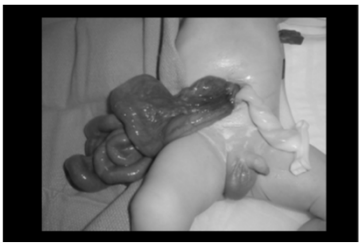
Less is More: Experience from the UCFC Gastroschisis Quality Improvement Initiative



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Disclosure

I have no relevant financial relationships with the manufacturer(s) or any commercial product(s) and/or provider of commercial products or services discussed in this CME activity.

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Outline

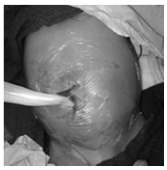
1. Gastroschisis - Background
2. UCLA – Change is Challenging
3. UCFC – Evidence to Support Change
4. UCFC Gastroschisis “Less is More” Clinical Pathway – Changing Practice through a Quality Improvement Initiative

Audience Questions

1. How many are familiar with gastroschisis?
2. How many at your institution routinely use:

Silos?

Bedside skin closure?



Gastroschisis - Epidemiology

Increasing prevalence in the US:
2.3->4.4 per 10,000 births (1995->2005)

Length of Stay (Uncomplicated): 1 month
Treatment Costs: $200,000

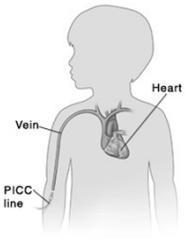
Congenital Abdominal Wall Defects: Gastroschisis versus Omphalocele

Gastroschisis versus Omphalocele

	Gastroschisis	Omphalocele
Covering	No	Yes
Location	Right of Midline	Midline
Etiology	Umbilical Vein Involution	Failure of Midgut Return
Incidence	4:10,000	1:3,000-10,000
Associations	Younger Mothers Low Birth Weight	Genetic Abnormalities Pentology of Cantrell; B-W
Mortality	<5%	<34%
Bowel Motility	Poor	OK
Malrotation	Yes	Yes
Intestinal Atresia	10%-23%	No
C-Section	No	? Severe Cases

Gastroschisis Matted Bowel

Nutrition



UCLA Experience

Frequent Cesarean-section.
Routine intubation/paralysis/narcotics.
Routine silo with delayed closure.
Prolonged antibiotics.
Discharge on methadone not uncommon.

Change is Challenging

Minimize Paralysis -> Decrease Ventilator Days
Minimize Antibiotics -> Decrease Antibiotic-Resistance
Initiate Feeding Protocol -> Reduce TPN/CVC Days
Avoid Operating Room -> Bedside Skin Closure!

University of California Fetal Consortium

5 University of California Campuses
- Davis
- Irvine
- Los Angeles
- San Diego
- San Francisco

3 Disciplines
- Maternal Fetal Medicine
- Neonatology (Pediatric Specialties)
- Pediatric Surgery

UCFC 2007-2012 (n=191) Gastroschisis - Adverse Outcomes

University of California Fetal Consortium

Neonates with adverse outcome	14% (n=27)
Specific adverse outcomes:	
Atresia/Stricture	10% (n=19)
Insertion of G-tube	7% (n=13)
Intestinal Ischemia Before Closure	1% (n=2)
Necrotizing Enterocolitis	1% (n=2)
Death	1.6% (n=3)

Overcash RT, DeUgarte DA, et al for the University of California Fetal Consortium. Factors Associated with Gastroschisis Outcomes. *Obstetrics & Gynecology* 2014 (124): 551-7.

Changing Practice

1. Literature Review (Evidence-Based Practice)
2. Retrospective Review
3. Study Other Institution's Practices
4. Consensus - Best Practices
5. Initiate Quality Improvement Project
6. Prospective Evaluation

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UCFC 2007-2012 Uncomplicated Gastroschisis Practice Patterns and Outcomes

University of California Fetal Consortium

Table 1. Baseline cohort characteristics

	All sites n=168	Site 1 n=42	Site 2 n=13	Site 3 n=29	Site 4 n=36	Site 5 n=48	p value*
Maternal smoking/drug use**	15% (26)	24% (10)	0% (0)	21% (6)	19% (7)	6% (3)	0.05
Gestational age (weeks)	36.5 ± 1.7	36.0 ± 1.4	36.8 ± 1.8	37.3 ± 1.6	36.8 ± 1.7	36.2 ± 1.7	0.67
Birth weight (kilograms)	2.5 ± 0.5	2.5 ± 0.4	2.6 ± 0.4	2.6 ± 0.5	2.4 ± 0.5	2.5 ±0.5	0.67
Male sex	55% (92)	50% (21)	62% (8)	59% (17)	50% (18)	58% (28)	0.85
Other major congenital anomalies	7% (11)	5% (2)	8% (1)	0% (0)	11% (4)	8% (4)	0.38

Lusk LA, Brown EG, Overcash RT, Grogan TR, Keller RL, Kim JH, Poulain FR, Shew SB, Uy C, DeUgarte DA. Multi-institutional practice patterns and outcomes in uncomplicated gastroschisis: a report from the University of California Fetal Consortium (UCfC). *Journal of Pediatric Surgery* 2014 12:1782-6.

Practice Patterns & Outcomes

Table 2. Practices and outcomes by site (univariate analysis)

	All sites % (n) N=168	Site 1 % (n) N=42	Site 2 % (n) N=13	Site3 % (n) N=29	Site 4 % (n) N=36	Site 5 % (n) N=48	p value*
Survey Results							
Routing silo placement	-	No	Yes	Yes	No	Yes	-
Antibiotic prophylaxis following silo reduction **	-	4-7 d	7-14 d	≤3 d	7-14 d	≤3 d	-
Routine intubation prior to silo placement	-	No	Yes	Yes	Yes	No	-
Routine paralysis during silo reduction	-	No	No	Yes	No	No	-
Opiate use with silo		4-7 d	7-14 d	≥14 d	≥14 d	≤3 d	
Opiate use with primary closure		4-7 d	4-7 d	7-14 d	≥14 d	≤3 d	
Characteristics							
Silo (yes/no)	58% (98)	17% (7)	77% (10)	93% (27)	39% (14)	83% (40)	**<0.001**
Number of silo days***	4.9 ± 3	6.3 ± 1.3	4.7 ± 2.7	6.3 ± 3.1	5.9 ± 1.6	3.5 ± 2.9	**<0.001**
Silo ≥5 days ****	36% (60)	17% (7)	46% (6)	72% (21)	33% (12)	29% (14)	**<0.001**
Antibiotic days	11 ± 7	10 ± 8	12 ± 8	15 ± 9	12 ± 8	10 ± 5	**0.04**
Central line days	26 ± 15	26 ± 16	26 ± 18	34 ± 18	26 ± 11	20 ± 10	**<0.001**
Outcomes							
Length of stay (days)	35 ± 21	33 ± 20	36 ± 30	43 ± 36	38 ± 10	31 ± 13	**<0.001**
Ventilator days	6.7 ± 6.2	4.2 ± 3.8	5.5 ±2.9	12.1 ± 9.4	5.4 ± 3.4	6.8 ± 6.1	**<0.001**
Age at full feeds (days)	29 ± 19	30 ± 15	28 ± 19	39 ± 37	26 ± 10	26 ± 9	**<0.001**
Cholestasis	21% (35)	12% (5)	31% (4)	17% (5)	33% (12)	19% (9)	0.16
Bacteremia	12% (20)	17% (7)	8% (1)	17% (5)	14% (5)	4% (2)	0.25
Gastrostomy tube	2% (3)	2% (1)	8% (1)	3% (1)	0% (0)	0% (0)	0.15

Variations in:
- Routine silo placement
- Routine intubation
- Use of paralysis
- Days of antibiotics for prophylaxis
- Opiates

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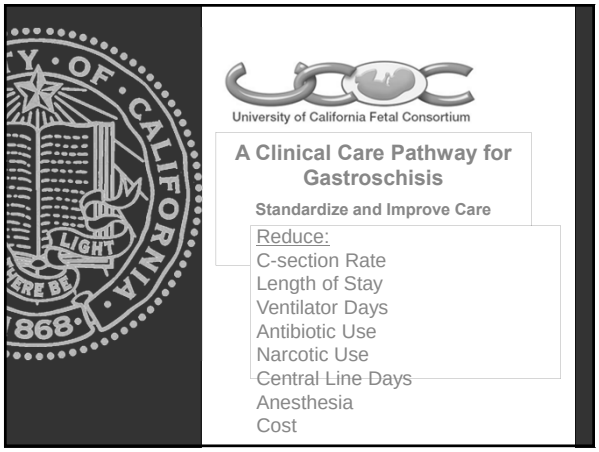


Less is More

Term Delivery > Preterm Delivery
Vaginal Delivery > C-section
Reduce Ventilator Days > Routine Intubation/Paralysis
Earlier Closure > Late Closure of Defect
Non-Operative Closure > Operative Closure
Minimize Antibiotics > Prolonged Antibiotics
Judicious Opiate Use > Excessive Opiates
Early Removal of Central Lines > Late Removal

Maternal Fetal Medicine/Obstetrics Clinical Pathway Guidelines

- Do not recommend routine preterm delivery or induction (<37 weeks).
- Recommend vaginal delivery with Cesarean section only for obstetrical indications.

Pediatric Surgery Clinical Pathway Guidelines

- *Primary closure or routine silo placement are acceptable.*
- *Operative and bedside abdominal closure are acceptable.*
- *Silo-assisted immediate closure and suture-less closure are acceptable.*
- If silo is utilized, expeditious closure within 3 days is recommended when clinically feasible.
- Gastric and rectal decompression are recommended as strategies to facilitate reduction.
- Routine intubation and paralysis are not recommended for silo placement or reduction.

Neonatology Clinical Pathway Guidelines

- Routine intubation and paralysis are not recommended for bedside silo placement or reduction.
- Recommend discontinuation of antibiotics ≤ 48 hours after abdominal closure in the absence of culture-positive sepsis or clinical instability.
- The recommended prophylactic antibiotics for reduction and closure are ampicillin/gentamicin.
- Recommend discontinuation of narcotics ≤ 48 hours after abdominal closure.
- Recommend the use of non-narcotic medications (e.g. acetaminophen).

Neonatology
Clinical Pathway Guidelines

- Recommend early initiation of feedings (≤ 20cc/kg/day) ≤ 48 hours after gastric output becomes non-bilious.
- Recommend advancing feeds ≥20cc/kg/day as tolerated.
- Recommend utilization of maternal breast milk for feeds if available (avoid pedialyte).
- Recommend oral feeds.

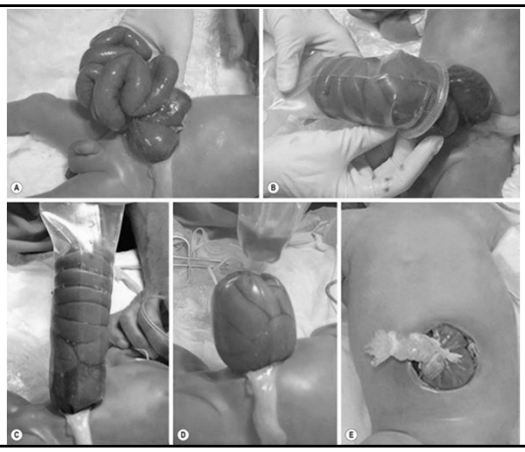
Neonatology
Clinical Pathway Guidelines

- Recommend peripherally-inserted (PICC) over centrally-inserted venous catheters (e.g., Broviac) for nutritional support.
- Recommend removal of central venous catheters when 100kcal/kg/day of enteral feeds (or ad lib oral feeds) are tolerated.

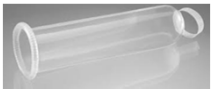
Treatment
1. Position and Cover

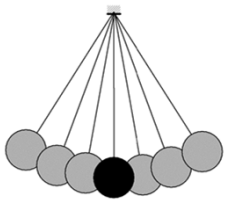
Treatment
2. Neonatal Preparation

Treatment
3. Decompression



Treatment
Historical Reference





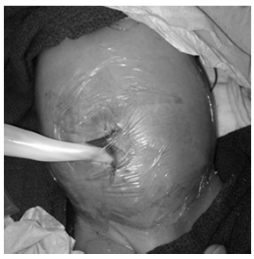
Primary Repair vs. Routine Silo

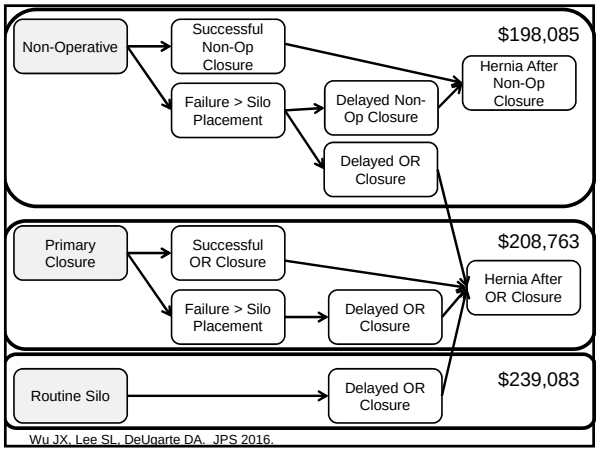
Treatment
Non-Operative Skin Closure

PRESERVE UMBILICUS!

"Umbilical Flap" "Ward" "Plastic" "Sutureless"

↓General Anesthesia, ↓Abdominal Pressure, ↓Pain, ↑Cosmesis





Wu JX, Lee SL, DeUgarte DA. JPS 2016.

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Preliminary Results (10/2016)

Adoption (All 5 UC Sites): Early 2015 -> Mid-2016.

Data to Fall of 2016 (n=40)

Goals:
1) Reduce % inborn C-section: 34% -> 25% (34%)
2) Uncomplicated cases:
Reduce mean length of stay: 35±21 -> 30 (35 days)
Reduce mean ventilator days: 6.7±6.2 -> 5 (2.7)

Summary

1. Gastroschisis –> Exemplifies Multi-Disciplinary Care
2. UCLA –> Change is Challenging
3. UCFC –> Buy-In with Evidence, Consensus, and Competition
4. UCFC Gastroschisis "Less is More" Clinical Pathway -> Less Invasive Protocols May Have Lower Costs and Equivalent/Better Outcomes!