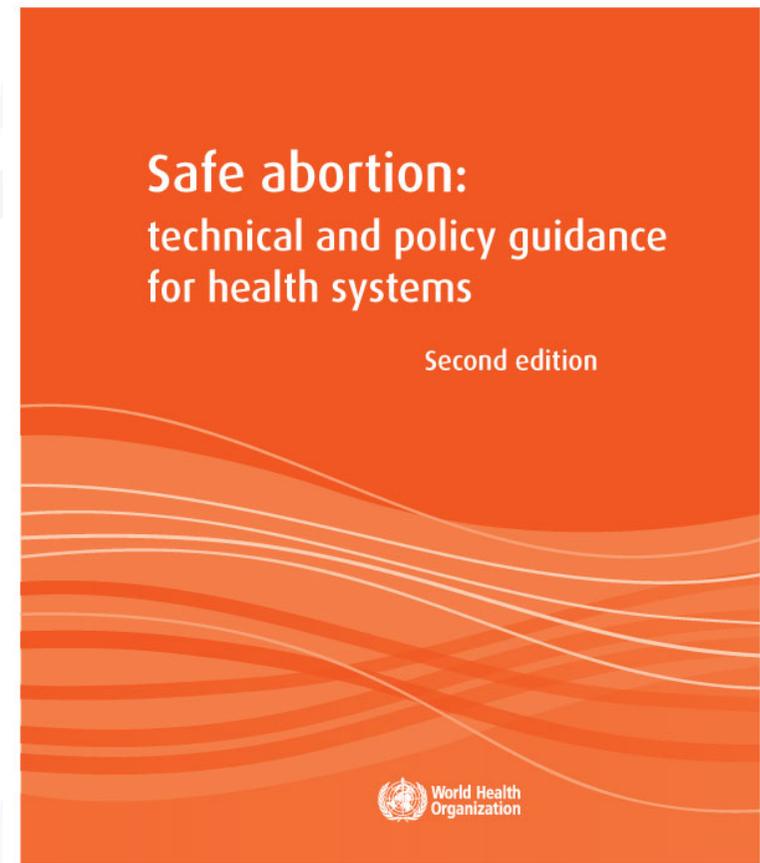
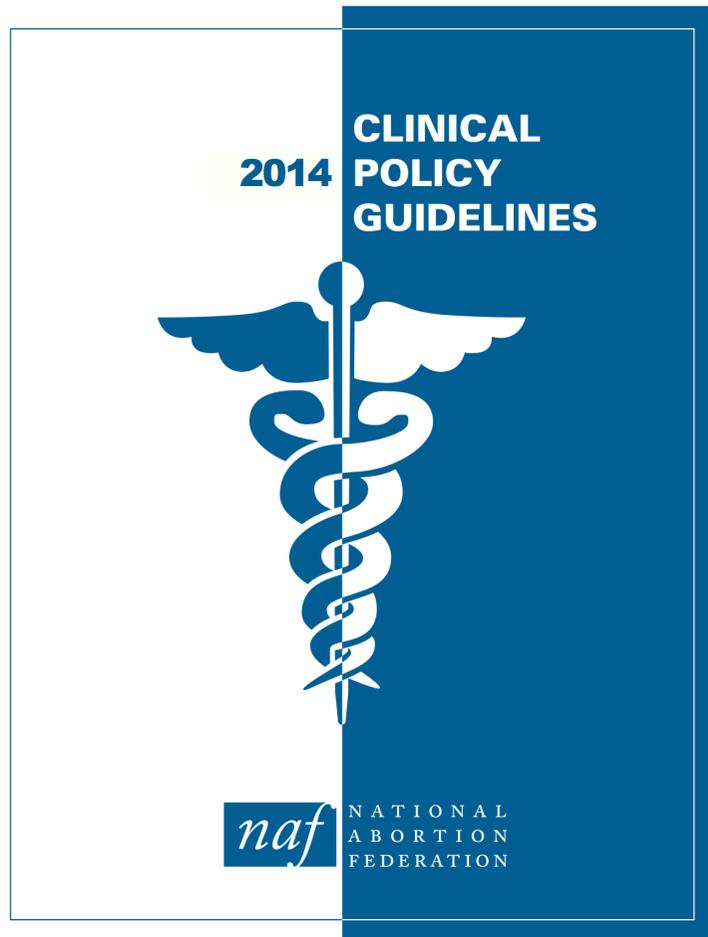


# D&E Workshop

11th fiapac Conference  
Ljubljana, Slovenia  
2 October 2014



# Guidelines







# **Methods of Cervical Dilation**

Matthew F. Reeves, MD

2 October 2014

# Cervical Dilation

- Review methods
  - Rigid
  - Osmotic
  - Pharmaceutical
- Discuss evidence for use
  - Early 2<sup>nd</sup> trimester
  - Late 2<sup>nd</sup> trimester

# Methods of Cervical Dilation

- Rigid Dilators
  - Active mechanical dilation over several minutes
- Osmotic Dilators
  - Gradual dilation, usually over 2-24 hours
- Pharmaceutical Dilators
  - Medication to induce cervical dilation

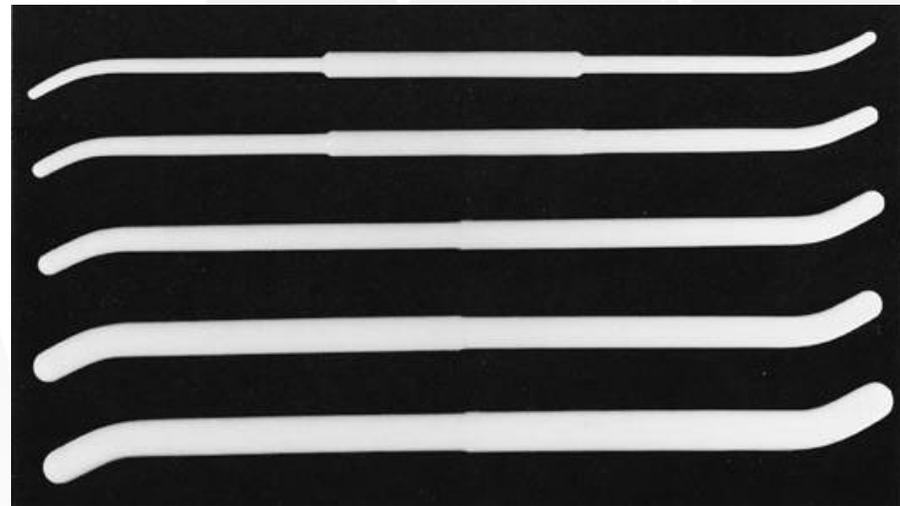
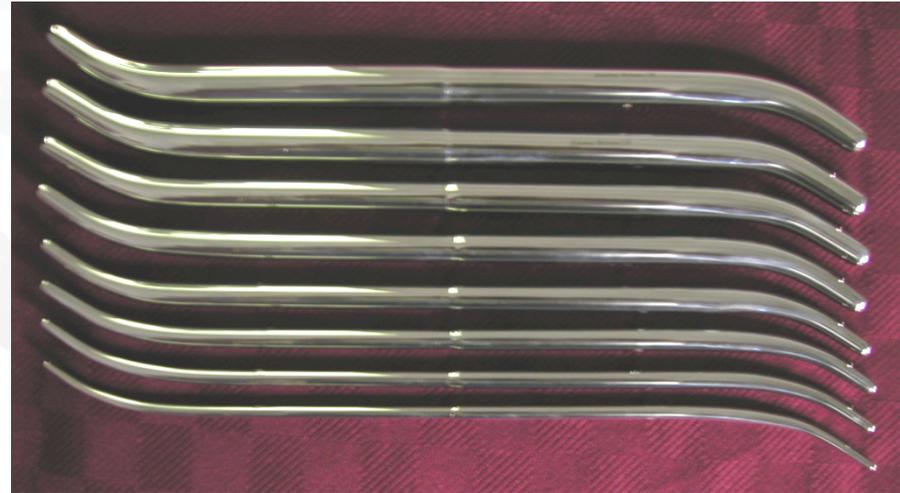
# Rigid Dilators

- Hegar Dilators
  - An older rigid dilator
  - Blunt-ended
  - 1 mm increments
    - 1/2 mm increments available
  - More cervical injury compared to tapered (Pratt) dilators

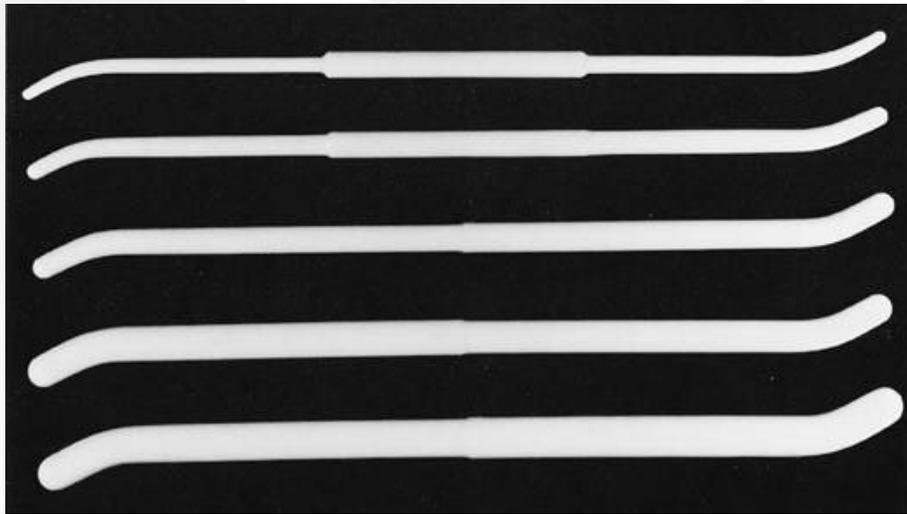
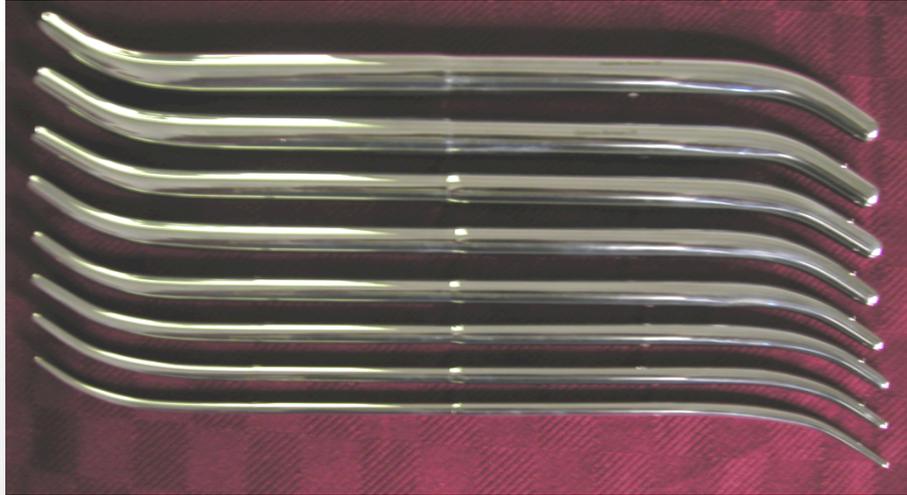


# Rigid Dilators

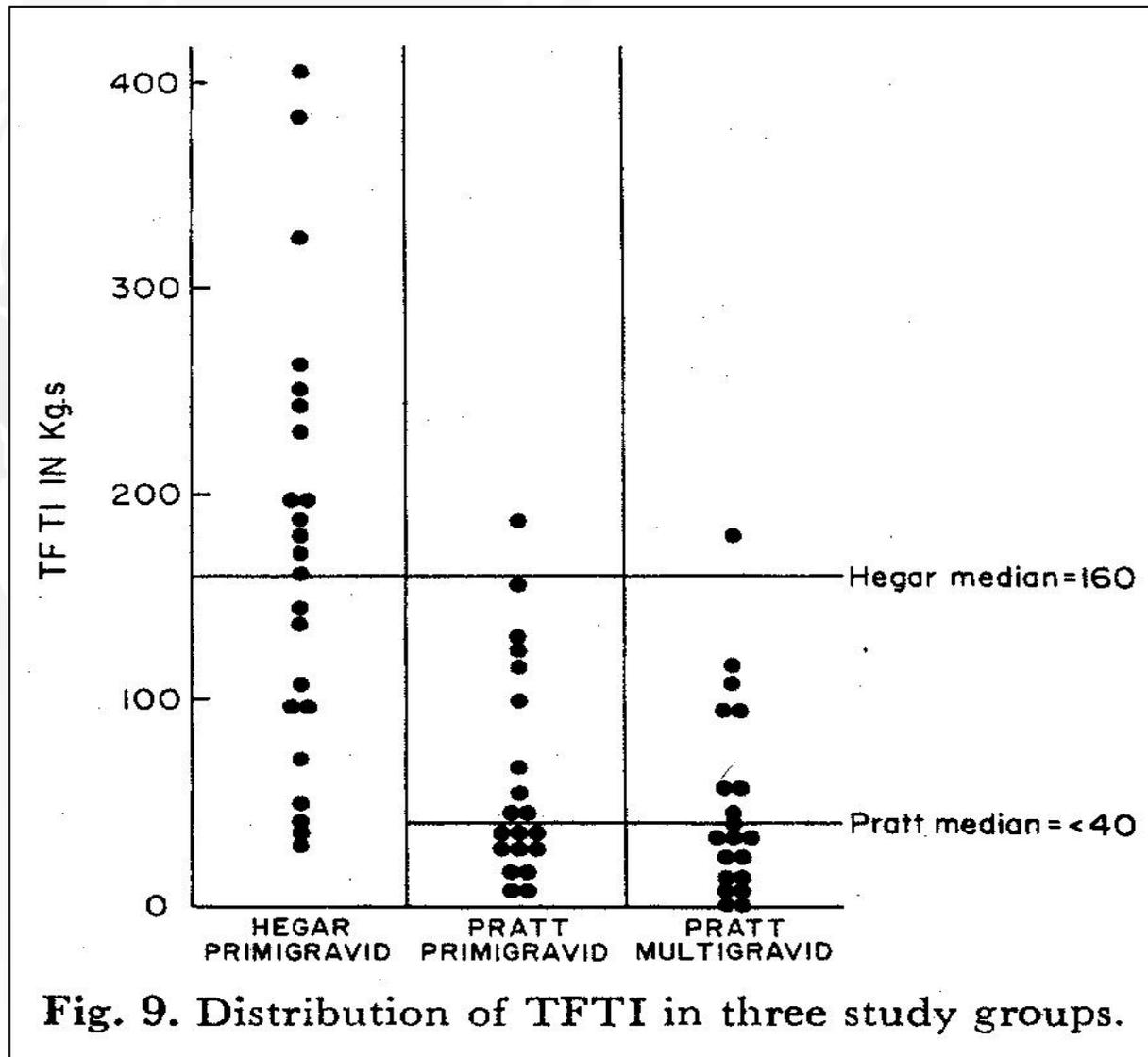
- Pratt Dilators
  - Tapered-ends
  - Increase in diameter more gradually than Hegar (2/3 mm)
- Denniston Dilators
  - Plastic version of Pratt dilators



# Rigid Dilators



# Force Required to Dilate: Hegar vs. Pratt



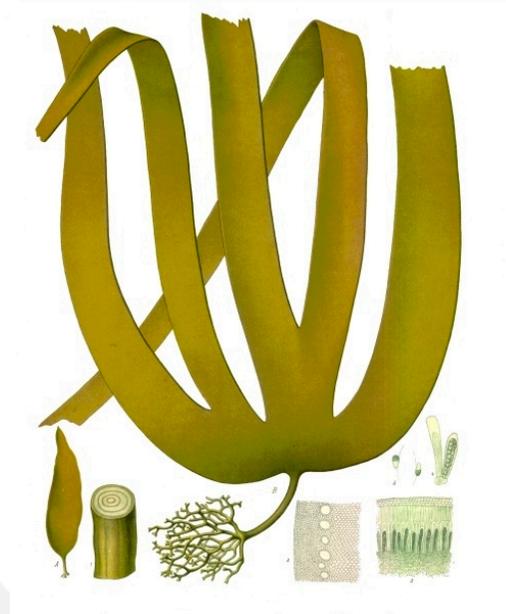
# Osmotic Dilators

- Hygroscopic rods placed within the cervix
- Absorb water
  - Removal of water from cervix
  - Swelling of dilators creates mechanical pressure
- Often called “tents”
  - tent (2): *n.* A small cylindrical plug of lint or gauze used to keep open or probe a wound or an orifice.
  - [Middle English *tente*, from Old French, from *tenter*, to probe, from Latin *tentare*, to feel, try; see tentative.]

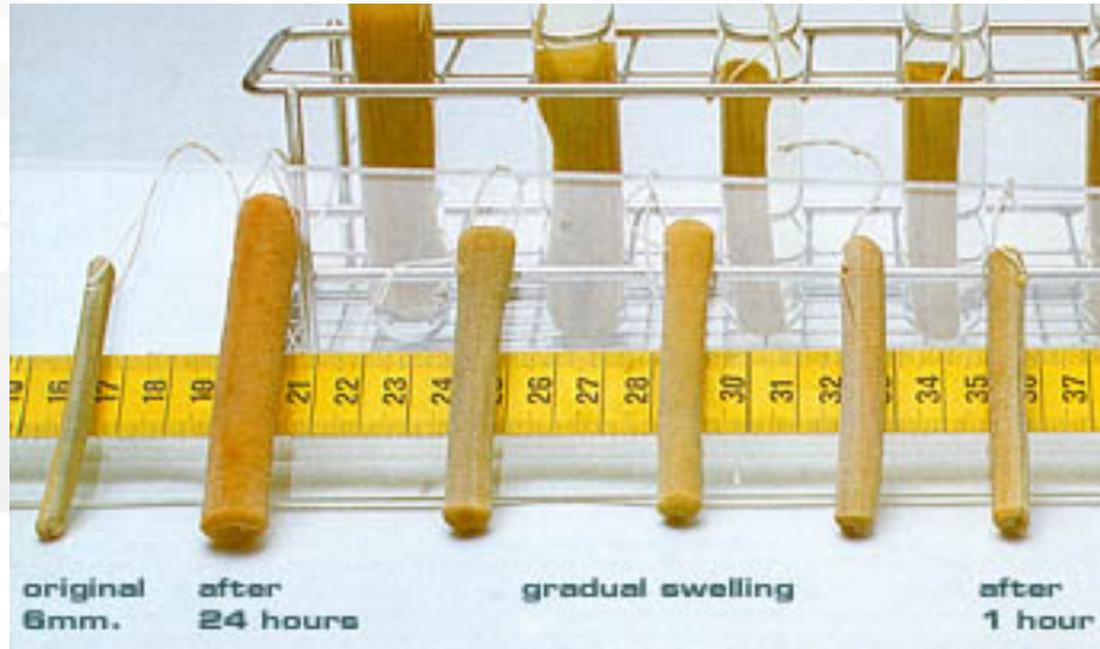


# Laminaria tents

- Commonly known as “Kelp”
- *L. japonicum*
  - Now *Saccharina japonicum*
  - Kombu in Japanese
- *Laminaria digitata*
  - Does not perform as well
- Sterilized with ethylene oxide
  - Not completely sterilized
  - But no evidence of increased rates of infection



# Laminaria tents



- Swells to several times its dried diameter over 12-24 hours
  - Creates mechanical force to dilate cervix
  - Draws water out of cervix
  - Increases serum & cervical prostaglandin levels

# Laminaria japonica

– *Kombu* in Japanese



# Dilapan

- Hypan tents,
  - made of polyacrylonitrile hydrogel
  - Completely synthetic
  - Allows more uniformity in production
  - 4 mm by 65 mm



# Dilapan-S



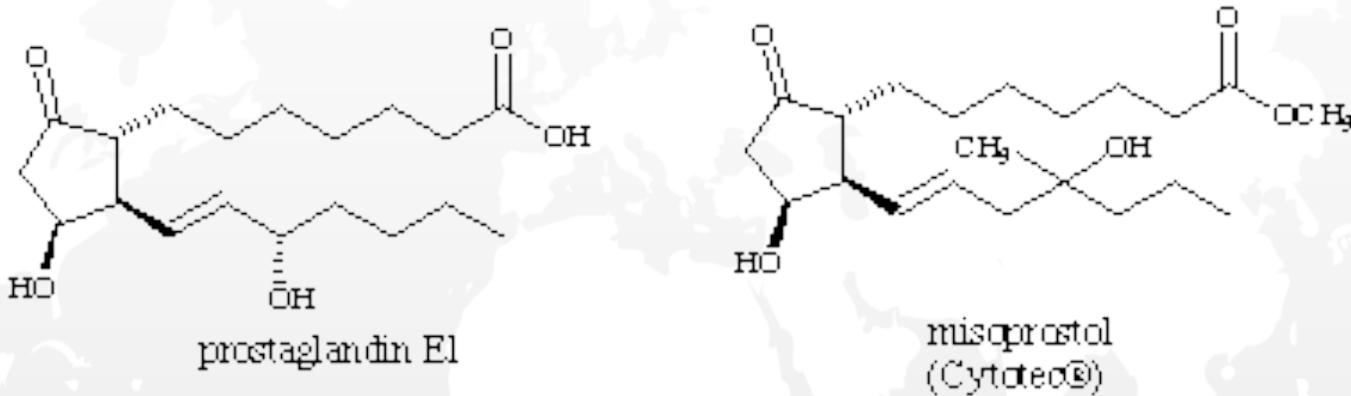
# Lamicel

- A compressed polyvinyl alcohol polymer sponge
- Impregnated with 450 mg of Magnesium sulfate
- Available in 2 sizes
  - 5mm
  - 3mm
- Dilation not due to mechanical force
  - Expanded sponge in soft
  - Sponge may draw water out of cervix
  - Lamicel induces collagenolytic activity
  - Dilation often attributed to Magnesium

# Pharmaceutical Dilators

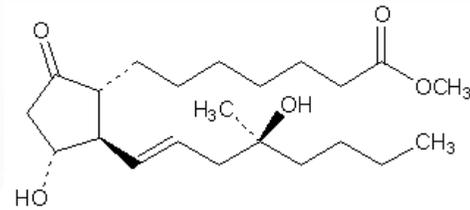
- Misoprostol
  - A synthetic prostaglandin E1 analog
  - Cheap & stable at room temperature
- Gemprost
  - Also a PGE1 analog, but requires refrigeration
- Other prostaglandin
  - Not commonly used on the US
- Mefipristone
  - Progesterone antagonist
- Nitric Oxide Donors
  - Rarely used; no significant effect in studies

# Misoprostol

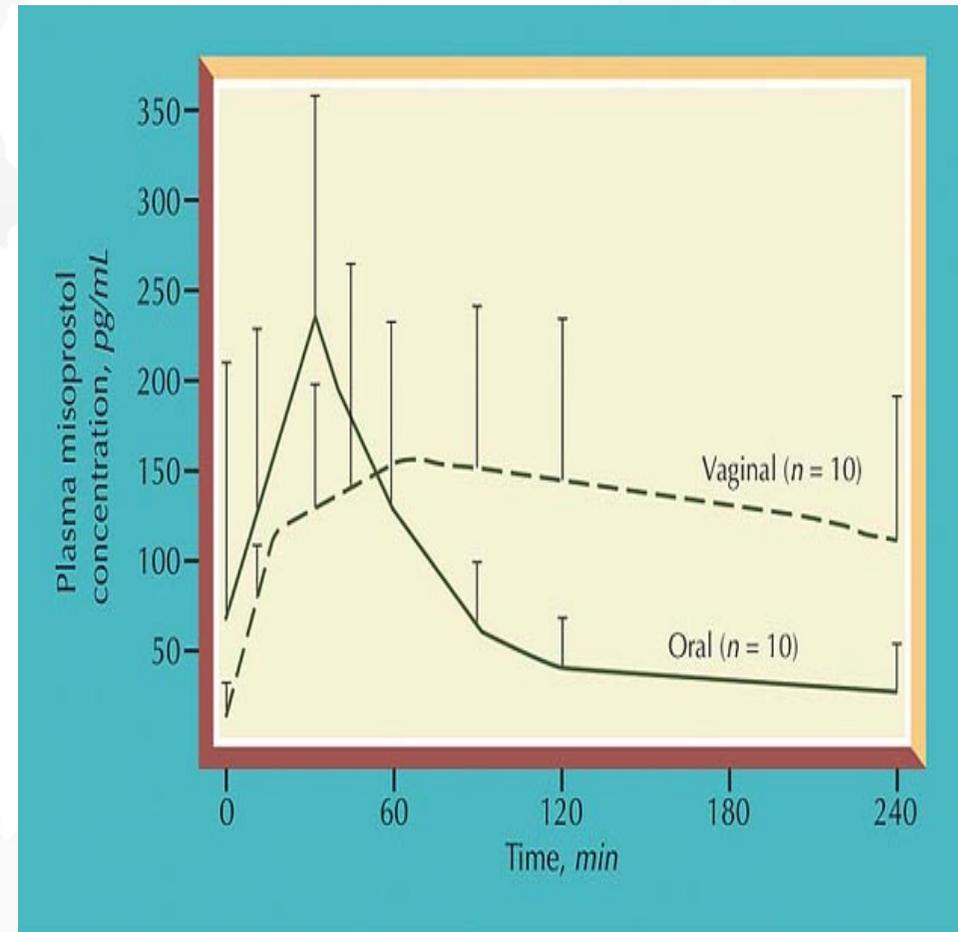


- Misoprostol: analog of prostaglandin E1
  - More stable than PGE1
  - Lower cost than most prostaglandin analogs

# Misoprostol

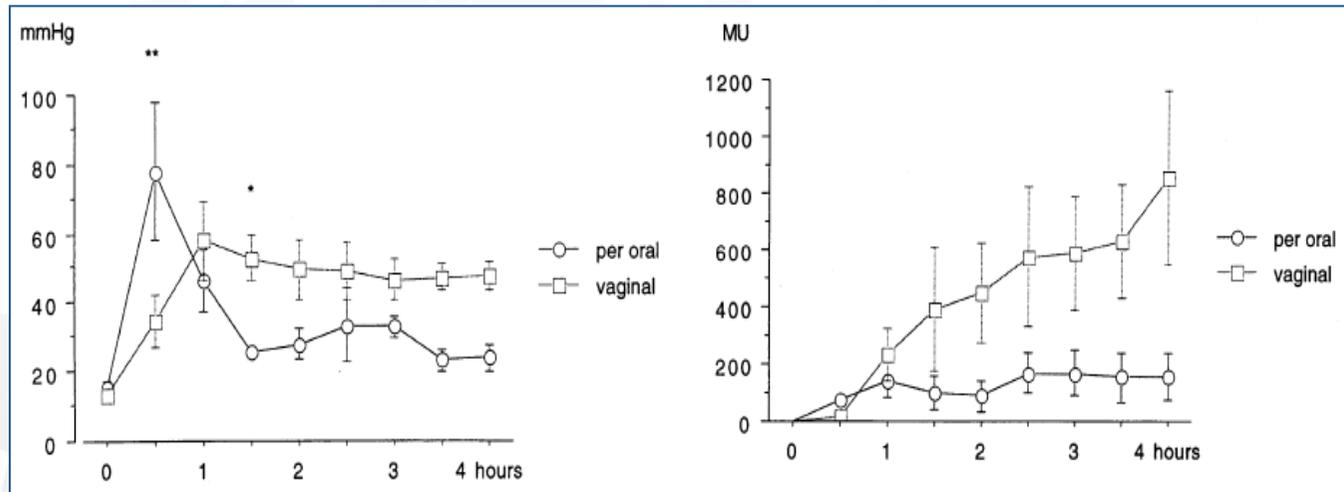


- Multiple routes:
  - Oral
  - Vaginal
  - Buccal
  - Sublingual
  - Rectal
- Oral or SL gives quicker higher peak
- Vagina gives greater area under the curve
  - And local effect
  - 400mcg vaginally compared to 400 mcg orally:
    - Double AUC at 4 hours
    - Triple AUC at 6 hours



# Uterine Effects of Misoprostol

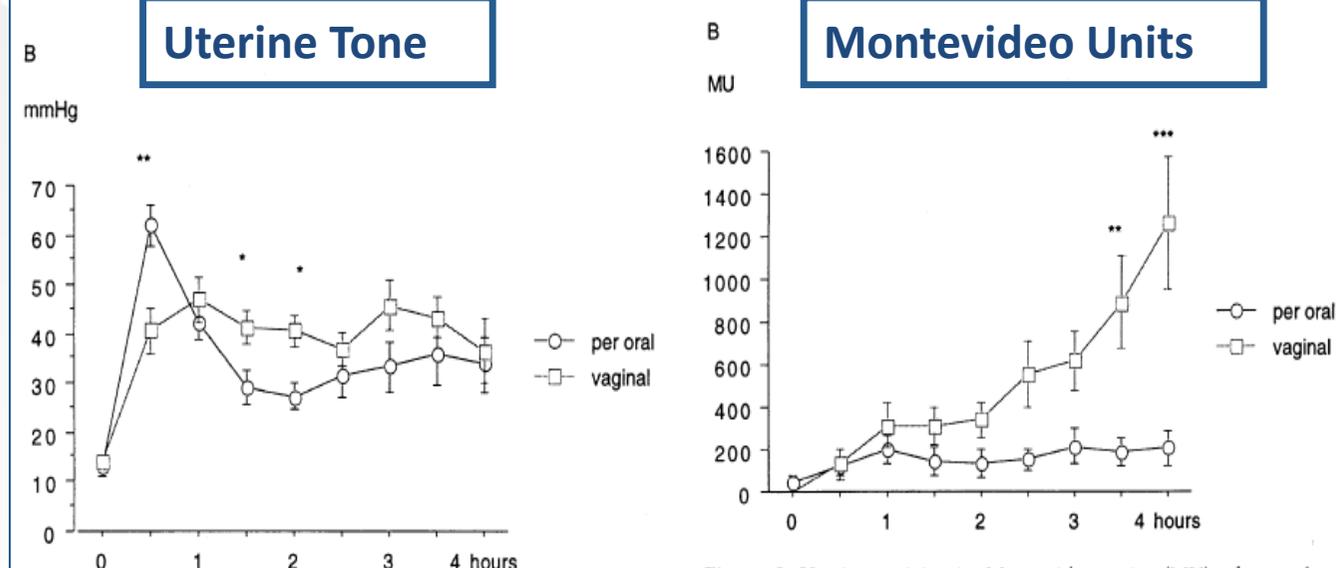
200 mcg:



Uterine Tone

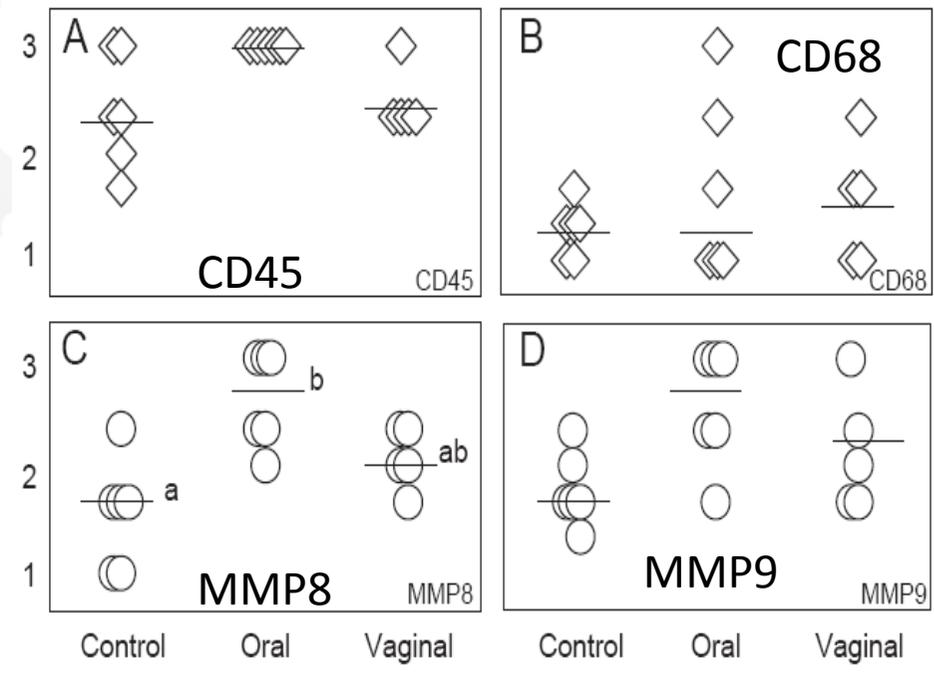
Montevideo Units

400 mcg:



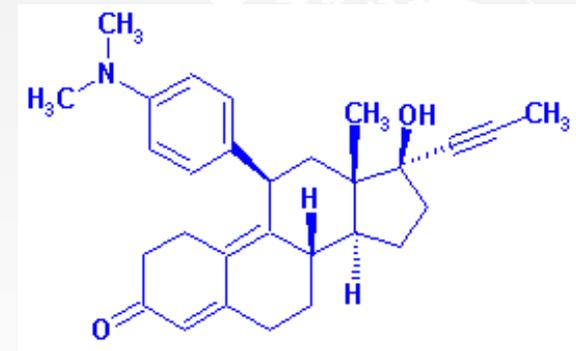
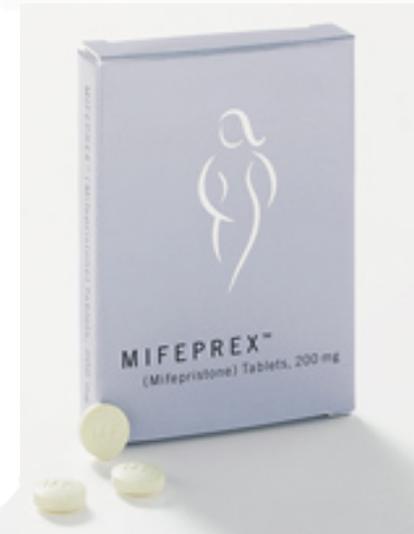
# Changes in the Cervix after Misoprostol

- Misoprostol induces inflammation in cervical stroma
  - Similar to changes with labor
- 3 hours after misoprostol, cervical biopsies show increases in the following:
  - CD45
    - leukocyte common antigen
  - Matrix metalloproteinase 8
    - degrades fibrillar collagens
  - Matrix metalloproteinase 9
    - degrades collagen IV of basement membranes



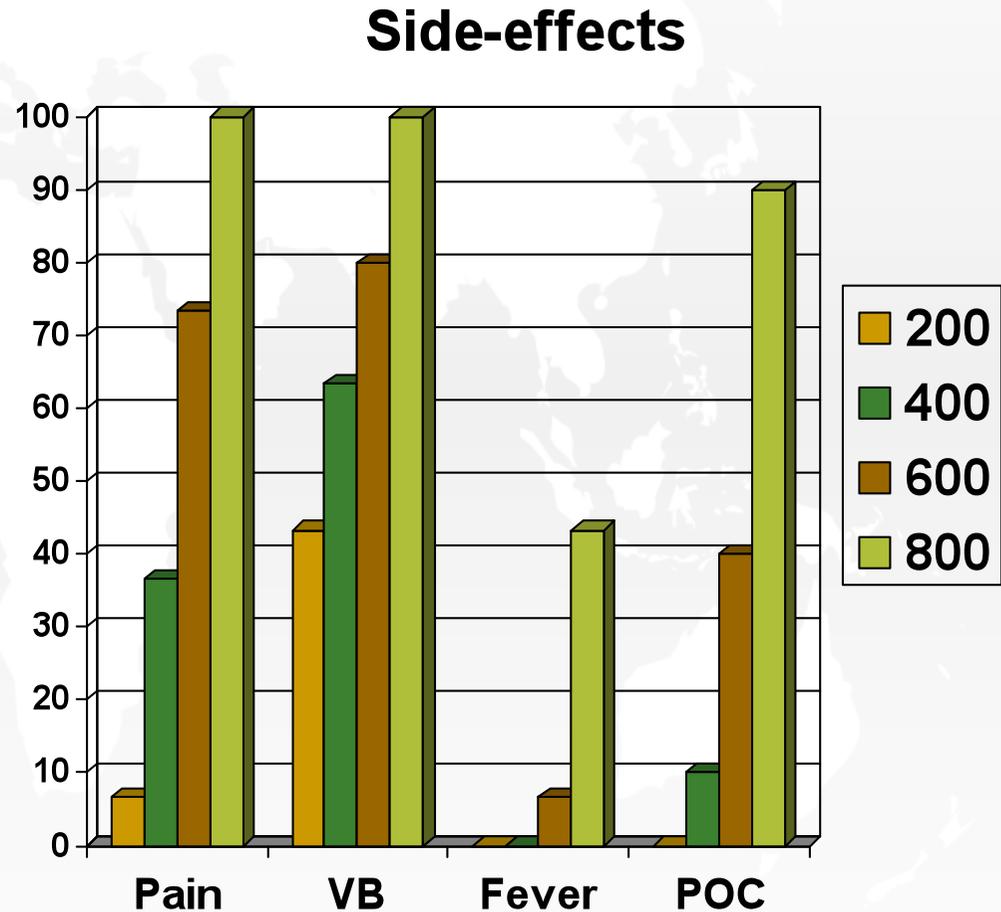
# Mifepristone

- Mifepristone is a anti-progestin (and anti-glucocorticoid)
- Studied at 4-36 hours before D&E
- Expensive
  - May still be cost effective

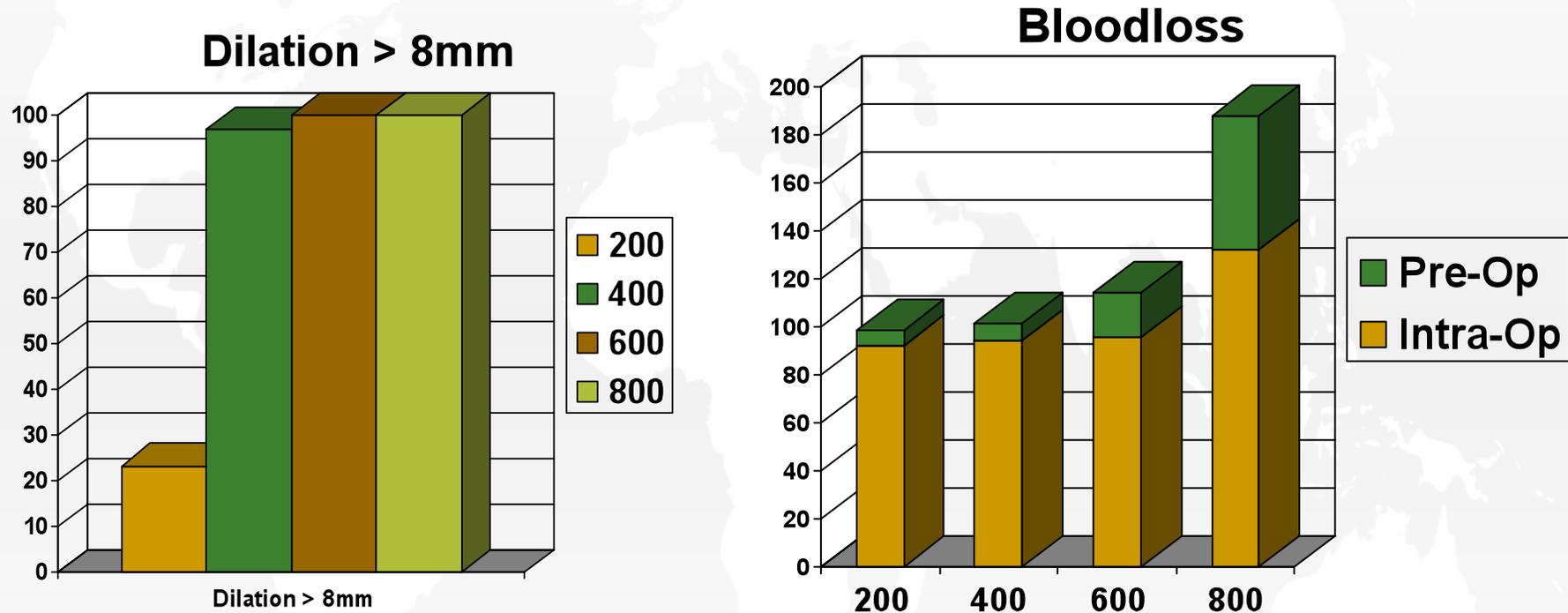


# Misoprostol in Singapore for 3-4 hours: Which Dose is Best?

- Double-blind RCT
- 4 groups in 1<sup>st</sup> trimester received **vaginal** misoprostol
  - 200 mcg (n=30)
  - 400 mcg (n=30)
  - 600 mcg (n=30)
  - 800 mcg (n=30)
- Demographics
  - Mean Age: 20-22 yo
  - Mean GA: 8 weeks
  - All nulliparous
- Evaluated at **3-4** hours



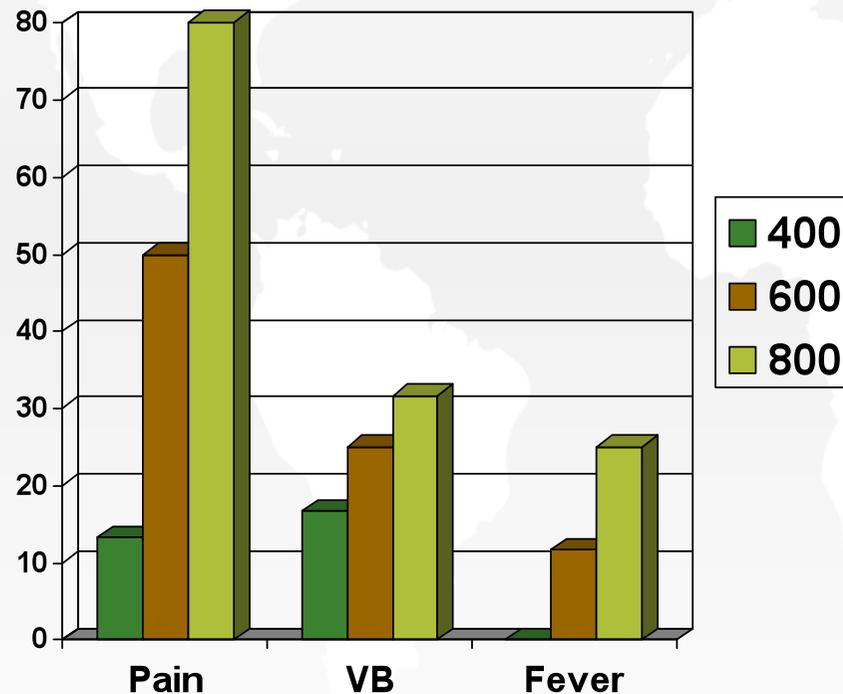
# Misoprostol in Singapore for 3-4 hours: Which Dose is Best?



- 400 mcg dose thought to be optimal
- Forces needed to dilate not measured

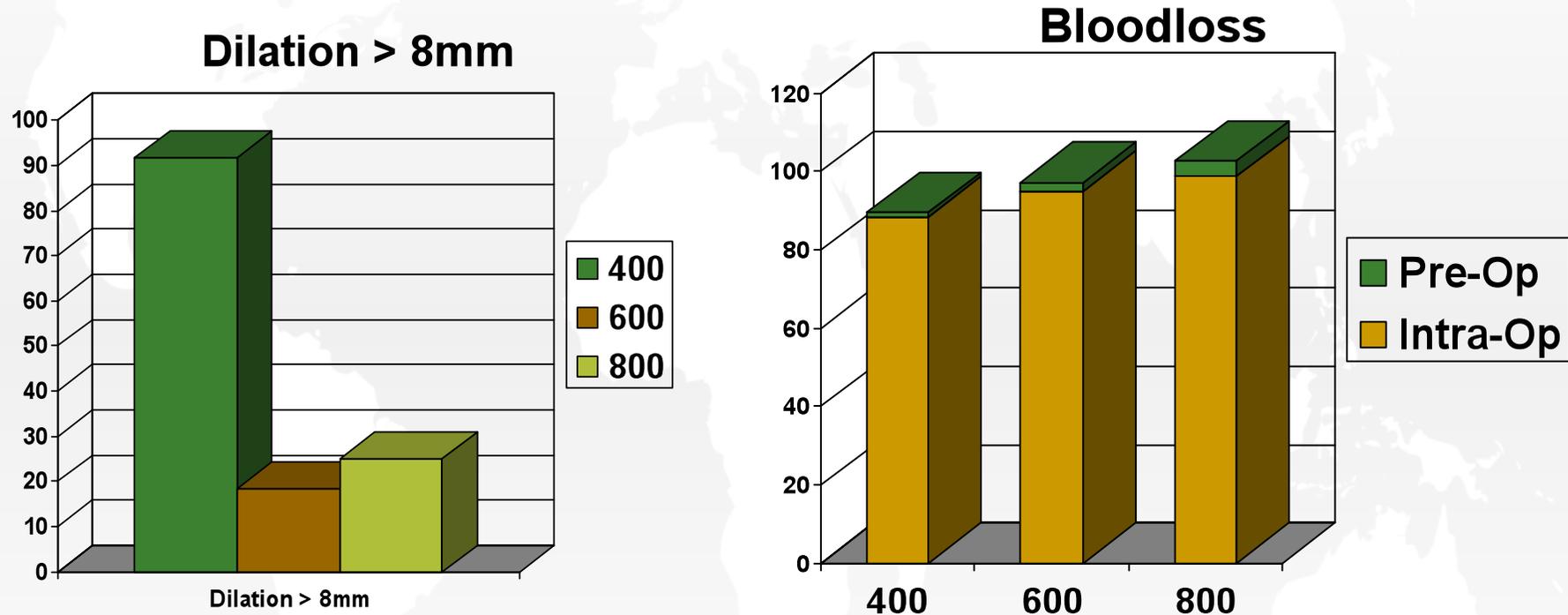
# Misoprostol in Singapore #2: Does Dose Equal Time?

Side-effects



- Double-blind RCT
- 3 groups in 1<sup>st</sup> trimester received vaginal misoprostol
  - 400 mcg for **3** hrs (n=60)
  - 600 mcg for 2 hrs (n=60)
  - 800 mcg for 2 hrs (n=60)
- Demographics
  - Mean Age: 20-21yo
  - Mean GA: 7.5-8 weeks
  - All nulliparous

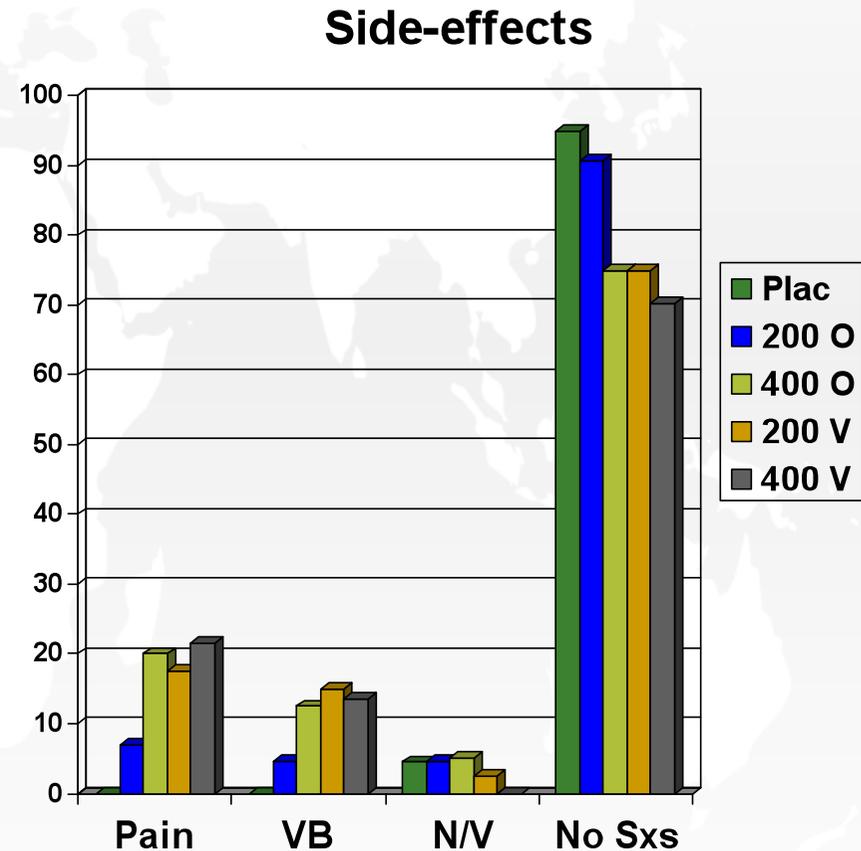
# Misoprostol in Singapore #2: Does Dose Equal Time?



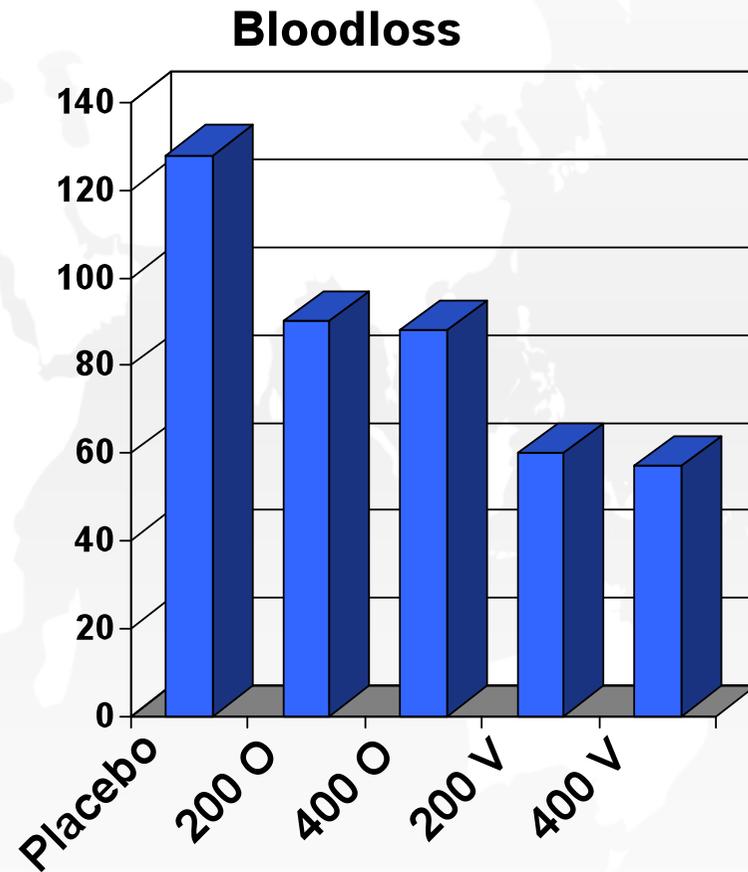
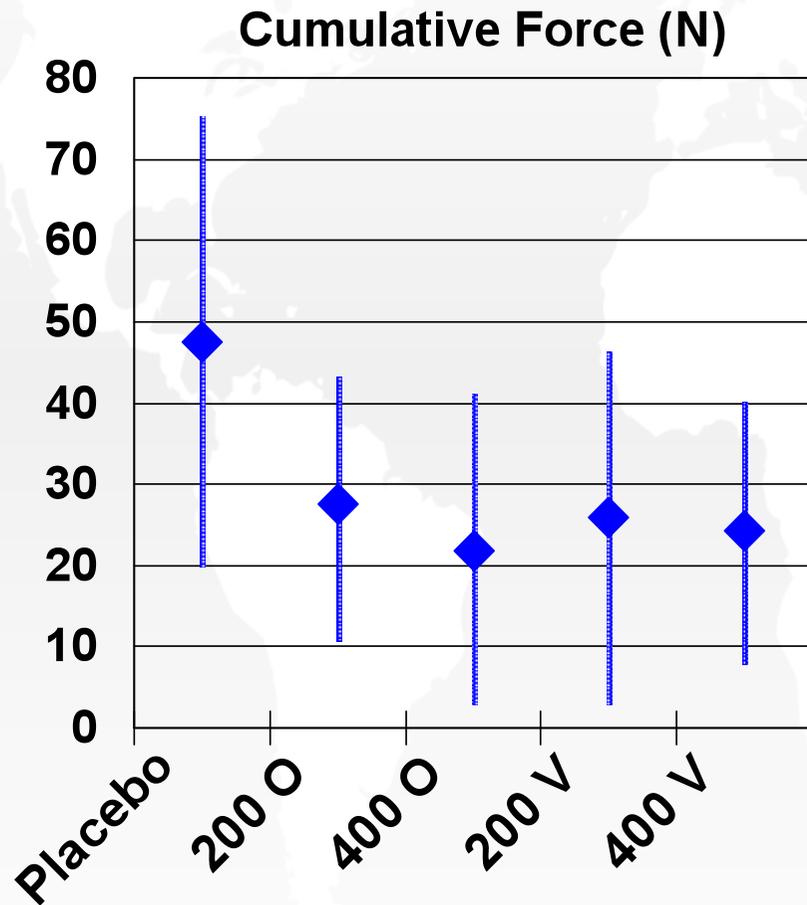
- 400 mcg dose again thought to be optimal

# Misoprostol in Hong Kong: Measuring Forces with a Placebo Arm

- Double-blind RCT
- 5 groups at 8-12 wks received misoprostol for 3 hours
  - Placebo (n=44)
  - 200 mcg oral (n=43)
  - 400 mcg oral (n=40)
  - 200 mcg vaginal (n=40)
  - 400 mcg vaginal (n=37)
- Demographics
  - Mean Age: 21-23yo
  - Mean GA: **9.5-10** weeks
  - All nulliparous
- Evaluated at **3** hours

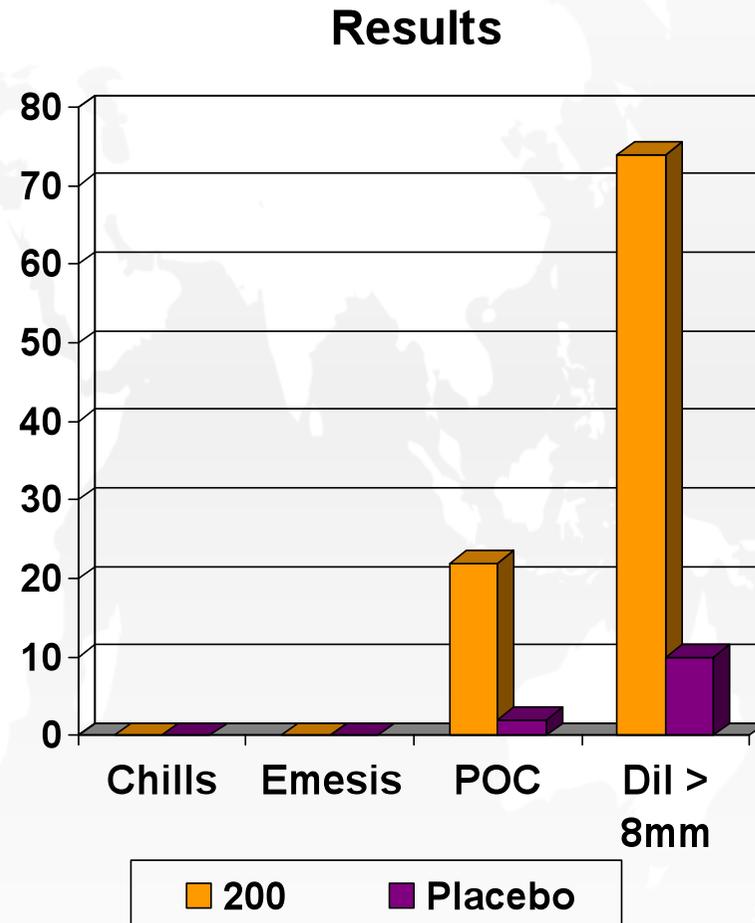


# Misoprostol in Hong Kong: Measuring Forces with a Placebo Arm



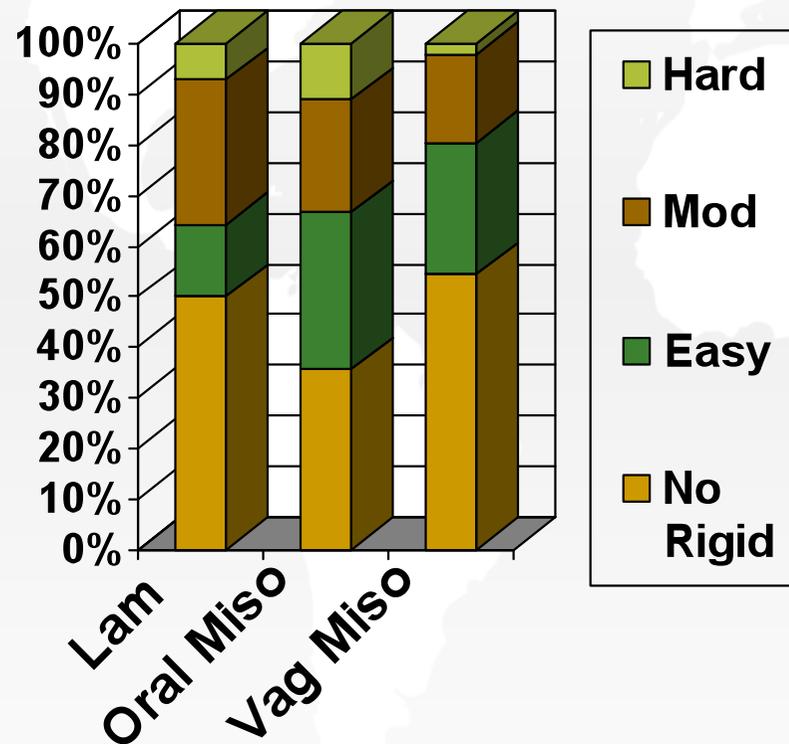
# Misoprostol in Mozambique: Less Miso, More Time

- Double-blind RCT
- 2 groups at 8-12 wks received vaginal misoprostol for 6 hours
  - Placebo (n=50)
  - 200 mcg (n=50)
- Demographics
  - Mean Age: 24-25yo
  - Mean GA: 8.5 weeks
  - Mean Parity: 1.4
- Evaluated at **6** hours



# First Trimester Dilation in San Francisco

## Difficult of Rigid Dilation

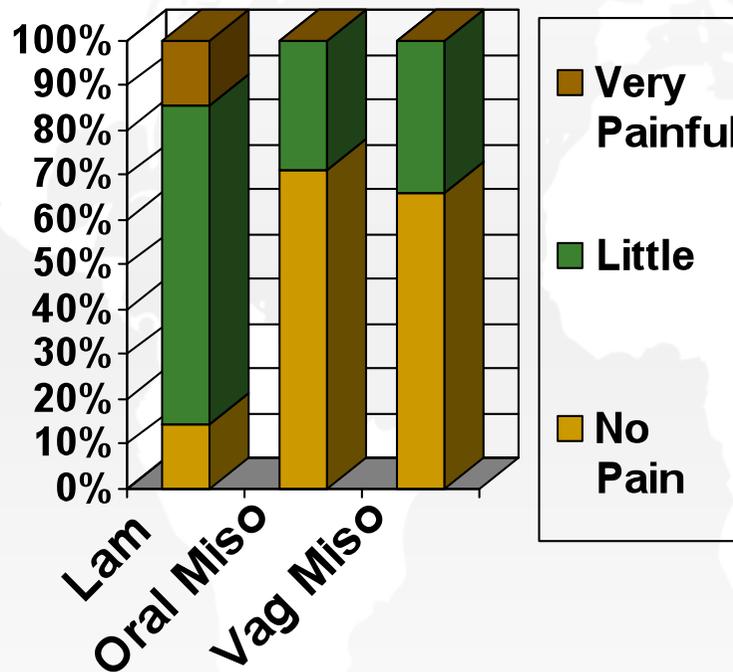


- Double-blind RCT
- 106 women at 7-14 weeks
  - mean 9 weeks
- 3 treatment groups
  - 1 medium Laminaria
  - 400 mcg oral Misoprostol
  - 400 mcg vaginal Misoprostol
- Each for 4 hours
- Mean Dilation (French):
  - Lam: 26mm
  - Oral Miso: 24mm
  - Vag Miso: 28mm

# First-Trimester Dilation in San Francisco

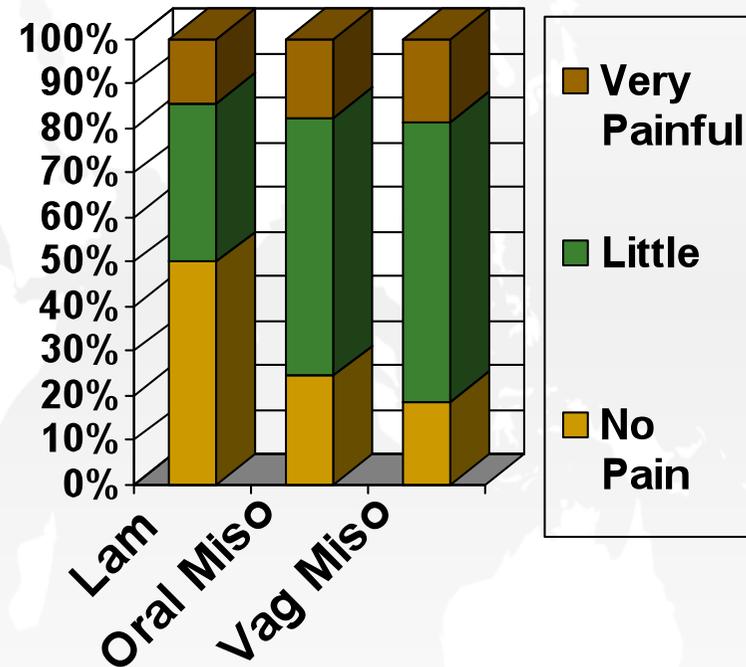
## Pain at Placement

p=0.001



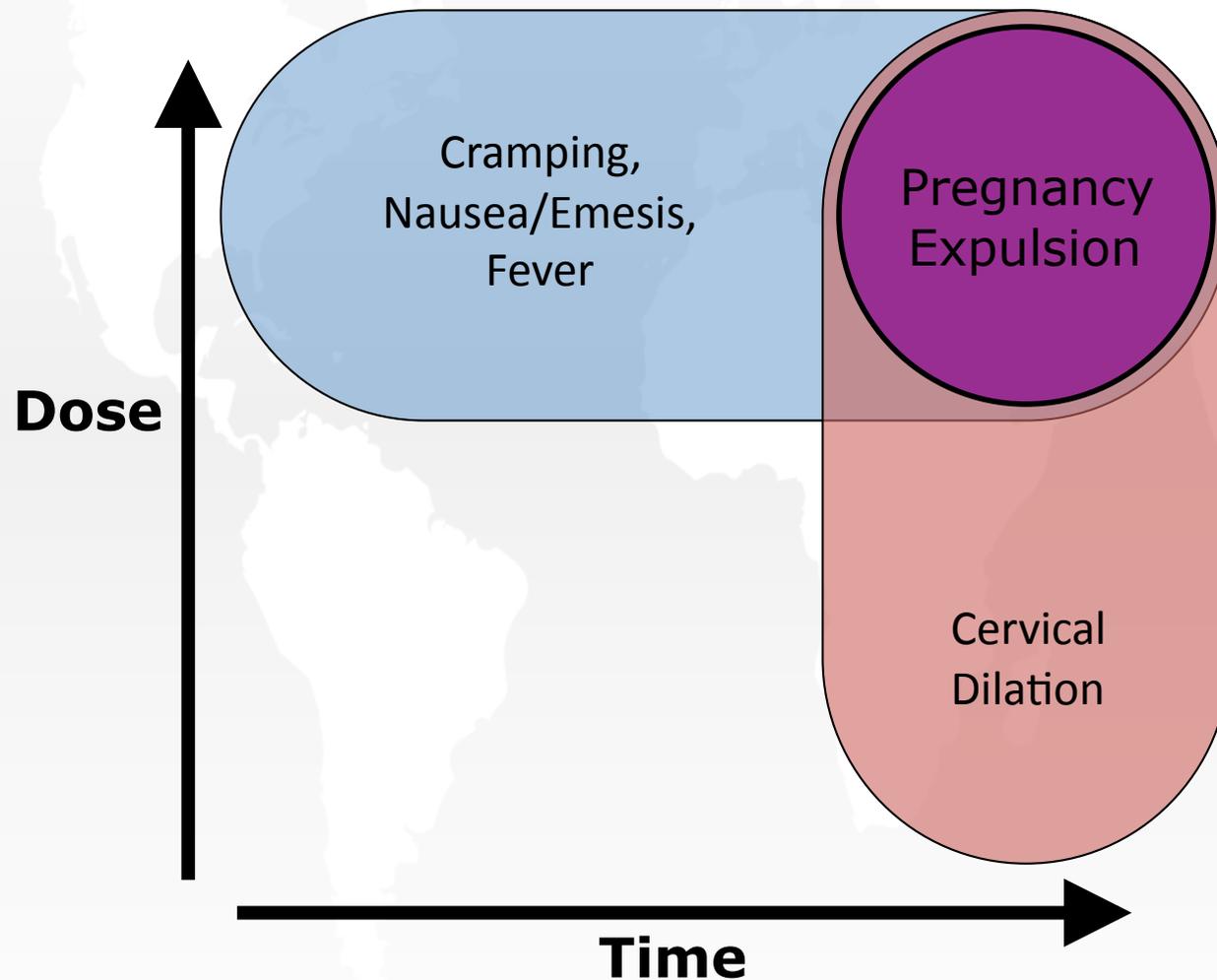
## Pain while waiting

p=0.21



- Bleeding  $\geq$  1 soaked pad: 0 of 14 lam; 2 of 45 oral miso; 3 of 47 vaginal miso

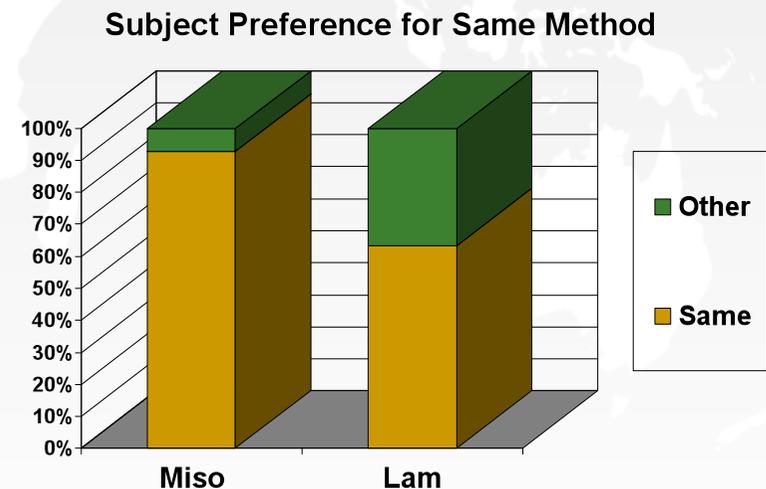
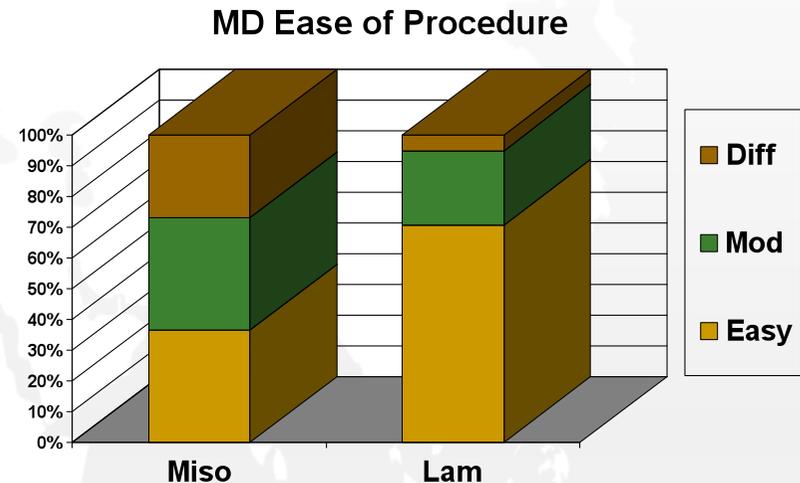
# A Conceptual Model of the Effects of Misoprostol



- A low dose of misoprostol seems to give good cervical preparation
- Avoids side-effects
- But it needs time to work

# Misoprostol vs. Laminaria for 13-16 week D&E

- Double-blinded RCT with 83 women
- 2 groups:
  - 3-6 medium laminaria for 24 hours
  - 400 mcg vaginal misoprostol for 3-4 hours
- Much better dilation with laminaria
  - Mean dil: 43 vs. 33 fr. ( $p < 0.001$ )
  - MDs preferred laminaria group
  - All used laminaria normally
- Subjects strongly preferred a one-day procedure
  - despite more pain/cramping



# Adding Buccal Misoprostol to Laminaria at 13-16 weeks

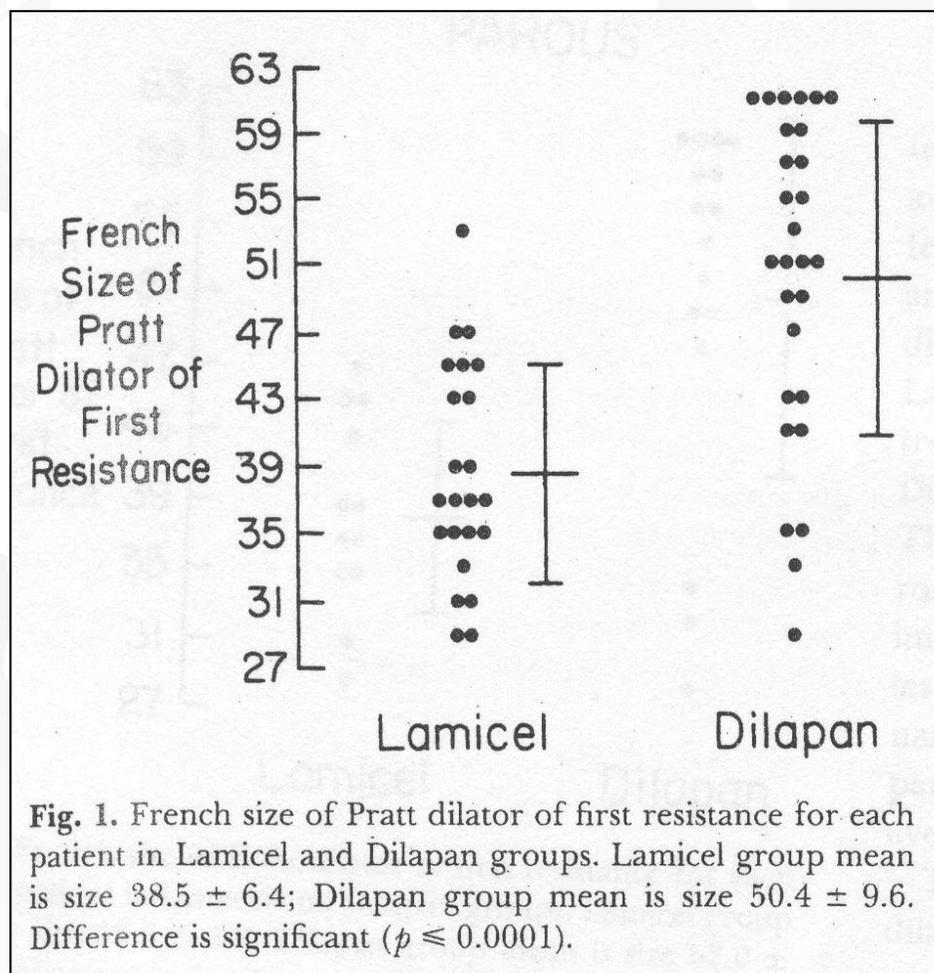
- RCT with 72 women in Portland
- Laminaria overnight
- 400 mcg Miso for 90 minutes
  
- No difference in dilation or procedure time
  - This is not surprising: not enough time
  - Still a 24-hour procedure

# Laminaria or Lamitel for 4 hours

- Double-blind RCT
- 2 groups at 14-16 wks received for 3-4 hours:
  - Laminaria (n=110)
  - Lamitel (n=109)
- Demographics
  - Mean Age: 22yo
  - Mean GA: **15** weeks
  - Mean Parity: 0.6
- Evaluated at **3.7** hours
- Results:
- Initial Dilation  $\geq$  37 fr
  - Laminaria: 47%
  - Lamitel: 48%
- Able to dilate to 43 fr
  - Laminaria: 95%
  - Lamitel: 96%

# Lamicel vs. Dilapan for 20 hours: When time is not the issue

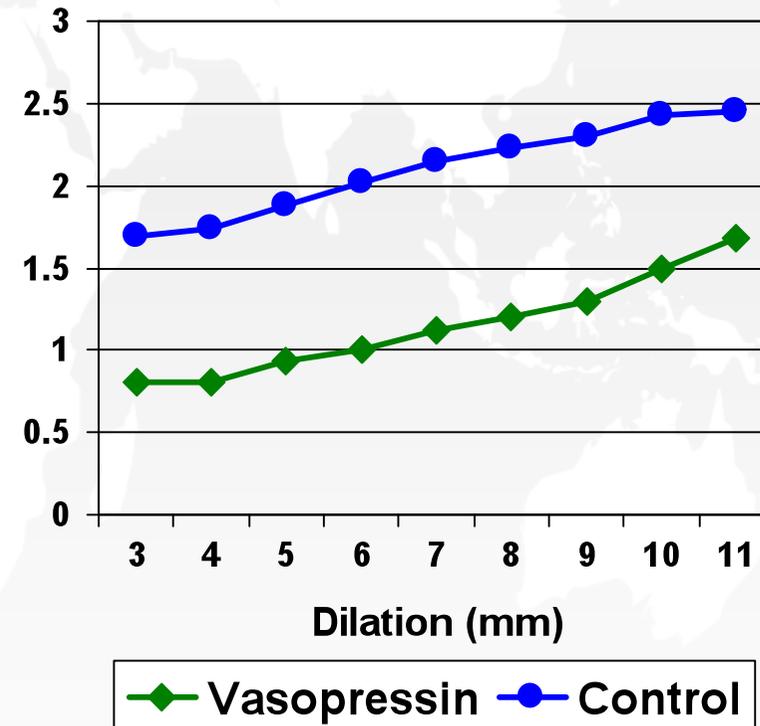
- Evaluator-blinded quasi-RCT
- 2 groups at 13-16 wks received for 20 hours:
  - 1 Lamicel (n=23)
  - 1 Dilapan (n=28)
- Demographics
  - Mean Age: 24yo
  - Mean GA: **15 weeks**
  - 40% nulliparous



# Vasopression & Cervical Dilation: The Only Study

- Double-blinded RCT of dilation at hysteroscopy
- 52 non-pregnant women, mean age 40
  - On Lupron for myoma resection
- Intracervical injection of
  - 20cc saline
  - 20cc saline with 1u vasopressin
- Shorter time to dilate to 11mm ( $p < 0.001$ )
  - Vaso: 132 sec (169-359)
  - Control: 695 sec (302-1249)

Peak Force Required to Dilate (lbs)



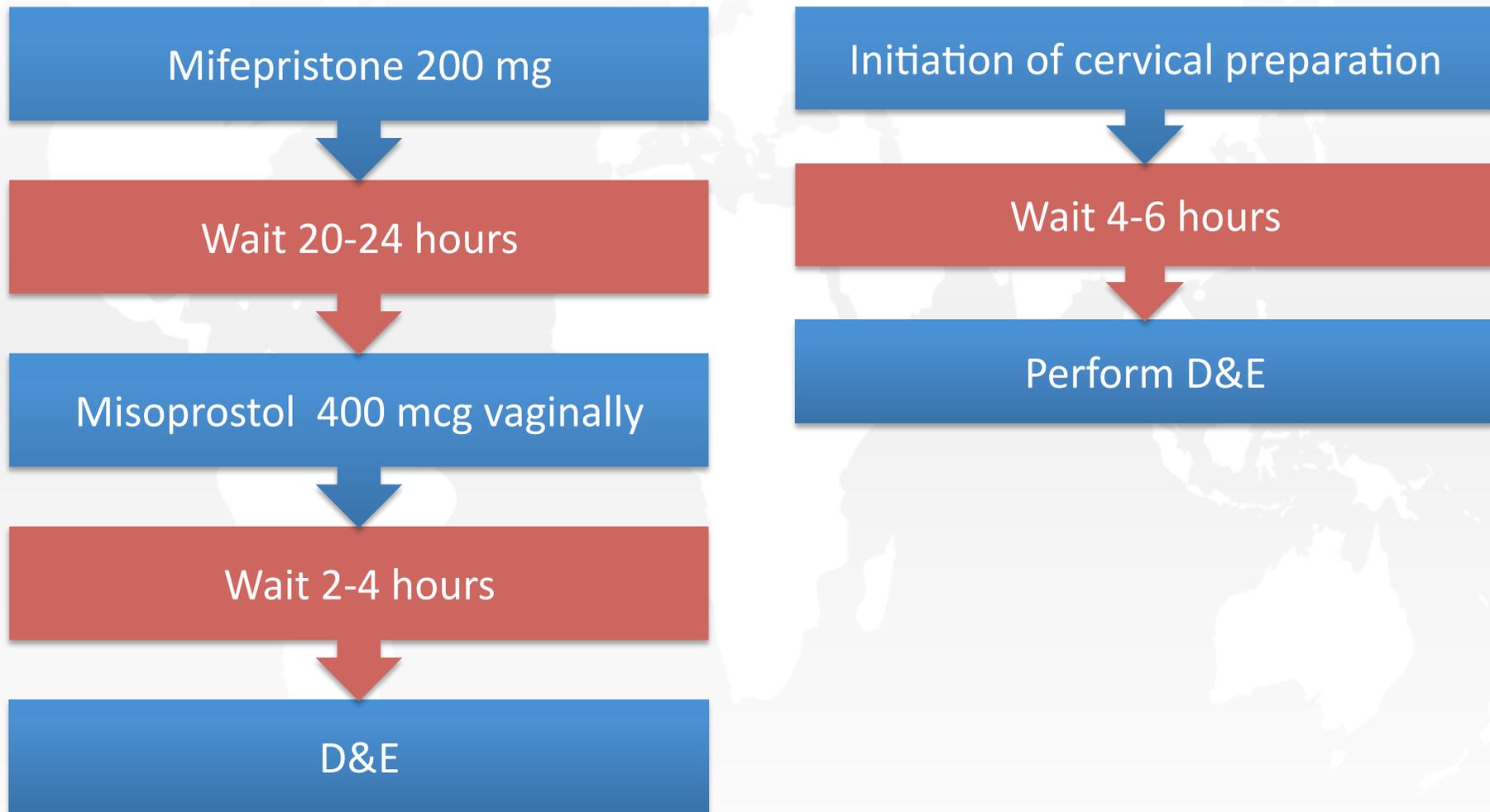
# D&E: Cervical Preparation

- To open the cervix before the procedure
- Options
  - Osmotic dilators:
    - Laminaria: overnight
    - Dilapan 3-24 hours
  - Misoprostol
    - 400 mcg vaginal 3-6 hours before
  - Mifepristone
    - 200 mg 24 hours before
  - More time with more weeks

# Procedure room



# Timeline: Induction vs. D&E



# Dilation in the 2<sup>nd</sup> Trimester

- Dilapan is better than laminaria
  - Better for overnight
  - Faster for same-day
- Misoprostol work
- Women are willing to trade temporary discomfort to lessen total time



# Thank you

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