WHAT’S THE OPTIMAL USE OF EPIDURAL DURING LABOUR?

Giselle Villar, MD, FRCPC
BCWH Vancouver
OPTIMAL LABOUR ANALGESIA

- Allows for maternal control/input
- Minimizes effects on normal labour physiology:
  - Labour progress and delivery
  - Mobility
  - Bladder functionality
  - Gravity-assisted delivery position
- Minimal risk of significant harm to mother/baby
- Consistent pain relief, long duration, minimizing need for top-ups.
HOW TO ACHIEVE IT?

• Patient-controlled options: PCEA, CSE + PCEA
• Use drugs that have minimal effect on fetus/neonate
• Minimize effects on labour progress: dilute solutions/CSE
• Minimize effects on need for intervention: avoid motor block
• Allow for mobility
WHAT ARE THE INDICATIONS FOR LABOUR EPIDURAL?

• PAIN !!

“In the absence of maternal contraindication, maternal request is a sufficient medical indication for pain relief during labour “

OTHER INDICATIONS:

• Epidural may facilitate an atraumatic breech delivery vaginal delivery of twins vaginal preterm delivery
• Facilitates BP control in preeclamptic women
• Blunts the hemodynamic effects of uterine contractions and pain response in patients at risk:
  Mitral stenosis
  Spinal cord injuries
  Aneurysms
  Severe asthma
• Difficult airway
CONTRAINDICATIONS:

- Patient refusal or ability to cooperate
- Increased intracranial pressure (mass lesion)
- Skin or soft tissue infection at the site of needle placement
- Frank coagulopathy
- Hemodynamic instability
ADVERSE EFFECTS

Systematic Review of Serious Adverse Events

1.37 million women receiving EA during labour

• Epidural hematoma 1/168,000
• Epidural abscess 1/145,000
• Persistent Neurological Damage 1/240,000
• Transient Neurological Injury 1/6,700
• Hemodynamic instability

OTHER ADVERSE EFFECTS

• Hypotension up to 80%
• Inadvertent dural puncture 1%. If it happens, headache in 70%
• Urinary retention (heavy blocks)
• High spinal
• Intravascular LA injection
• Back pain (long term not related to epidural)
EFFECTS ON THE PROGRESS OF LABOUR:

Controversial: Is there a cause-and-effect relationship between neuraxial techniques and prolonged labour or operative delivery?
DIFFICULTY PERFORMING RCT’S:

- No analgesia would be not ethical
- High crossover rates
- Patients with high risk for operative delivery are excluded from non-epidural group, patients with low risk are excluded from epidural group: difficult to compare women at equal risk
- Lack of external validity (women who consent are inherently different)
- Not double-blinded: potential for bias by parturient, nurses, anesthesia, OB provider
GREATER PAIN INTENSITY DURING LABOUR IS A RISK FACTOR FOR OPERATIVE DELIVERY?

• Women at higher risk for prolonged labour or operative delivery are more likely to request an epidural.
• Higher levels of pain during the latent phase were predictive of longer latent and active labour.


• Parenteral opioids
  - Meperidine $\geq$ 50mg/h : 14% C/S
  - Meperidine < 50 mg/h : 1.4 % C/S

  *Alexander et al. Anesth Analg 2001; 92:1524-8*
The rate of C/S was more than twice as high in women who required 3 or more supplemental boluses then women who required 2 or fewer boluses.

*Hess et al. Anesth Analg 2000; 90:881-6*
## EFFECT ON C-SECTION RATE

<table>
<thead>
<tr>
<th></th>
<th>Epidural Analgesia</th>
<th>Systemic opioid analgesia</th>
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<tbody>
<tr>
<td>Actual treatment</td>
<td>9.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Intent-to-treat</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Intent-to-treat using PCIA</td>
<td>4</td>
<td>5</td>
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</table>

Cesarean Delivery Rate %

Parkland Hospital RCT’s

*Sharma et al. Anesthesiology* 1997;87:487-94
## Review: Epidural vs Opioid Analgesia for Labor

**Comparison:** Mode of Delivery  
**Outcome:** Cesarean Delivery Rate

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Epidural (n/N)</th>
<th>Opioid (n/N)</th>
<th>OR (random), 95% CI</th>
<th>OR (random), 95% CI</th>
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<tbody>
<tr>
<td><strong>Normotensive patients</strong></td>
<td></td>
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<tr>
<td>Robinson</td>
<td>0/17</td>
<td>0/18</td>
<td>Not estimable</td>
<td>Not estimable</td>
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<tr>
<td>Nikkola</td>
<td>0/28</td>
<td>0/30</td>
<td>Not estimable</td>
<td>Not estimable</td>
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<tr>
<td>Clark</td>
<td>15/156</td>
<td>22/162</td>
<td>0.68 (0.34, 1.36)</td>
<td></td>
</tr>
<tr>
<td>Sharma</td>
<td>13/358</td>
<td>16/357</td>
<td>0.80 (0.38, 1.70)</td>
<td></td>
</tr>
<tr>
<td>Sharma</td>
<td>16/226</td>
<td>20/233</td>
<td>0.81 (0.41, 1.61)</td>
<td></td>
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<tr>
<td>Howell</td>
<td>13/175</td>
<td>16/178</td>
<td>0.81 (0.38, 1.74)</td>
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<tr>
<td>Loughnan</td>
<td>36/304</td>
<td>40/310</td>
<td>0.91 (0.56, 1.47)</td>
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<tr>
<td>Halpern</td>
<td>12/124</td>
<td>12/118</td>
<td>0.95 (0.41, 2.20)</td>
<td></td>
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<tr>
<td>Ramin</td>
<td>43/664</td>
<td>37/666</td>
<td>1.18 (0.75, 1.85)</td>
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<tr>
<td>Muir</td>
<td>3/28</td>
<td>2/22</td>
<td>1.20 (0.18, 7.89)</td>
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<tr>
<td>Jain</td>
<td>7/43</td>
<td>11/83</td>
<td>1.27 (0.46, 3.56)</td>
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<tr>
<td>Philipsen</td>
<td>10/57</td>
<td>6/54</td>
<td>1.70 (0.57, 5.06)</td>
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<tr>
<td>Bofill</td>
<td>5/49</td>
<td>3/51</td>
<td>1.82 (0.41, 8.06)</td>
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<tr>
<td>Thorp</td>
<td>12/48</td>
<td>1/45</td>
<td>14.67 (1.82, 118.22)</td>
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<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>2287</td>
<td>2337</td>
<td></td>
<td></td>
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<tr>
<td>Total events: 185 (Epidural), 186 (Opioid)</td>
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Test for heterogeneity: $\chi^2 = 11.09$, df = 11 (P = 0.44), $I^2 = 0.8%$

Test for overall effect: $Z = 0.04$ (P = 0.97)

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Epidural (n/N)</th>
<th>Opioid (n/N)</th>
<th>OR (random), 95% CI</th>
<th>OR (random), 95% CI</th>
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<td><strong>Hypertensive Patients</strong></td>
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<td>Lucas</td>
<td>63/372</td>
<td>62/366</td>
<td>1.00 (0.68, 1.47)</td>
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<tr>
<td>Head</td>
<td>10/56</td>
<td>7/60</td>
<td>1.65 (0.58, 4.67)</td>
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<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>428</td>
<td>426</td>
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<tr>
<td>Total events: 73 (Epidural), 69 (Opioid)</td>
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</tbody>
</table>

Test for heterogeneity: $\chi^2 = 0.77$, df = 1 (P = 0.38), $I^2 = 0%$

Test for overall effect: $Z = 0.32$ (P = 0.75)

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Epidural (n/N)</th>
<th>Opioid (n/N)</th>
<th>OR (random), 95% CI</th>
<th>OR (random), 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CSE vs Opioid</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Gambling</td>
<td>39/616</td>
<td>34/607</td>
<td>1.14 (0.71, 1.83)</td>
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</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>616</td>
<td>607</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total events: 39 (Epidural), 34 (Opioid)</td>
<td></td>
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</tbody>
</table>

Test for heterogeneity: not applicable

Test for overall effect: $Z = 0.54$ (P = 0.59)

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Epidural (n/N)</th>
<th>Opioid (n/N)</th>
<th>OR (random), 95% CI</th>
<th>OR (random), 95% CI</th>
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<tbody>
<tr>
<td></td>
<td>3331</td>
<td>3370</td>
<td></td>
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<tr>
<td>Total events: 297 (Epidural), 289 (Opioid)</td>
<td></td>
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</tbody>
</table>

Test for heterogeneity: $\chi^2 = 12.12$, df = 14 (P = 0.60), $I^2 = 0%$

Test for overall effect: $Z = 0.32$ (P = 0.75)

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AN IMPACT STUDY

Epidural analgesia and C/S rate at Tripler Army Hospital (1992-1996)

1987: 10% epidural rate, 4% C/S
1992: 45% epidural rate, 5% C/S
1994: 57% epidural rate, 4% C/S

RATE OF INSTRUMENTAL VAGINAL DELIVERY

- Systematic reviews concluded that epidural analgesia is associated with higher risk of instrumental vaginal delivery
- Impact studies showed no difference
- Higher dose epidural analgesia, with more dense motor block, were associated with higher rate of instrumental vaginal delivery

Chestnut et al. Obst Gynecol 1987; 69:323-7

- “Effective” second-stage analgesia increases the risk of instrumental vaginal delivery

Chestnut DH. Anesthesiology 1991; 74:805-8
EPIDURAL AND MALROTATION

• Motor blockade may increase the incidence of malrotation of the fetal vertex


• Possible higher incidence of OP position at delivery
  Using ultrasound, prospective cohort study
  13% in EA group X 3%

FIRST STAGE:

Controversial results:

• Meta-analysis of 9 studies
  No difference (mixed parity, different definitions of 1st st)
  *Halpern et al. Evidence-based Ob Anesthesia, 2005.*

• Parkland Hospital meta-analysis
  0.5 hour longer, nulliparous women
  *Sharma et al. Anesthesiology 2004; 100:142-8*

• Shorter
  RCT’s, comparing EA to systemic opioids, early neuraxial analgesia, secondary outcome (90 min).
  *Ohel et al. Am J Obst Gynec 2006; 194:600-5*
SECOND STAGE

Prolonged in women who received EA
Mean duration: 15 min

*Halpern et al. Evidence-based Ob Anesthesia, 2005.*
*Sharma et al. Anesthesiology 2004; 100:142-8*

ACOG recommendation:

“if progress is being made, duration of second stage alone does not mandate intervention”
AREAS OF UNCERTAINTY

• Maternal Fever:
  EA associated with maternal fever
  Mechanism is unknown
  No increase in neonatal sepsis
  Increased neonatal evaluations for sepsis
  No association of EA and cerebral palsy
  
  Segal S. Anesth Analg 2010; 111:467-75

• Breastfeeding
  Medical and social variables
  Conflictive retrospective studies
  High doses of fentanyl may interfere with early success
  
OXYTOCIN AUGMENTATION
CONTROVERSIAL RESULTS

• Higher rate of oxytocin augmentation with epidural

• Higher rate of C/S with EA and low-dose-oxytocin
  Kotaska et al. Am J Obst Gynecol 2006; 194:809-14

• No difference in oxytocin augmentation

• Lower oxytocin utilization rates with earlier CSE group, comparing with systemic opioid group
PCEA:

(patient-controlled epidural analgesia)

• Greater patient satisfaction

• Minimize interventions by anesthesiologist

• Minimize requirement for a local anesthetic

• Minimize motor block

PCEA - ADVANTAGES

Meta-analysis of PCEA vs CEI

640 pts total
Fewer anesthetic interventions RD 27%
Less total drug consumption WMD 3.92
Less motor block RD 18%

PCEA – WHY NOT TO USE IT?

Survey of Californian anesthesiologists IJOA 2006:

Only 25% of 133 hospitals (= 58% response rate) using PCEA despite epidural rate of 65% overall.
Larger hospitals more likely to use PCEA.

Reasons to not use:
- Cost
- Safety
- Inconvenience of change
- Clinician preference for alternative methods
CSE :
(COMBINED SPINAL-EPIDURAL)

- Good sacral neuroblockade (late active stage)
- If initiated early in labour, option for only opioid (less hypotension, less motor block)
- Faster onset
- Higher incidence of fetal bradycardia with intrathecal opioids, no increase in C/S rate

MOBILE LABOUR EPIDURAL ANALGESIA

Ambulation per se has no benefit on labour outcome

• 160 nullips, average post-epidural labour duration = 240 min
  Walked on average for only 25 min, sat for 40 min

• 61 pts, stood/ambulated for 30% of 1st stage

• Traditional vs low-dose mobile epidurals
  1054 women, 3 groups (std, CSE, low-dose epid)
  Only 37% of women in mobile groups stood or walked in 1st stage, 11% 2nd stage
  COMET Lancet 2001, Anaesthesia 2009
WHAT DOES MOBILE LABOUR EPIDURAL ANALGESIA MEAN?

- Not confined to bedrest after first 30 minutes
- Walk in labour room
- Go to the bathroom
- Sit in the easy chair
- Deliver in a position “anything but lithotomy” (ABL)
OBSTETRICAL BENEFITS

- Flexible labour and delivery positions
  Trend to fewer C/S and forceps/vacuum with upright delivery position


- Shorter 1\textsuperscript{st} stage

  Cochrane 2009 Lawrence

- Shortened 2\textsuperscript{nd} stage by \sim 5\ min

  COMET, Cochrane 2009 Gupta

- Reduced use of vacuum/forceps

  COMET 2001, Cochrane 2009 Gupta
COCHRANE 2009: 1\textsuperscript{ST} STAGE DURATION UPRIGHT VS RECUMBENT

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Upright</th>
<th>Recumbent</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
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<tbody>
<tr>
<td>1 Nulliparous woman</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Haukkama 1982</td>
<td>13</td>
<td>10.2 (5.4)</td>
<td>12</td>
<td>8.9 (4.4)</td>
<td>20 %</td>
</tr>
<tr>
<td>McHans 1978</td>
<td>10</td>
<td>10.5 (2.7)</td>
<td>10</td>
<td>10.5 (4.9)</td>
<td>23 %</td>
</tr>
<tr>
<td>Williams 1980</td>
<td>25</td>
<td>7.9 (3.9)</td>
<td>30</td>
<td>7.4 (3.2)</td>
<td>85 %</td>
</tr>
<tr>
<td>Chen 1987</td>
<td>22</td>
<td>3.3 (2.25)</td>
<td>38</td>
<td>4.23 (2.5)</td>
<td>80 %</td>
</tr>
<tr>
<td>Andrews 1990</td>
<td>20</td>
<td>3.8 (2.5)</td>
<td>20</td>
<td>4.1 (1.5)</td>
<td>93 %</td>
</tr>
<tr>
<td>Phumentou 2007</td>
<td>40</td>
<td>3.5 (1.31)</td>
<td>43</td>
<td>3.73 (2.1)</td>
<td>96 %</td>
</tr>
<tr>
<td>Mitr 1974</td>
<td>50</td>
<td>5.47 (1.71)</td>
<td>50</td>
<td>7.25 (1.69)</td>
<td>104 %</td>
</tr>
<tr>
<td>Bloom 1998</td>
<td>272</td>
<td>7.6 (1.39)</td>
<td>272</td>
<td>7.3 (3.3)</td>
<td>104 %</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>452</strong></td>
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<td></td>
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<td><strong>475</strong></td>
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<tr>
<td>Heterogeneity: $t^2 = 1.38; Chi^2 = 30.45; df = 7 (P &lt; 0.00001); P = 83%</td>
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<td>Test for overall effect: $Z = 1.83 (P = 0.064)$</td>
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2 Nulliparous woman

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<tr>
<th>Study or subgroup</th>
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<th>Recumbent</th>
<th>Mean Difference</th>
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<tr>
<td>Haukkama 1982</td>
<td>18</td>
<td>5.6 (3.8)</td>
<td>17</td>
<td>6.6 (4.1)</td>
<td>37 %</td>
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<tr>
<td>Williams 1980</td>
<td>23</td>
<td>6.3 (2.9)</td>
<td>25</td>
<td>7.8 (3.4)</td>
<td>84 %</td>
</tr>
<tr>
<td>McHans 1978</td>
<td>10</td>
<td>5.3 (1.4)</td>
<td>10</td>
<td>5.6 (2.1)</td>
<td>66 %</td>
</tr>
<tr>
<td>Chen 1987</td>
<td>19</td>
<td>1.2 (0.75)</td>
<td>37</td>
<td>2.08 (1.08)</td>
<td>110 %</td>
</tr>
<tr>
<td>Bloom 1998</td>
<td>264</td>
<td>4.6 (2.4)</td>
<td>259</td>
<td>4.7 (2.4)</td>
<td>113 %</td>
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<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>334</strong></td>
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<td></td>
<td></td>
<td><strong>348</strong></td>
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<tr>
<td>Heterogeneity: $t^2 = 0.12; Chi^2 = 6.73; df = 8 (P = 0.75); P = 41%</td>
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<td>Test for overall effect: $Z = 1.95 (P = 0.051)$</td>
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3 Mixed or unclear parity

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<tr>
<td>Fyna 1978</td>
<td>34</td>
<td>4.1 (3.17)</td>
<td>34</td>
<td>6.7 (2.17)</td>
<td>63 %</td>
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<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>34</strong></td>
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<td>Heterogeneity: not applicable</td>
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<td>Test for overall effect: $Z = 3.23 (P = 0.0013)$</td>
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</table>

Total (95% CI): 820

Heterogeneity: $t^2 = 0.80; Chi^2 = 62.16; df = 13 (P = 0.00001); P = 79%

Test for overall effect: $Z = 3.23 (P = 0.0013)$
ROBERTS META-ANALYSIS 2005: UPRIGHT POSITION AND LABOUR OUTCOME WITH EPIDURAL ANALGESIA

Fig. 1. Delivery outcomes for upright versus recumbent positions in the second stage of labour for women with epidural analgesia. RR, relative risk; 95% CI, 95% confidence interval.
WHEN USING MLEA:

- Do not “test” catheter with lidocaine/epi
- Use the lower range for epidural background infusion
- No mandatory foley catheter: encourage to void ~ 1hr after block initiated
- No need to monitor maternal vitals after each PCEA dose
- Encourage non-recumbent positions
- Ambulate for as long as feel safe and not received top-up >0.124%
SAFETY ISSUES WITH MLEA:

• Check motor strength and balance
• Proprioception preserved in majority (Buggy 1994)
• Hypotension not an issue

  Shennan Br J Obstet Gynaecol 1995 (CSE)
  Al-Mufti Br J Obstet Gynaecol 1997 (PCEA)

Better hemodynamics with sitting/standing patients following PCEA bolus vs lying
HOW TO MAKE IT SUCCESSFUL?

1. Everyone has to buy in/engage
   - Expectations of the analgesia provided by the epidural
     - Woman
     - Labour RN
     - Obstetrical care provider
     - Anesthesia

2. Using PCEA with dilute solution successfully
   - Have to use the bolus feature
   - Minimize background infusion to minimize cumulative motor block
   - Be prepared for transition and descent of fetal head
INTRAUTERINE EXPOSURE

- Cohort study: 5320 children, Learning Disability
- 497 C/S (193 GA and 304 RA)
- Children exposed to GA or RA for C/S are NOT more likely to develop LD
- Brief exposure has no effect on long-term neurodevelopmental outcomes.

_Sprung et al. Anesthesiology 2009;111:302-10_
TO TAKE HOME:

• We are in the same team !!!
• Neuraxial analgesia is not a generic procedure. It should be tailored to patient needs
• Risks are acceptably low
• No analgesia might be more hazardous to some women than neuraxial analgesia
  Cardiac patients, difficult airway, high risk of emergency C-sections