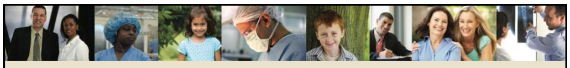

Standardization of the Second Stage of Labor: A Perinatal Quality Perspective

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October 10th, 2013

FAIRVIEW

Original Research:

- The Authors want to thank the Society of Obstetricians and Gynaecologists of Canada, and Ann E. Sprague, PhD, RN for permission to use the "Guideline for Second Stage Labor", *Copyright* 2006 *Society of Obstetricians and Gynaecologists of Canada.*
- This was originally published in the *Journal of Obstetrics and Gynaecology Canada*, September 2006, to create this adapted and amended "Guideline for the Management of the Second Stage of Labor Primigravida or Multigravida with Epidural" prepared jointly by Samantha A. Sommerness, DNP, RN, CNM of Fairview Health Services, Becky Gams, MS, RN, CNP, and Dr. Charles L. Hirt, Jr. as well as the Zero Birth Injury Team.

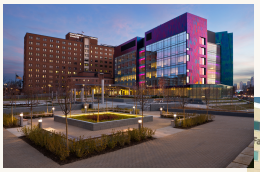
FAIRVIEW

Learning Objectives

- Describe the 'normal' length and physiology of the 2nd stage of labor
- Describe specific strategies for implementation of a standardized second stage of labor guideline at various hospital types – academic, urban and rural.
- Describe the implementation process from a quality improvement perspective including:
  - determining current state of clinical practice,
  - education of staff and providers,
  - data collection and analysis
  - obstacles and lessons learned.

FAIRVIEW

Fairview Health Services- 2 of 5 Hospitals



632 birth injuries in 2008 (of ~12,000 births)!

FAIRVIEW

A tale of two hospitals…..

- Fairview Southdale
  - Edina, suburban Minneapolis
  - Part of the Fairview Hospital System
  - 90 + Private OB/GYNs Practicing
  - 13 Bed Labor and Delivery
  - 3400 Deliveries per year
  - NICU
  - 1 credentialed CNM
- University of Minnesota Medical Center
  - Urban Academic Health Center
  - Part of the Fairview Hospital System
  - Combination of OB/GYN's, MFM's, Family Practice, Residents and CNM's
  - -13 bed Labor and Delivery
  - -10 bed Pregnancy Special Care Unit
  - -Level IV NICU (48 beds,
  - **40% CNM attended births**

FAIRVIEW

First Step: Perinatal Safety Initiative

- Institute of Healthcare Improvement (IHI)
- Premier Safety Initiative
  - 16 hospitals, 2 hospitals within FHS joined the initiative
- Fairview Health Services Call to Action for Perinatal Safety – all 6 hospitals
- Zero Birth Injury Multidisciplinary Steering Committee
- Zero Birth Injury (ZBI) Committee

FAIRVIEW

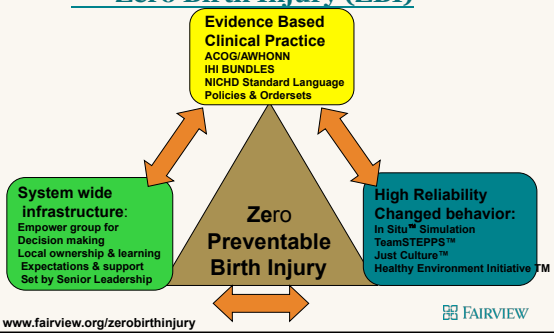
Background: Zero Birth Injury Initiative (ZBI) was the first step

- In 2008, Fairview Health System (FHS) initiated the Zero Birth Injury Initiative (ZBI):
  - Broad scope
    - Maternal Fetal Medicine Specialists
    - Obstetricians
    - Family Practice
    - Neonatologists
    - Certified Nurse Midwives
    - Advanced Practice Nurses
  - Full support of Administration

- Purposes
  - Improve Perinatal (maternal and neonatal) process and clinical outcomes
  - Implement evidenced based education, guidelines, and order sets.
  - Reduce and ultimately eliminate preventable birth injuries as measured by the Adverse Outcome Index (AOI)

FAIRVIEW

Zero Birth Injury (ZBI)



www.fairview.org/zerobirthinjury

FAIRVIEW

Perinatal Adverse Outcome Index (AOI)

Weights for Adverse Outcomes	
Maternal death	750
Intrapartum Neonatal Death	400
Uterine Rupture During Labor	100
Unplanned Maternal Admission to ICU	65
Birth Trauma	60
Unanticipated Operative Procedure	40
Admission to NICU	35
APGAR 5 < 7	25
Maternal Blood Transfusion	20
3rd and 4th degree perineal laceration	5

The Adverse Outcome Index (AOI) is the number of patients with one or more of the identified adverse events as a proportion of total deliveries.

The Weighted Adverse Outcome Score (WAOS) is the total weights of all the adverse events divided by the total number of deliveries.

The Severity Index (SI) is the total weights of all the adverse events divided by the number of deliveries with an adverse event (each delivery is counted only once but each event is counted.)

Source: Premier Patient Safety Initiative AOI version 2.2-adapted from original Harvard AOI

FAIRVIEW

AOI Definitions related to Newborns

- **Birth Trauma** – Inborns only ≥ 2000 grams; dx codes 767.0, (subdural and cerebral hemorrhage), 767.11 (epicranial subaponeurotic hemorrhage - massive), 767.3 (other injuries to skeleton), 767.4 (injury to spine and spinal cord), 767.5 (facial nerve injury), 767.6 (injury to brachial plexus), or 767.7 (other cranial and peripheral nerve injuries) and exclude (756.51 osteogenesis imperfecta). (Case Weight: 60)
- **APGAR 5 < 7** - Inborns only, Birthweight ≥ 2500 grams and ≥ 37 weeks completed gestation and APGAR 5 < 7, excludes cases with congenital anomalies (DX codes 740-759.9) or fetal hydrops (DX code 778.0) or dwarfism (DX Code 259.4). (Case Weight: 25)
- **Admission to NICU of neonate birthweight ≥ 2500 grams and ≥ 37 weeks gestational age (GA)** for >1 day** Inborns only BW ≥ 2500 grams, GA ≥ 37 weeks, and NICU admission (day or charge) within one day of birth for greater than a day. Excludes cases with congenital anomalies (DX codes 740-759.9) fetal hydrops (778.0), dwarfism (259.4), or neonatal abstinence syndrome (779.5)
4. **Intrapartum Neonatal Death ≥ 2500 grams and ≥ 37 weeks gestation** – inborns only, neonate ≥ 2500 grams with discharge disposition of died within 7 days of birth and excluding cases with congenital anomalies (DX code 740-759.9), fetal hydrops (778.0) or dwarfism (259.40).

Source: Premier Patient Safety Initiative AOI version 2.2-adapted from original Harvard AOI

10

FAIRVIEW

Maternal Adverse Outcome Measures

1. **Maternal Death** – DRG 370-375 or MSDRG 765-768 and 774-775 and discharge disposition = died
2. **Uterine Rupture during Labor** – DRG 370-3 75 or MS DRG 765-768 and 774-775 with DX code 665.
3. **Unplanned Maternal Admission to the ICU** – DRG 370-375 or MS DRG 765-768 and 774-775 with DX code 5th digit = 2 delivered with mention of postpartum condition) on any DX code 640-677 and with an ICU day or charge. **Or**

   DRG 370-375 or MS DRG 765-768 with DX code 5th digit = 2 (delivered with mention of postpartum condition) on any DX code 640-677 and discharged to another hospital **OR**

   DRG 370-375 or MD DRG 765-768 and 774-775 with DX code 5th digit = 2 (delivered with mention of postpartum condition) on any DX code 640-677 and one of the following procedure codes: insertion of ETT (96.04) , other intubation of respiratory tract (96.05), insertion of Sengstaken tube (96.06), other continuous invasive mechanical ventilation (96.7), non-invasive mechanical ventilation (93.90), IPPB (93.91), Nonmechanical methods of resuscitation (93.93).

1. **Unanticipated Operative Procedure** – DRG 370-375 or MS DRG 765-768 and 774-775 with one of the following procedure codes in the first or second procedure field: (evacuation of other hematoma of vulva or vagina (75.92), D & C following delivery (69.02), reclosure of postoperative disruption of abdominal wall (54.61), other surgical occlusion of abdominal vessels (38.86), control of hemorrhage aspiration curettage following delivery (69.52)
2. **3rd and 4th Perineal Degree lacerations** – DRG 370-375 with diagnosis codes 664.2x-3rd degree perineal laceration or 664.3x 4th degree perineal laceration.

Source: Premier Patient Safety Initiative AOI version 2.2-adapted from original Harvard AOI

FAIRVIEW

A Perinatal Care Quality and Safety Initiative: Hospital Costs and Potential Savings

Kozhimannil KB, Sommerness S, Rauk P, Gams R, Davis S, Miller K, Hirt C, Landers D. A perinatal care quality and safety initiative: hospital costs and potential savings. Joint Commission Journal on Quality and Patient Safety, forthcoming; 2013

FAIRVIEW

Background

- Increasing national focus on hospital initiatives to improve obstetric and neonatal outcomes.
- While costs of providing care may decrease with improved quality, the accompanying reduced adverse outcomes may impact hospital revenues.
- The purpose of this study was to estimate, from a hospital perspective, the financial impacts of implementing a perinatal quality and safety initiative.

FAIRVIEW

Key findings

- Health impact: After adjusting for relevant covariates, implementation of ZBI was associated with an 11% decrease in the rate of maternal and neonatal adverse outcomes between 2008 and 2011 (AOR=0.89, p=0.076).
- Financial impact: As a result of the adverse events avoided, the hospital system saved $284,985 in costs but earned $324,333 less revenue, which produced a net financial decrease of $39,348 (or a $305 net financial loss per adverse event avoided) in 2011, compared with 2008

FAIRVIEW

Conclusions

- Adoption of a perinatal quality and safety initiative that reduced birth injuries had little net financial impact on the hospital.
- ZBI produced better clinical results at a lower cost, which represents potential savings for payers, but the hospital system offering increased quality reaped no clear financial rewards.
- Important future role for shared-savings collaborations (among patients, providers, government and third-party payers, and employers) to incentivize quality improvement.

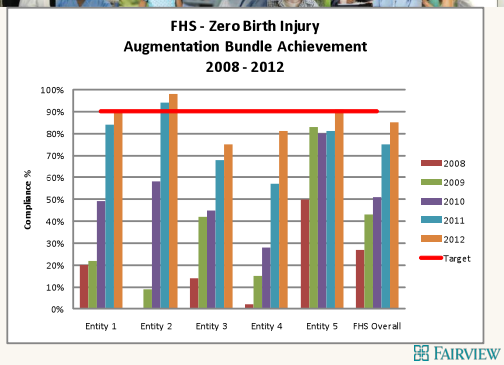
FAIRVIEW

ZBI Areas of Work . . .

- IHI Bundle Implementation
  - Induction Bundle
  - Augmentation Bundle
  - Vacuum Assisted Delivery Bundle
- Initial work revolves around First Stage of Labor
- Staff Education

- **Standardization of Practice**
  - OB Induction Plan
  - Induction and Augmentation of Labor orders and policies
  - Cervical ripening orders and policies
  - Intrapartum admissions orders
  - Management of Uterine Activity algorithm
  - Chorioamnionitis management orders
  - Diabetes order sets and outpatient guideline developed
- **Policies:**
  - Vacuum Extractor: assisted delivery
  - Neonatal Resuscitation Team at High Risk Delivery
  - Umbilical Cord Gas Assessment
  - Placental Pathology
  - Code Cesarean Section

FAIRVIEW



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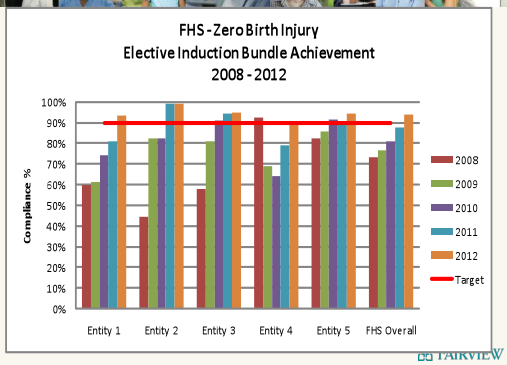

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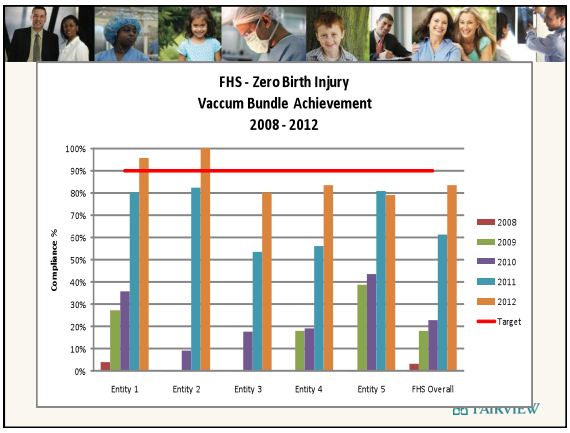

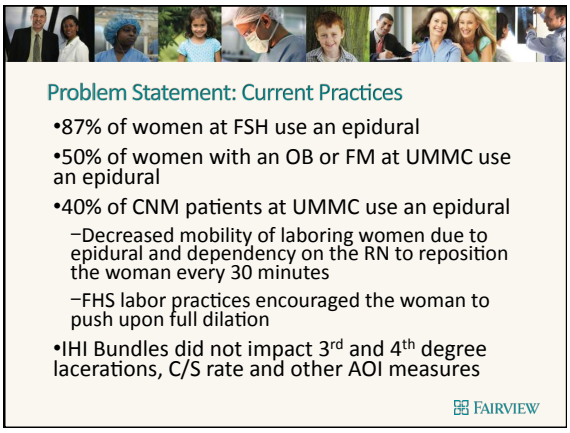

Problem Statement: Current Practices

- 87% of women at FSH use an epidural
- 50% of women with an OB or FM at UMMC use an epidural
- 40% of CNM patients at UMMC use an epidural
  - Decreased mobility of laboring women due to epidural and dependency on the RN to reposition the woman every 30 minutes
  - FHS labor practices encouraged the woman to push upon full dilation
- IHI Bundles did not impact 3rd and 4th degree lacerations, C/S rate and other AOI measures

FAIRVIEW

Problem Statement: Identified Second Stage of Labor as Critical Area to Address

- **Areas of concern:**
  - Third and Fourth Degree Laceration Rates
  - Vacuum Assisted Delivery Rate
  - Cesarean Section Rate
  - Adverse Outcome Index
  - All leading to neonatal and maternal morbidity

- **Second Stage of Labor** identified as a potential driver of adverse results
  - Points identified in second stage of labor where alternative strategies could have improved outcomes
  - Trend of Vacuum Assisted Deliveries for Maternal Exhaustion
  - Little standardization

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Current evidence suggests improved outcomes by delaying pushing in women who have epidurals until the urge to push is present

FAIRVIEW

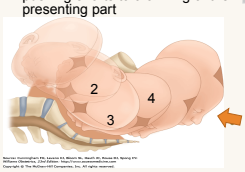
IHI May 2010 2nd Stage Labor "Deep Dive"

- Lack of standardization of management of the length of the second stage of labor
- Inconsistent use of operative vaginal delivery bundle
- Fetal heart rate patterns are managed differently in the second stage than in the first stage
- Inadequate fetal monitoring in second stage
- Failure to rescue in the second stage
- Lack of documentation in second stage

FAIRVIEW

Defining the Second Stage

- Two phases to the Second Stage:
  - Phase I: "the lull" or Latent phase: From complete dilatation until the urge to bear down
  - Phase II: Active phase or pushing phase: From the onset of active pushing efforts to crowning of the presenting part



Cardinal movements through the Curve of Carus (we will focus steps 2-4):

1. Head floating, before engagement
2. ***Engagement, descent, flexion***
3. ***Further descent, internal rotation***
4. ***Complete rotation, beginning extension***
5. Complete extension,
6. Restitution (external rotation)
7. Delivery of anterior shoulder
8. Delivery of posterior shoulder

Pushing too early without the urge to push, not only leads to exhaustion, but works against the natural curve of the maternal spine

FAIRVIEW

A Needs Assessment Survey Confirmed the Appetite for Change

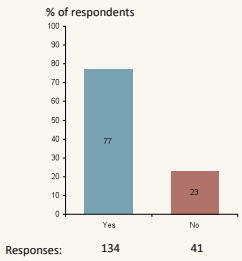
- Objectives to learn
  - Current practices
  - Providers' knowledge of laboring down
  - Nurses view of laboring down
  - Concerns about laboring down

- 69 providers and 111 nurses responses
- 61% had at least 11 years of experience
- 100% were aware of the **laboring down** concept
- 96% had used laboring down
- >80% were aware of research supporting laboring down
- **77% felt there is a need for an evidence based guideline to manage the second stage of labor**
- 65% stated they would use laboring down as a strategy more if there was a standardized guideline

FAIRVIEW

Needs Assessment-Survey Results

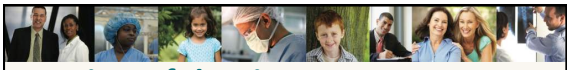
Results from Question 9:



Responses: 134 41

- Question 9: "Do you believe there is a need for an evidence based protocol to manage the second stage of labor at Fairview?"
- 77% felt there is a need for an evidence based guideline to manage the second stage of labor

FAIRVIEW



Review of the Literature

- Length of the Second Stage of Labor
  - Increased (Roberts and Hansen, Fraser, Lai)
- Active Pushing Time
  - Decreased (Roberts and Hansen, Fraser, Lai, Kelly)
- Fetal Effects
  - Apgar scores
    - Unchanged
  - FHR Decelerations
    - Decreased (Roberts and Hansen, Kelly)

FAIRVIEW

Review of the Literature

- **Maternal Effects**
  - Perineal Lacerations, Episiotomies
    - Decreased (Roberts and Hansen) Unchanged in others
  - Fatigue
    - Improved (Roberts and Hansen, Lai)
  - Operative Vaginal Delivery Rates
    - Improved (Fraser, Lai)
  - C/Section Rate
    - Unchanged
- No adverse outcomes related to delayed pushing

FAIRVIEW

Delayed Pushing

- Based on current evidence, a better approach is to delay pushing until the woman feels the urge to push (Simpson, 2006)
- WHY?
  - The duration of pushing is shorter (up to 51%) without extending the total time in second stage of labor
  - Maternal fatigue was decreased
  - Decrease in Vacuum Assisted Delivery and Cesarean Sections
  - Shortening the active pushing phase decreases fetal distress
- With the use of epidural anesthesia, pushing can be delayed up to 2 hours for nulliparous women, and 1 hour for a multiparous woman (Fraser et al., 2000; Hansen et al., 2002, Simpson & James, 2005).

FAIRVIEW

Literature Review – Best Practices (Roberts & Hansen)

- Best Practices in Second Stage of Labor Care: Maternal Bearing Down and Positioning- An analysis of current 2nd stage labor management articles (Roberts , J., Hansen, L., JNWH 2007)
  - Reviewed articles for sustained valsava versus spontaneous pushing efforts and the effect it has on the fetus, pelvic floor and other maternal effects.
  - Reviewed articles about immediate versus delayed pushing, exploring effects of laboring down, cost effectiveness of delayed pushing and fetal oxygenation with second stage.
  - Explored articles r/t duration of second stage and maternal positioning as well as outcomes such as 3rd and 4th degree lacerations, C/S rate

FAIRVIEW

Literature Review – Best Practices (Roberts & Hansen)

Outcomes:

- Laboring down results of 9 Randomized Control Trials showed overall increased length of second stage, but shorter pushing times
  - Fewer FHR decelerations
  - Improved perineal outcomes:
    - *Fewer 3rd and 4th degree lacerations and episiotomies*
  - Diminished fatigue scores
    - Less overall time spent actively pushing
    - No adverse outcomes even with prolonging the passive phase.
- Cost-effectiveness of delayed pushing showed that early and delayed pushing utilized resources in different ways but delayed pushing increased cost by $68 b/c of extended labor care.

FAIRVIEW

Literature Review – Best Practices (Roberts & Hansen)

Overall key points for the Management of the 2nd Stage:

- Bearing down should be delayed until the urge to push is felt, especially for women with an epidural
- Prolonging the early passive phase of second stage carries no risk to the mother and fetus
- Shortening the phase of active pushing and avoiding breath-holding to minimize hypoxic stress for the fetus and pelvic or perineal damage for the woman
- Bearing down for less than 6 seconds appears to be safe for the fetus
- Women should be discouraged from prolonged breath holding
- An environment where women feel free to choose positions that provide comfort might also facilitate labor progress

FAIRVIEW

Literature Review - Continuous Epidural Analgesia (Fraser, et al)

- Multicenter, randomized controlled trial of delayed pushing for nulliparous women in the second stage of labor with continuous epidural analgesia (Fraser, et al AJOG)
  - Delayed pushing group (n=936), randomly assigned
  - Early pushing group (n=926), randomly assigned
    - Average delayed pushing time 115 minutes
    - Longer 2nd stage overall 187 vs 123 (p<0.0001)
    - Shorter length of pushing 68 vs 110 (p<0.0001)

FAIRVIEW

Literature Review - Continuous Epidural Analgesia (Fraser, et al)

- Outcomes
  - "Difficult delivery" decreased from 22.5% vs 17.8% (RR 0.79, CI 0.66-0.95)
  - Midpelvic procedures (forceps, vacuum, manual rotation) decreased from 13.0% vs 9.3%. (RR 0.72, CI 0.55-0.93)
  - No change in low pelvic procedures
  - No change in C/S
  - Umbilical pH higher in delayed group.
  - No change in 3rd or 4th degree laceration rate

FAIRVIEW

Literature Review – Postpartum Fatigue & Birth Outcomes (Lai, et al)

- Effects of Delayed Pushing During the Second Stage on Postpartum Fatigue and Birth Outcomes in Nulliparous Women (Lai, et al JNR 2009)
  - Experimental group pushed with maternal urge, station at +1 and OA, and adequate contractions
  - Control group pushed at full dilation, OA, and adequate contractions
  - Outcomes:
    - Less fatigue at 1 and 24 hour postpartum
    - Shorter pushing time – 70 min versus 130 min
    - Higher SVD rate – 89% versus 69%
    - No change in Apgars, perineal tears, or neonatal outcomes, despite an overall increase duration of the second stage

FAIRVIEW

Literature Review – Delayed Pushing (Kelly, et al)

- Delayed Versus Immediate Pushing in Second Stage of labor (Kelly M, et al. MCN 2010)
- Delayed pushing of up to 90 minutes in nulliparous women with a continuous epidural resulted in:
  - A decrease in pushing time of 51%
  - No change in overall second stage time – 117 versus 87 minutes
  - No change in Apgar Score BUT fewer decelerations
  - No change in 3rd of 4th degree perineal lacerations

FAIRVIEW

Literature Review – Delayed Pushing (Hansen, et al)

- Active Pushing Versus Passive Fetal Descent in the Second Stage of Labor: A randomized Controlled Trial (Hansen, SL, et al. Obstet Gynecol 2002)
- A delay in pushing of up to 120 minutes in nulliparous and 60 minutes in multiparous patients resulted in:
  - Longer overall second stage
  - Decreased pushing time
  - Fewer fetal heart rate decelerations
  - Less maternal fatigue
  - No change in Apgar Score, lacerations, cesarean section or operative vaginal delivery
  - A second stage of up to 4.9 hours in the delayed pushing group resulted in no adverse perinatal outcome and significant benefit

FAIRVIEW

Duration of the Second Stage

"The second stage of labor does not need to be terminated for duration alone."*

-There is no arbitrary time limit for 2nd stage of labor if good progress is maintained and the mother's and baby's conditions are satisfactory

*Rouse, DW.,. Second-stage labor duration in nullipara women: relationship to maternal and perinatal outcomes. *Am J Obstet & Gynecol.* 2009; 357, e1-e7

FAIRVIEW

A Team Inspired by….

- the **IHI 'deep dive'**,
- 2nd stage survey results **supporting** a standardized guideline
- evidence in the literature,
- a **recognition** that the IHI bundles seem to reduce harm for some but not all AOI measures,
- a **desire** to further improve clinical outcomes,

the ZBI team developed a guideline for the management of the Second Stage of Labor

FAIRVIEW

Intervention: Development of a Guideline which included:

1. Both primigravida and multigravida women
2. Completely dilated cervix with an **epidural infusion**
3. Criteria of who should labor down and who should push
4. Repositioning every 30 minutes, both during the first stage of labor and in the guideline
5. Consistent examiner, who is proficient in station and position assessment
6. Normal FHR required for any delayed pushing strategy
7. Provider to be notified every hour and PRN

FAIRVIEW

FAIRVIEW FAIRVIEW HEALTH SERVICES

GUIDELINE FOR THE MANAGEMENT OF THE SECOND STAGE OF LABOR– PRIMIGRAVIDA OR MULTIGRAVIDA WITH EPIDURAL

Use ONLY when maternal and fetal status is NORMAL

1st Hour – BEGINS WHEN WOMAN IS FULLY DILATED

START Pushing ONLY IF Pushing Criteria Met

DELAY Pushing – ONLY IF (check all that apply)

2nd Hour Begins @ _____ ASSESS PROGRESS

3rd Hour Begins @ _____ PROVIDER– NOTIFIED TO ASSESS

4th Hour Begins @ _____ PROVIDER NOTIFIED TO ASSESS – ALL SHOULD BE PUSHING

AT END OF HOUR 4

SECOND STAGE SHOULD ONLY CONTINUE BEYOND 4 HOURS IF VAGINAL BIRTH IMMINENT and FHR is normal

GUIDELINE FOR THE MANAGEMENT OF THE SECOND STAGE OF LABOR– PRIMIGRAVIDA OR MULTIGRAVIDA WITH EPIDURAL

FAIRVIEW

Process of Education

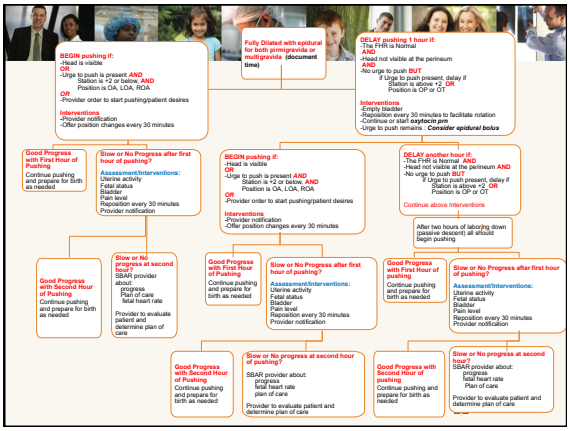
- Education tool developed for nurses
- Lead physicians visited with local clinic to educate physician groups on guidelines and potential benefits to patients
- Reminders on Labor and Delivery from observing leaders about appropriate use of guidelines

FAIRVIEW

Guideline algorithm

- The 2nd stage of labor management guideline algorithm establishes two separate pathways
  - Immediate Pushing:
    - Head is visible
    - Urge to push is present AND station is + 2 or below AND position is OA , LOA, ROA
    - Provider desires
  - Delayed Pushing
    - Those who don't meet the above criteria (OP)

FAIRVIEW



Obstacles in Implementation

- Physician resistance to guideline usage
- Disbelief in benefits of delayed pushing
- Rotation of patient on a consistent basis
- Nurses not taking initiative to place patient into guideline
- Pushing techniques (breath holding vs open glottis)

FAIRVIEW

Pushing Techniques

- **Currently AWHONN and ACNM encourages the use of physiologic bearing down versus sustained breath holding during expulsive efforts.**
  - **"**Physiologic bearing down (several short pushes without breath holding), while resulting in a slightly longer second stage, may result in improved maternal/fetal gas exchange and maternal satisfaction with her birth experience". (Varney, 2004)

FAIRVIEW

The impact of maternal pushing and breathing techniques on fetal oxygenation

- The phase of active pushing is usually accompanied by a decline in fetal pH. By allowing an early phase of rest and fetal descent and delaying pushing until the woman has an urge to push only when obstetric conditions are optimal, the decline in fetal pH will be decreased (Roberts, 2003).
- Traditionally a woman is encouraged to take one or two cleansing breaths at the start of the contraction and while the contraction is building. Then she is to take a deep breath and hold while she pushes for as long as she can. Two or three good pushes are usual during a contraction

FAIRVIEW

Physiology of pushing efforts on cardiac output and fetal oxygenation

Current issues in our labor and delivery practice

- Sustained breath holding combined with prolonged bearing down may produce fetal hypoxia and acidosis due to mother's closed glottis and increased thoracic pressure.
- This combination results in a drop in arterial pressure caused by decreased cardiac output due to diminished fetal return to the heart.

FAIRVIEW

Physiology of pushing efforts on cardiac output and fetal oxygenation

- Decreased arterial pressure has 2 effects:
  - 1. decreases blood flow to the placenta
  - 2. decreases oxygen content in the blood which circulates to the placenta
- Fetal hypoxia may be prevented if the woman is given different pushing and breathing instructions. (Varney, 2004)

FAIRVIEW

A better approach for maternal breathing efforts during pushing phase of labor

ACNM and AWHONN: Open-glottis pushing-

- The woman should be told to push simultaneously with a forced exhalation for short periods of time, usually over 5-6 seconds
- Often accompanied by a grunt
- The glottis is at least partially opened, abdominal muscles are shortened and contracted against the uterus and intrathoracic pressure does not increase to interfere with venous return

FAIRVIEW

Descriptive Data – Consistent Across Hospitals

Table 1 - Descriptive Data for Community Hospital and Academic Health Center

	Community Hospital			Academic Health Center		
	Retrospective Group	Post Guideline	p-value[1]	Retrospective Group	Post Guideline	p-value[1]
Descriptive Data	N=403	N = 429		N = 208	N = 229	
Maternal Age mean(SD)	30.3 (5.0)	31.1 (4.7)	0.02	28.5 (6.1)	28.5 (5.6)	0.94
Gestational Age mean(SD)	39.2 (1.2)	39.0 (1.5)	0.04	38.9 (2.9)	39.7 (3.8)	0.01
Induced- Yes	167 (41%)	151 (35%)	0.07	74 (36%)	77 (34%)	0.63
Pitocin Use	337 (84%)	363 (85%)	0.64	142 (70%)	157 (69%)	0.95
Birthweight	3416.6 (441.8)	3392.8 (477.8)	0.46	3280.3 (686.8)	3389.5 (439.4)	0.053
Nulliparous	215 (53%)	128/254 (50%)	0.46	124 (61%)	113 (49%)	0.03

[1] Independent t-test was used for the comparison of means (SD); for the comparison of proportions, chi-square was used.

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Maternal and Fetal Outcomes

Table 2 - Maternal and Fetal Outcomes, Community Hospital vs. Academic Health Center

	Community Hospital			Academic Health Center		
	Retrospective Group	Post Guideline	p-value[1]	Retrospective Group	Post Guideline	p-value[2]
Descriptive Data	N=403	N = 429		N = 208	N = 229	
APGAR at 5 minute	9 (7-10)	9 (6-10)	0.81	9 (0-10)	9 (5-9)	0.06
Length of 2nd Stage	40 (1-289)	47 (1-360)	0.052	43 (0 – 445)	52 (2 – 659)	0.16
Active Pushing	39 (1-265)	31 (0-218)	<.001	33 (0 – 275)	34 (1 – 405)	0.32
Delayed Pushing	18 (5%)	219 (51%)	<.001	44 (24%)	145 (63%)	<0.001
Vacuum Assisted Deliveries	83 (20.6%)	49 (11%)	<.001	3 (1%)	9 (4%)	0.32
Episiotomy	107 (26.6%)	107 (25%)	0.6	7 (3%)	6 (3%)	0.85
3rd Degree Lacerations	27 (6.7%)	23 (5%)	0.42	5 (2%)	6 (3%)	~1
4th Degree Lacerations	6 (1.5%)	2 (.5%)	0.13	2 (1%)	1 (0.5%)	0.61
Cesarean Section	15 (4%)	16 (4%)	0.99	1(1%)	8 (3.5%)	0.17

[1] Mann-Whitney test was used for the comparison of medians (ranges) and for the comparison of proportions, chi-square and Fisher's exact test were used.

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Results: Impact of Vacuum Use on Other Outcomes

Table 3: Path Model Showing a Regression Analysis

	Vacuum	p-value	Episiotomy	p-value	3rd degree lacerations	p-value
Guideline documented[1] (mean, range)	.44 (.24,.78)	0.006	1.1 (.71, 1.7)	0.64	.74 (.31, 1.8)	0.5
Guideline not documented[1] (mean, range)	.72 (.40,1.3)	0.3	.76 (.45, 1.3)	0.31	1.5 (.60, 3.6)	0.4
Nulliparous[2] (mean, range)	2.5 (1.6, 3.9)	<.001	2.5 (1.7,3.7)	<.001	5.4 (2.1,14.3)	0.001
Vacuum (mean, range)			1.7 (1.1, 2.7)	0.01	1.5 (.73, 3.2)	0.3
Episiotomy (mean, range)					5.6 (2.8, 11.1)	<.001

Half as likely to have vacuum

Women with vacuum 1.7 times as likely to have episiotomy

If episiotomy, almost 6 times as likely to have 3d degree laceration

[1]Reference group is prior to guideline. OR (95%CI)
[2]Reference is multiparous

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Regression Analysis Conducted to Explore Vacuum Use on Other Outcomes

- Hypothesis: the guideline may influences the number of episiotomies and 3rd degree lacerations
- Regression results (Controlling for parity)
  - If the guideline was used, a woman was half (.44) as likely to have a vacuum assisted birth.
  - If a vacuum assisted birth occurred, a woman was almost twice (1.7) as likely to have an episiotomy.
  - If a woman had an episiotomy, she is 5.6 times more likely to experience a 3rd degree laceration.

Guideline Group → Vacuum → Episiotomy → 3rd Degree Lacerations

Nulliparous → Vacuum

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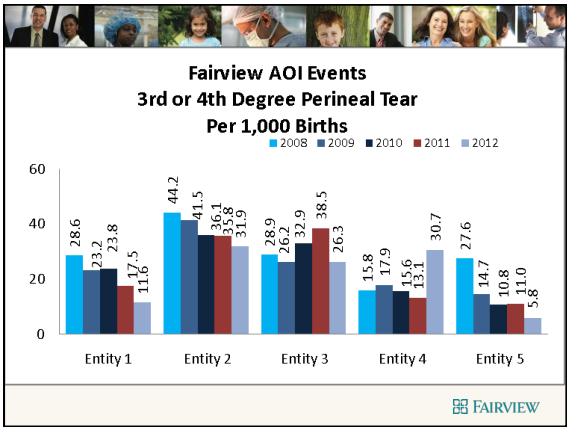

Vacuum rates: Nulliparous women Community hospital

- Overall, a vacuum was used on 80/334 (24%) of nulliparous births, and 33/314 (11%) of multiparous births
- For the **nulliparous:**
  - Retrospective group: 56/208 (27%)
  - Guideline used: 13/76 (17%)
  - Guideline not used: 11/50(22%)

***Nulliparous guideline group had 17% vacuum assisted births compared to the retrospective group (27%)

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Vacuum rates: Multiparous women Community hospital

- For the **multiparous**:
  - Retrospective group: 27/149(14%)
  - Guideline used: 2/64 (3%)
  - Guideline not used: 6/62(10%)
- Multiparous vacuum assisted births occurred in only 3% of guideline births, compared to 14% in retrospective group
- ***Both parity groups have a significant decrease in the guideline group. A drop of 7% for the nulliparous and 8% in the multiparous

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Recap: Benefits to Delayed Pushing – Community hospital

- Decreased vacuum use
  - And related reduction through the regression analysis
    - 3rd/4th degree lacerations
    - Episiotomies
- Decreased pushing time
- No change in length of second stage
- Potential for (not measured)
  - Reduced maternal fatigue
  - Increased patient satisfaction
  - Reduced nursing fatigue and injuries

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Recap: Benefits to Delayed Pushing – Academic

- No difference in active pushing time between pre and post guideline implementation
- Decrease in 3rd and 4th degree lacerations
- No change in length of 2nd stage of labor
- No change in apgars
- No change in C/S rates

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