions is related to differences in neonatal neurological status and neonatal behavior."

The Polyvagal Theory of Stephen Porges

This study supports Eishima's Findings Through Age Three

Factor 8: Assertiveness
Factor 12: Need to Control Environment

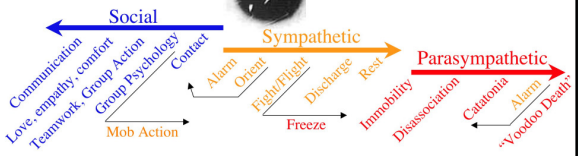
Both suggest themes of difficulties in:

- Interpersonal dynamics
- Mother-child attunement
- Autonomic nervous system regulation
- Sensory processing
- Sequencing

Jackson's Theory of Dissolution

"The higher nervous system arrangements inhibit (or control) the lower, and thus, when the higher are suddenly rendered functionless, the lower rise in activity."

–John Hughlings Jackson (1835-1911)
Father of English Neurology
Quoted by Stephen Porges 11/01



We play our newest, best card first, if that doesn't work (or has not worked in the past as determined by the amygdala), we try our older, second card. If that doesn't work, we play our oldest, last card. If that doesn't work we are in extreme danger of death.

Slide prepared by John Chitty, Colorado School of Energy Studies, www.energyschool.com

Five Infant Items

- Of the five items in the survey describing characteristics of the child in infancy, groups of two or more appeared in majority of the PCA factors studied (7 of the 12 studied), including the two found significant for Pitocin:
- *Suggests a continuity of disturbance in functioning from infancy to age three.*
- Faulty oxytocin imprinting could explain this continuity.

"Assertiveness"
(decreased by Pitocin) ≈
Social Engagement

"Need to Control Environment"
(increased by Pitocin) ≈
Sympathetic Activation (Fight/flight)

Oxytocin Receptors

- During pregnancy in humans, oxytocin receptor numbers increase in the uterus: beginning at six times the number in a non-pregnant uterus, up to 80-fold at term (Fuchs & Fuchs, 1984)

Hormonal Imprinting

"Excess of the target hormones . . . which are able to bind to the receptors, provoke faulty imprinting in the critical periods with life-long morphological, biochemical, functional or behavioural consequences." (Csaba, 2008, p. 1)

- PCA findings suggest that the binding of exogenous oxytocin (Pitocin) to oxytocin receptors during labor and delivery may result in faulty imprinting affecting aspects of ANS regulation and interpersonal dynamics.
- If both mother and baby experience faulty oxytocin imprinting, both may be contributing to a relative lack of attunement in the relationship, as reflected in significant differences in scores.

Major Findings of the Study

Significant relationships found between Pitocin and:

- Aspects of psychosocial functioning at age three, particularly ANS functioning and the resulting interpersonal dynamics.
- Reduced time spent together by mother and baby in first hour post-partum.
- Reduced exclusive feeding at the breast in the first six months.

Conclusions

- Pitocin use at birth appears to have psychosocial, and probably neurobiological, consequences for mother and child.
- Little is known about the long-term consequences of interfering with the hormonal physiology of childbirth in general and with the oxytocin system in particular.
- Increased Pitocin use at birth may be a contributing factor to the concurrent increase in a variety of disorders of regulation in children.

Conclusions, cont'd

- Further research needed to expand on present study and extend the investigation to the psychosocial functioning of older children.
- Possibility that other obstetrical interventions may also have long-term effects that require study.
- Encourage re-examination of Pitocin use in birth, and careful weighing of the risks and benefits of its use, for the benefit of the most vulnerable.


Questions?