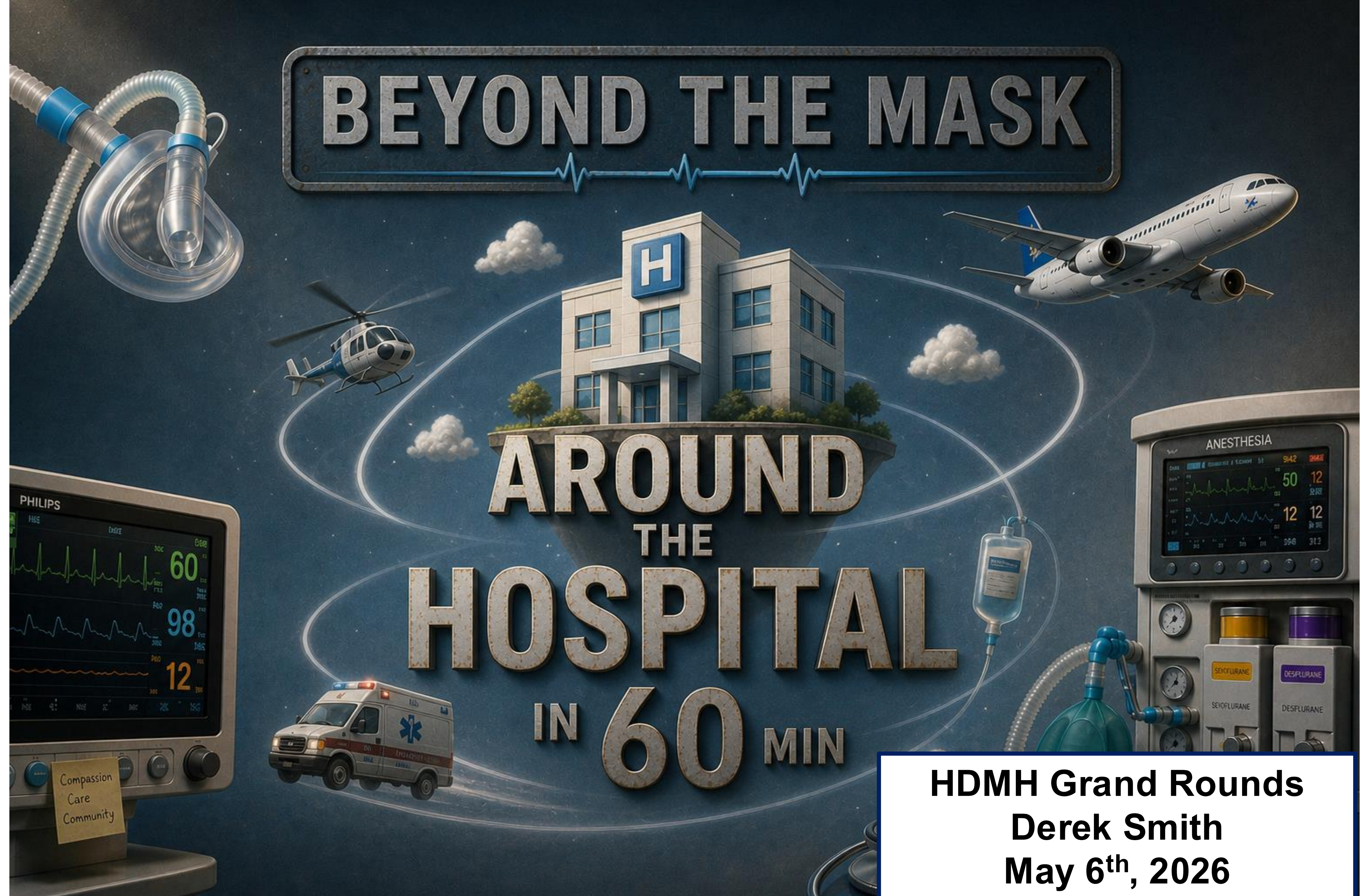

BEYOND THE MASK
AROUND
THE
HOSPITAL
IN 60 MIN
PHILIPS
60
98
12
ANESTHESIA
50
12
12
12
SEVOFLURANE
DESFLURANE
Compassion
Care
Community
HDMH Grand Rounds
Derek Smith
May 6th, 2026

GRAND ROUNDS OBJECTIVES

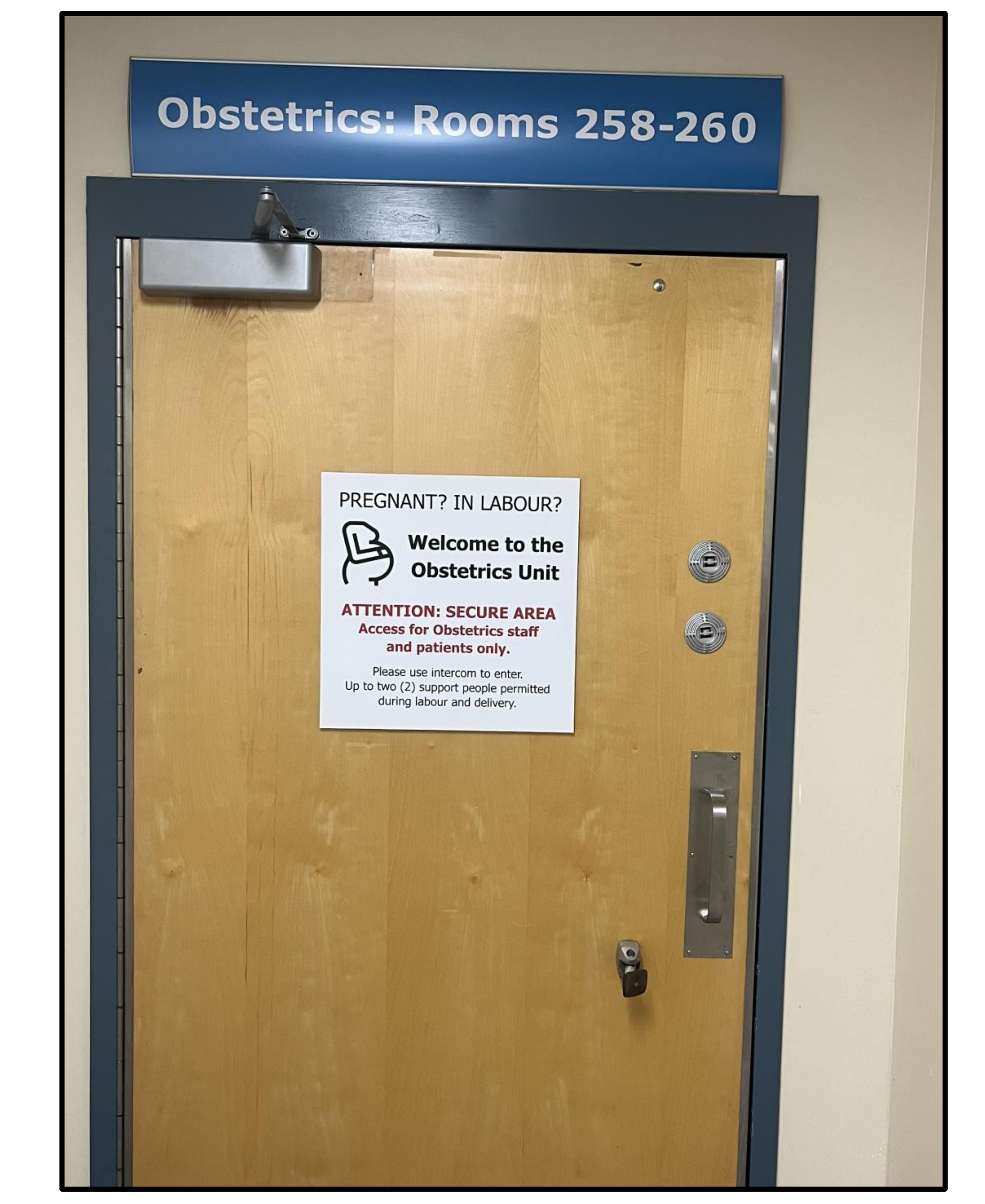
1. Describe the expanding role of anesthesiology beyond the operating room in managing pain, sedation, and acute physiologic issues across the hospital.

2. List practical, evidence-informed strategies for acute pain management in perioperative and non-operative settings.

3. Describe where Anesthesia is and could be used to better enhance collaborative, patient-centered care.

4. List new advancements as it relates to pain strategies, sedation and other anesthesia-focused techniques.

Through the Beyond the Mask initiatives, we aim to strengthen the leadership role of anesthesiologists within the health system while delivering the highest standards of innovative, safe, and sustainable patient care.

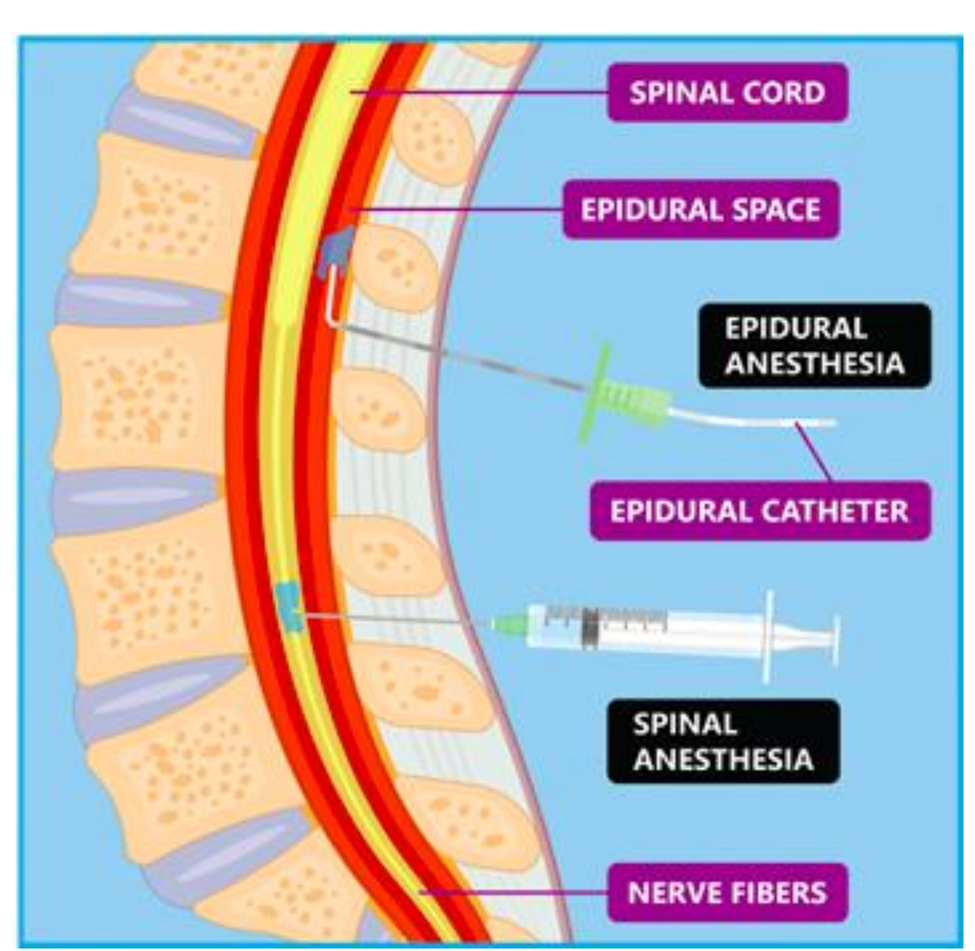

Obstetrics: Rooms 258-260
PREGNANT? IN LABOUR?
Welcome to the Obstetrics Unit
ATTENTION: SECURE AREA
Access for Obstetrics staff and patients only.
Please use intercom to enter.
Up to two (2) support people permitted during labour and delivery.

ANESTHESIA AND OBSTETRICS

- Epidurals
  - CSE vs. DPE
  - Studies ongoing with respect to onset, efficacy

- Timing of epidurals (earlier vs. later)
  - Little evidence of increased instrumentation
    - Secondary to modern low dose epi techn.[1]
  - Delays second stage by 8-15min[2,4]
  - Second stage lasts 1 hr longer[2,4]

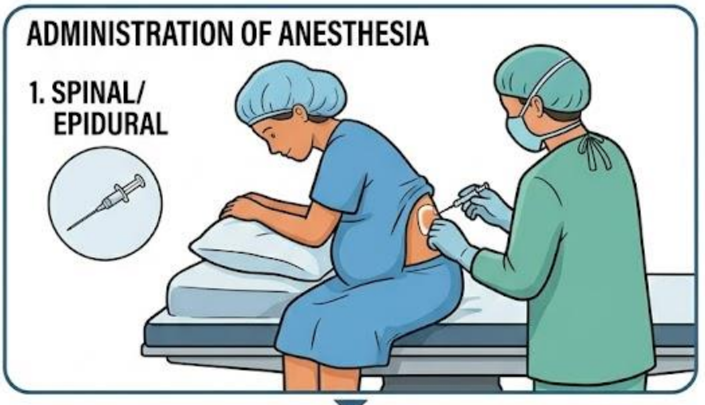
- Less concen. epidural solutions (Bupi =< 0.1%)
  - More mobility, more effective pushing, less instrumented deliveries, etc.[1,3,4]

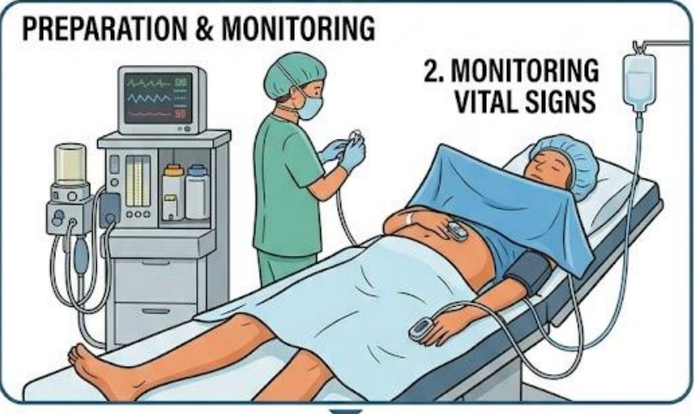


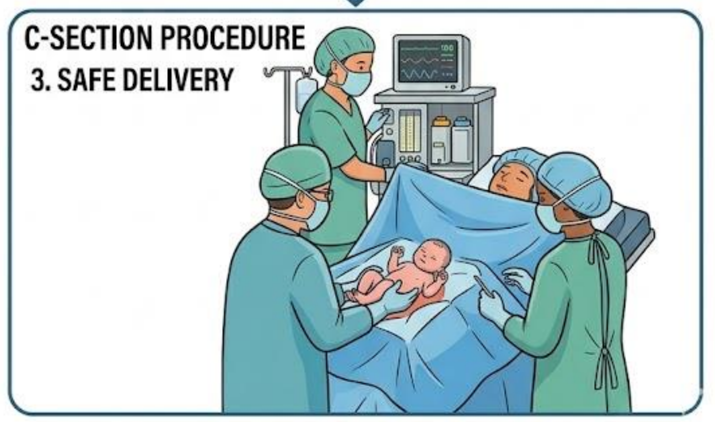
ANESTHESIA AND OBSTETRICS (CONT'D)

- Caesarean sections
  - Enhanced recovery after surgery (ERAS)[5]
  - "Sip till send" – clear fluids encouraged
  - IV Vasopressors
  - IV NSAIDs + IV/PO Acetaminophen
    - Adam Ling – my arch nemesis.
  - Intrathecal Morphine
    - Provides **superior** analgesia than parenteral opioids after C/S[6]
  - Carbetocin vs. Oxytocin
    - Synthetic, single dose, no further confusion as ongoing needs

C-SECTION AND ANESTHESIA INFOGRAPHIC







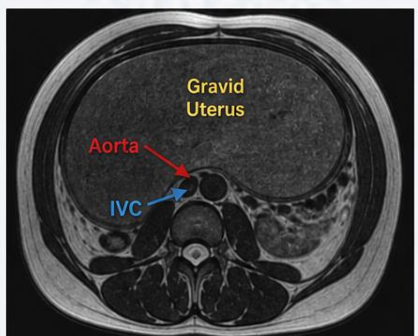
ANESTHESIA AND OBSTETRICS (CONT'D)

- Caesarean sections
  - Aorto-caval compression
    - Used to use 15 degree wedge
    - MRI study shows need 45 degrees to have near complete decompression[7-9]
  - RCT (Lee et al. 2017) showed no difference in neonatal acid-base status between supine and 15 degrees tilt (with concomitant vasopressor admin)
  - Modern anesthesia with vasopressor management ultimately renders any wedge unnecessary[7-9]

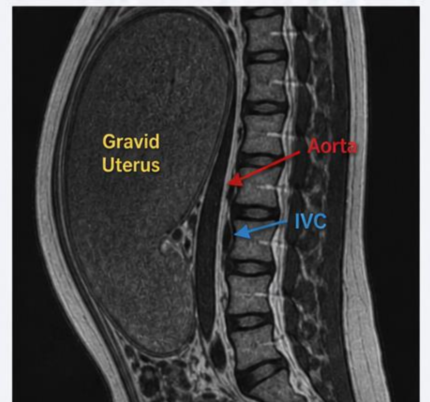
MRI STUDY IN PREGNANT WOMEN
45° LEFT TILT PREVENTS AORTO-CAVAL COMPRESSION

SUPINE (0° TILT)

AORTO-CAVAL COMPRESSION

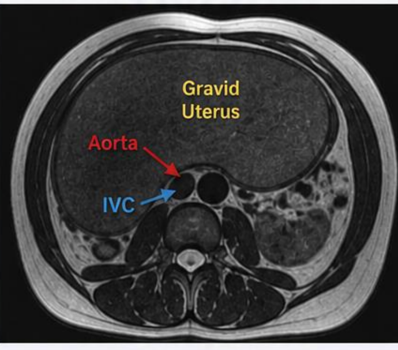


IVC AP DIAMETER	COMPRESSION INDEX
2.1 mm	82%

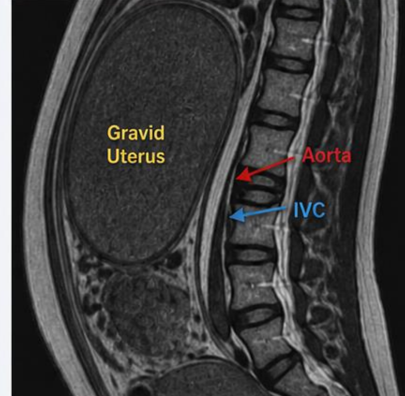


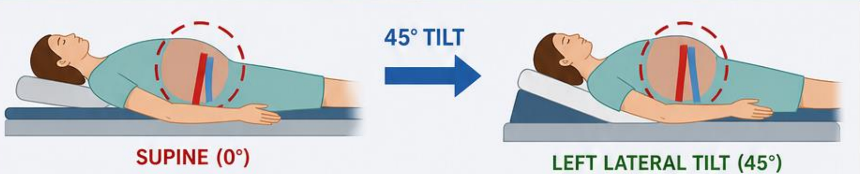
LEFT LATERAL TILT (45°)

AORTO-CAVAL COMPRESSION RELIEVED



IVC AP DIAMETER	COMPRESSION INDEX
12.5 mm	6%





SUPINE (0°)

LEFT LATERAL TILT (45°)

45° LEFT LATERAL TILT PREVENTS AORTO-CAVAL COMPRESSION
– IMPROVES MATERNAL HEMODYNAMICS

ANESTHESIA AND THE WARD

ANESTHESIA AND THE WARD

PAIN

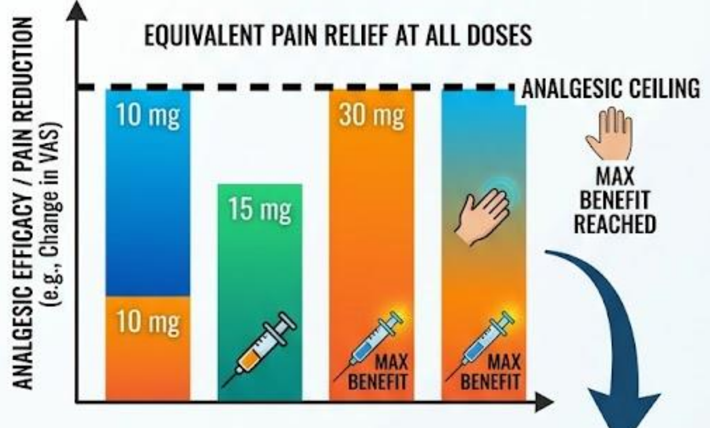
- Regular acetaminophen dosing
- IV Ketorolac = 4mg IV Morphine[10]
  - Reduces opioid consumption 25-50%[10]
  - 10mg = 15mg = 30mg[11]
- Indomethacin crosses BBB – has central effects
- PO Ibuprofen = lowest risk of GI complications[12]

- Nabilone (Cesamet) – approved for CINV
  - CB1/CB2 receptors – adjuv. Analgesia for pain severity
  - Biggest evidence for neuropathic pain

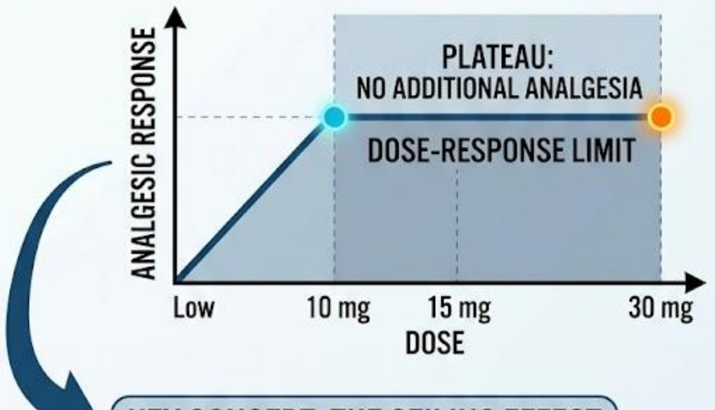
THE KETOROLAC ANALGESIC CEILING EFFECT

SOURCE: MOTOV ET AL., ANN EMERG MED, 2017

1. SPECIFIC DOSES: 10 mg vs 15 mg vs 30 mg (IV)



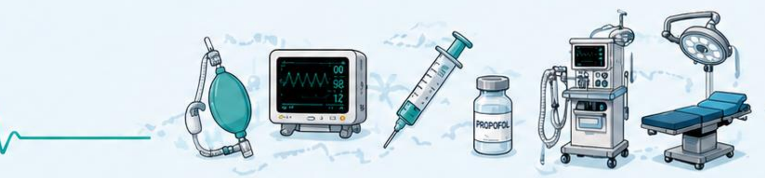
2. GENERAL DOSE-RESPONSE RELATIONSHIP



KEY CONCEPT: THE CEILING EFFECT

INCREASING DOSE ABOVE 10 MG DOES NOT INCREASE PAIN RELIEF BUT MAY INCREASE RISK OF ADVERSE EFFECTS

(e.g., GI bleed, renal issues)

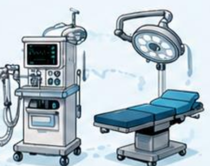


ANESTHESIA AND THE WARD

PAIN

- Ketamine (I hate it, but it works)
  - Oral absorption is poor (bioavailability ≦ 40%)
  - NMDA antagonist, dose dependent analgesia/anesthesia
  - 0.1mg – 0.3mg/kg mainly analgesia.
  - Comparable effects to morphine with similar need for rescue analgesia[13]
  - IV intermittent dosed q4h starting at 0.1mg/kg

- Topical
  - Lidocaine patches for Herpes Zoster, topical capsaicin
  - RUBA535 (substance P depletion) if you're really desperate for those folks with hard to treat, non-specific MSK pain.



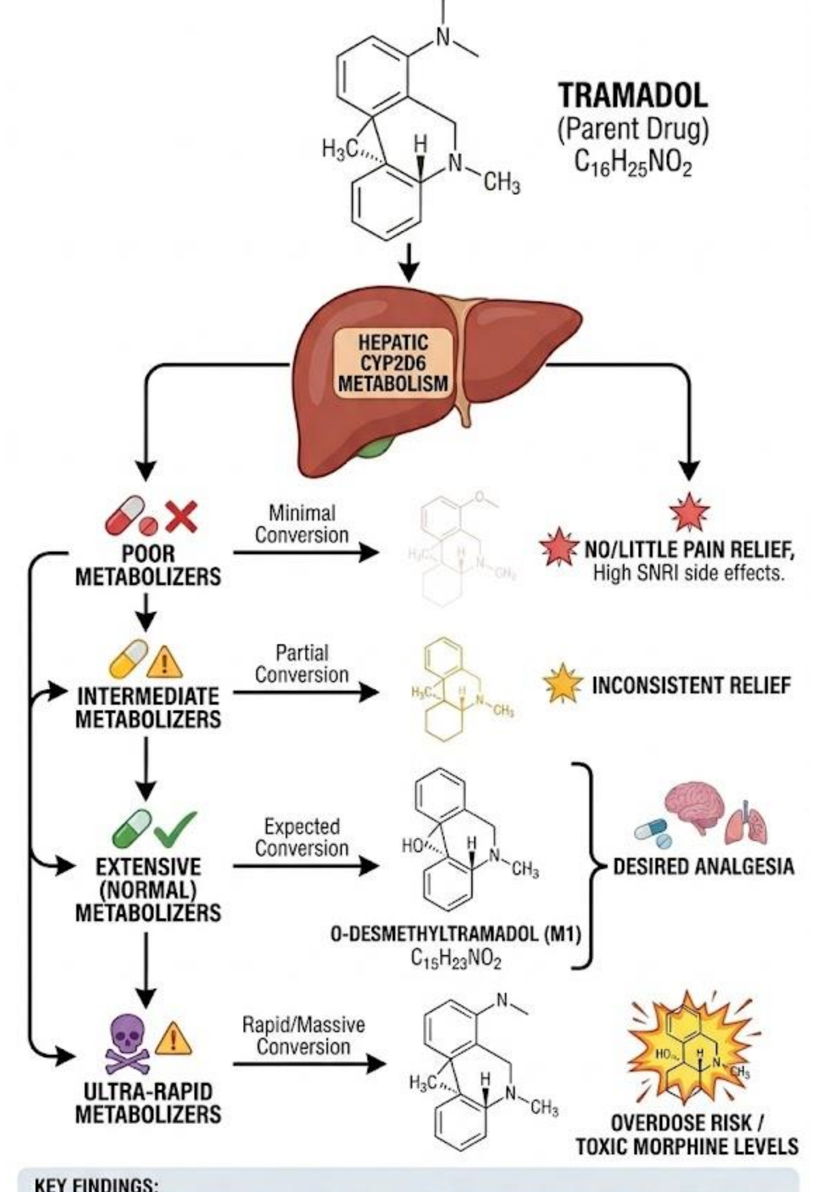
ANESTHESIA AND THE WARD

Some analgesics to avoid..

1. Codeine
   - CYPD2D6 heterogeneity
   - Lots of SEs and little benefit in low metabolization group[14]

2. Gabapentinoids
   - Opioid sparing effect is inconsistent[15]
   - Safety concerns inc. recognized
     - Respiratory depression
     - Risk of delirium (age >65)

3. Tramadol
   - CYP2D6 heterogeneity[14,15]
   - SNRI, weak opioid
   - Risk of serotonin syndrome, lowers seizure threshold



ANESTHESIA AND THE WARD

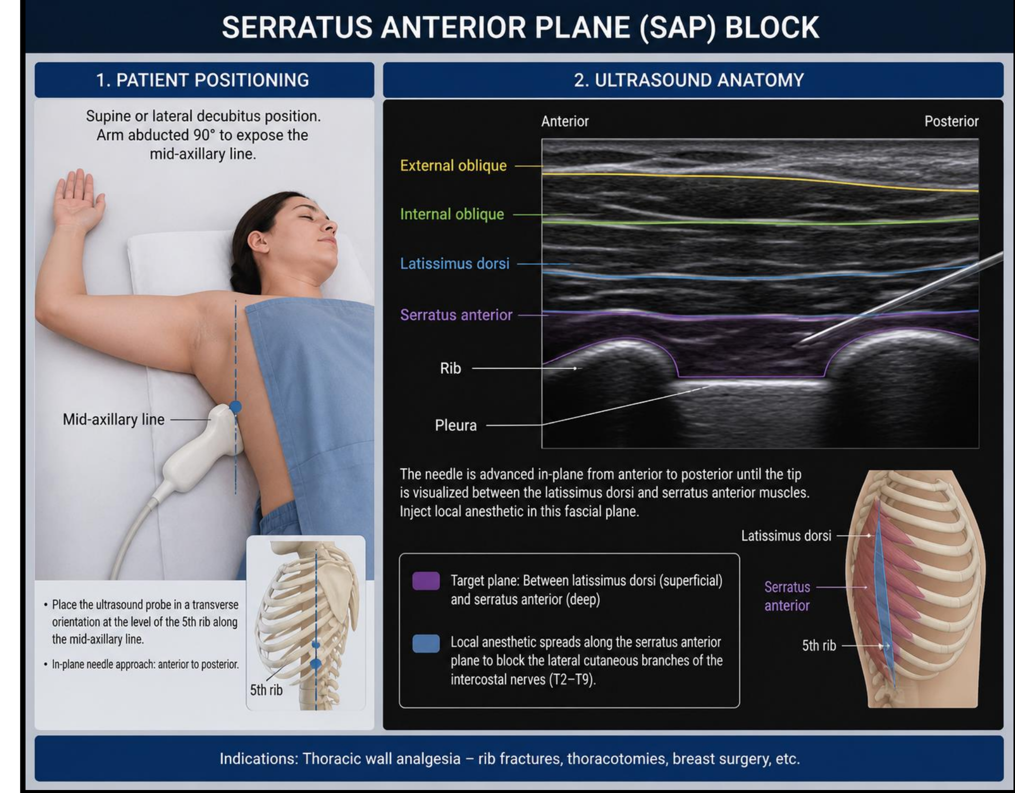
PAIN

- Specific cases:

- Rib fractures = call us.
  - TEA vs. Fascial plane blocks
  - Indwelling nerve catheters
  - PCA

- Hip fractures = call us.
  - Femoral nerve blocks vs. PENG vs. SIFI

- Widespread pain (malignancy, bony metastasis)
  - Dexamethasone – dec. periosteal stretching, capsular stretching of organs[16]

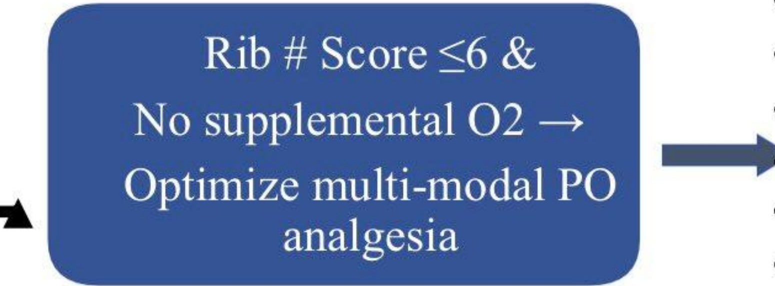


The Ottawa Hospital Pathway for Early Intervention in Rib Fracture

Rib Fracture score
breaks x sides + age factor

Breaks	Sides	Age factor
Number of fractures Total # of fractures to the ribs, NOT the # of ribs fractured	Unilateral = 1 Bilateral = 2	<50 years = 0 51-60 years = 1 61-70 years = 2 71-80 years = 3 >80 years = 4

Adapted from Easter's Rib fracture score and protocol (2004)



- **Acetaminophen 1000mg q6h**
- **+/- NSAID (Celebrex 200mg BID)**
- **PO/SQ opioid**
  - **+/- Tramadol 50mg q8h**
  - **Hydromorphone 1-2mg PO q4h PRN**
- **+/- Gabapentinoid**
  - **Pregabalin 25-50mg q8h**

Rib # score ≥7
OR ≤6 + Supplemental O2 →
<u>Consult APS</u>
+ Multi-modal analgesia
+/- Regional +/- PCA

- **+/- Ketamine infusion** *Consider when regional not possible*
- **+/- Lidocaine infusion**
- **Serratus Anterior Plane CatheterΨ <u>OR</u> Thoracic epidural*** (when expertise available)
  - ➢ **PVB/catheter – alternative** (provider discretion)
- **+/- IV PCA**

Ψ<u>SAP Catheter</u>: Not well studied, but clinical benefit seen. Consider for unilateral #'s +/- position issues +/- anticoagulated patients, when expertise permits. *(Run catheter at 8ml/h + 8ml bolus q30 mins <u>OR</u> nurse administered bolus 8ml q3h)*

***<u>Epidural</u>**: Multiple studies show improved pulmonary function, pain control, and better clinical outcomes vs systemic opioids

Rib # Score >10

- **Consider CPAP/BiPAP**

Created Dr. S Tierney, Nov. 2019

JAMA Published online March 24, 2025

Peripheral nerve blocks shown in short-axis ultrasound view

Under ultrasound visualization, local anesthetic is administered along the nerve bundle or within the fascial plane.

CROSS-SECTION THROUGH INGUINAL CREASE

Needle trajectory for pericapsular nerve group block

Fascia iliaca

Femoral nerve

Femoral artery

Femoral vein

AIIS

Iliacus muscle

Psoas muscle

Pectineus muscle

Local anesthetic

Iliopubic eminence

Plane of cross-section

Pericapsular nerve group

Psoas tendon

Ilium

Target local anesthetic spread area

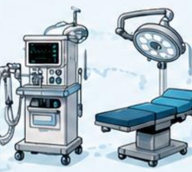
Fascia iliaca block

Femoral nerve block

Pericapsular nerve group block

- Large sys. review (19 RCTs):
- Biggest effect is ↓ delirium
- Also decreased pain scores within 30-120min[17]
  - Extends into post-op period
- No mortality benefit[17]

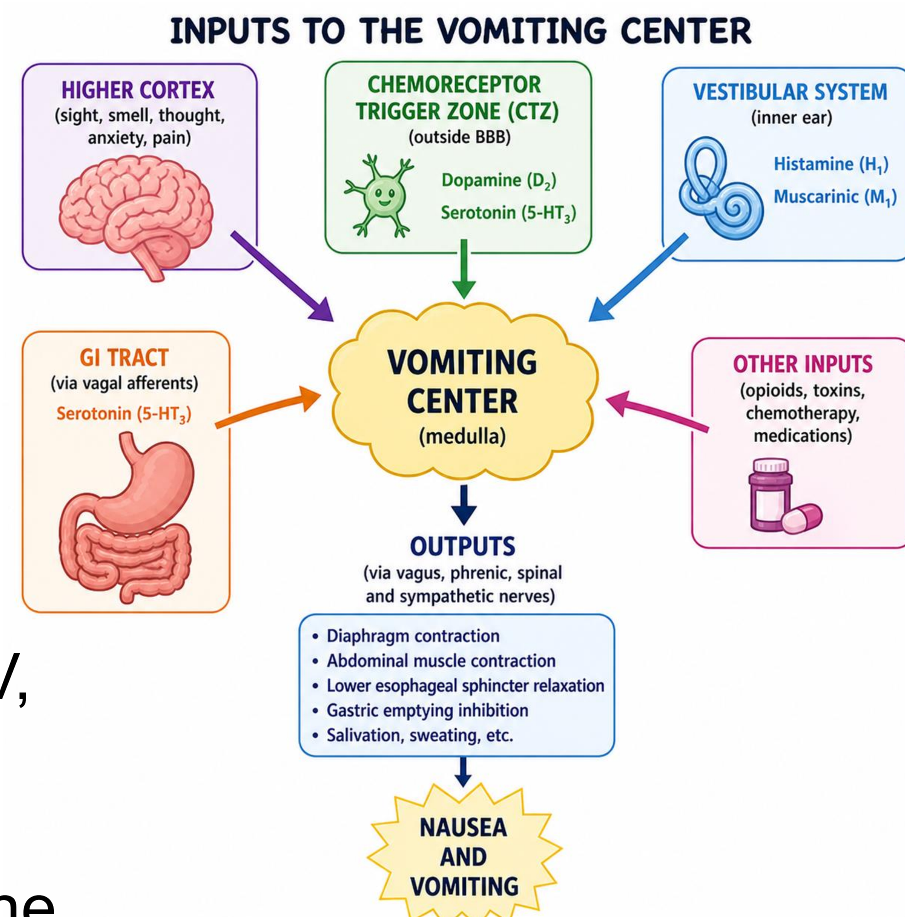
- Choice of block = variances in hip capsular coverage, but practically has now shown a statistical difference[17]



ANESTHESIA AND THE WARD

NAUSEA

- When usual fails – reach for Haloperidol or Olanzapine
  - Haloperidol blocks D2 in CTZ (opioid induced NV, PONV)
  - Olanzapine may be even better
    - D2 in CTZ, Serotonin (5HT2, 5HT3), Histamine (vestibular), Muscarinic (vestibular and central)
    - Strong in CINV, refractory NV.



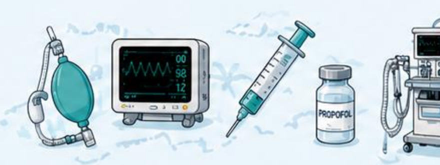
- Gravol and Dramamine are actually two different drugs that may not be that effective for antimetic purposes…

ANESTHESIA AN

"Dimenhydrinate is actually diphenhydramine combined with a theophylline derivative intended to counteract sedation. But that didn't work so they marketed it for motion sickness instead, and now it's a go-to for nausea despite being mostly hot garbage."

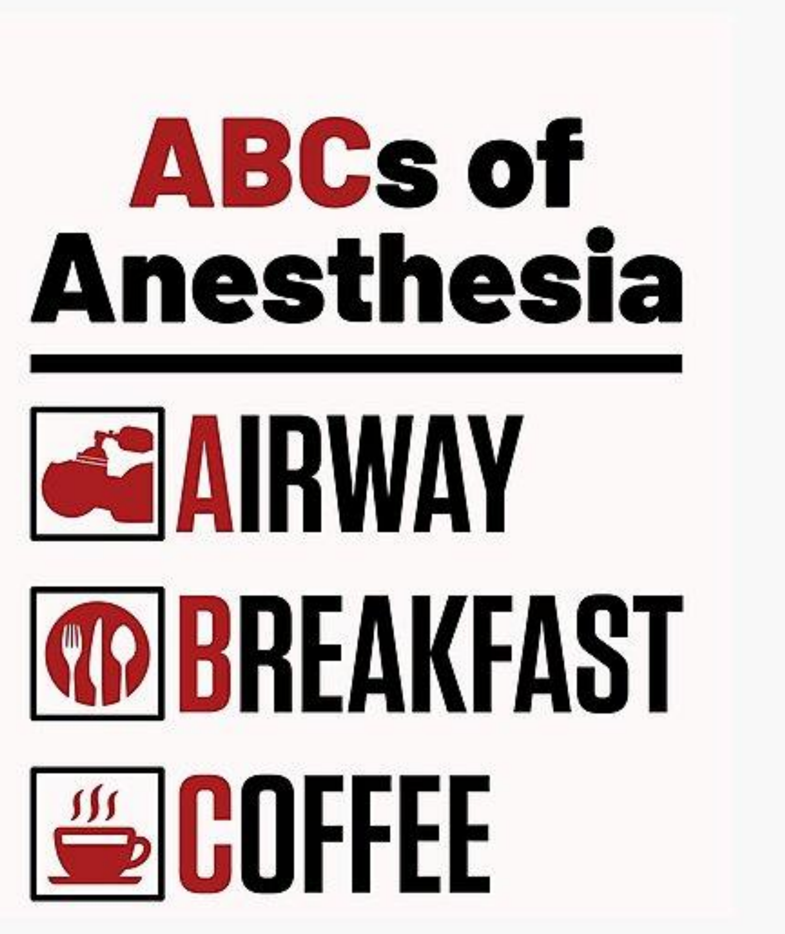
0:01 From Shanna Storrie

Every-time you give 7mg of
diphenhydramine an



ANESTHESIA IN THE CAFETERIA?

ANESTHESIA IN THE CAFETERIA



ANESTHESIA IN THE ED/ICU

ANESTHESIA IN THE ED/ICU
AIRWAY INTERVENTION

- Induction drugs: Ketamine vs. Etomidate (so 🔥 right now)[18]
  - Casey et al. showed greater hemodynamic collapse with Ketamine, non-inferiority with Etomidate
  - 28 day mortality no difference

- Airway equipment
  - Video laryngoscopy unequivocally better (1st attempt success without complication)[19]
  - We have HAVL and Mac VL – dealers choice.
    - HAVL = better glottic view, more difficult ETT delivery
    - Mac VL = worse glottic view, easier ETT delivery

ANESTHESIA IN ED/ICU

Home > Canadian Journal

A deliberately
GlideScope® v
faster and easi
with a full glott

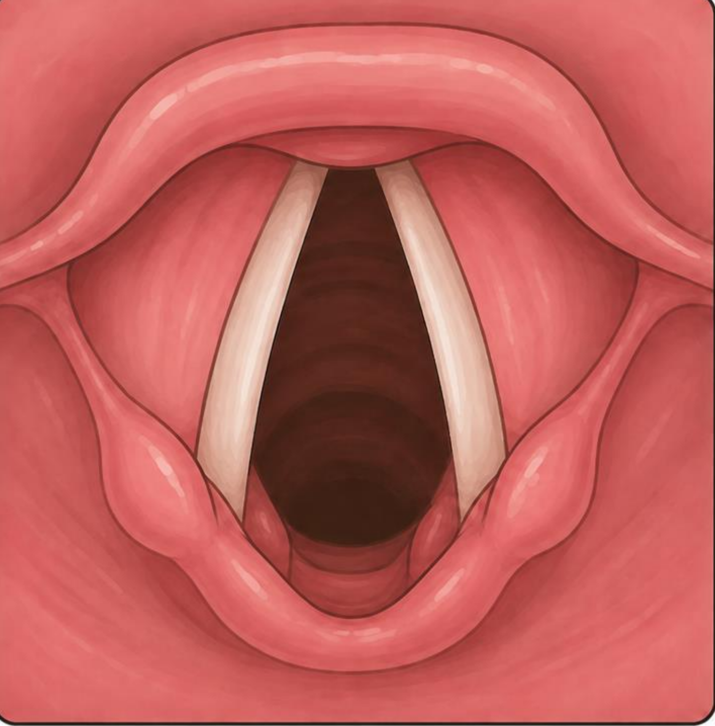
Une vue laryngée délibé
associée à une intubatio
étude clinique randomis

Reports of Original Investig

Anesthesia/Journal

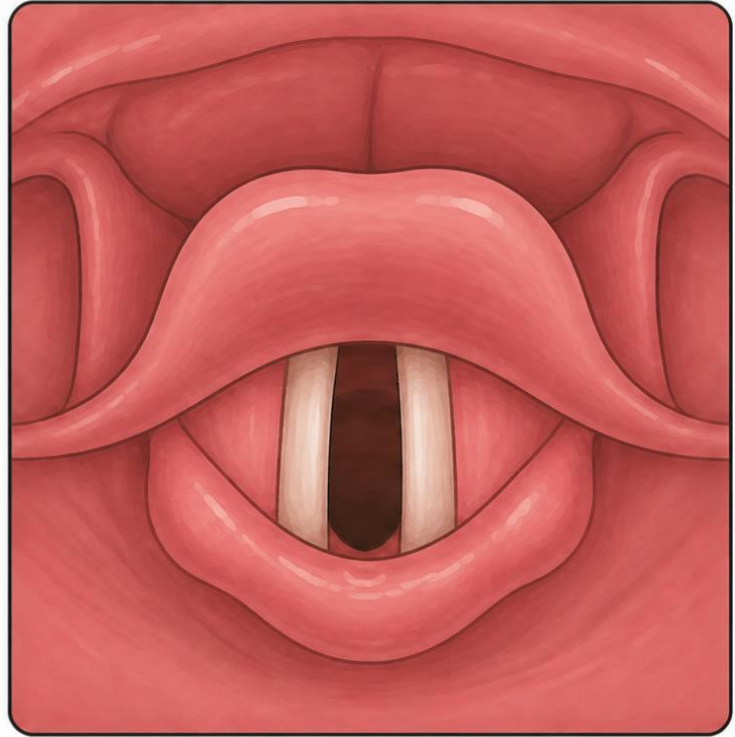
ie

Grade 1 View
(Full view of the glottis)



All of the glottic opening is visible,
including the anterior and posterior commissures.

50% Glottic Opening
(Partial view)



Approximately 50% of the glottic opening
is visible due to the epiglottis partially
obscuring the view (like a curtain).

ANESTHESIA IN ED/ICU

AIRWAY INTERVENTION

- Hemodynamics: best success is with not with induction medications, but giving peri-intubation vasopressors
  - Avoid hypotension – other end points (mortality, LOS, neurologic outcomes) less affected[20]

- **PREOXI** (2024) suggests we should be pre-oxygenating our critically-ill patients with NIV whenever possible[19]
  - Hypoxemia during intubation reduced: 18.5% (mask) → 9.1% (NIV)
  - Longer ”safe” apnea time

ANESTHESIA IN ED/ICU

SEDATIONS

- “Huntsville” Ketamine: Ideal for those patients who spontaneous vent. is paramount

- Pediatrics: mix oral midazolam with Tylenol and give in a syringe
  - Midazolam oral bioavailability low – we have concen. forms avail.

- Going to give Ketamine to a pediatric patient? Pre-treat with Glycopyrrolate (anticholin.) to minimize secretions and decrease laryngospasm risk.

ANESTHESIA IN HOSPICE & PALLIATIVE CARE

ANESTHESIA IN HOSPICE & PALLIATIVE CARE

- “Tunneled” epidural catheters for long-term pain solutions
  - Choice of concentration of epidural solution to suit the unique needs of every patient
- Nerve blocks
  - Catheters taped and secured – again with infusions allowing for varying levels of analgesia and mobility
- Infusions
  - Lidocaine, Ketamine
- Home visits (some providers)?
  - Sedations for withdrawal of care scenarios, IV access for MAiD

ANESTHESIA IN HOSPICE & PALLIATIVE CARE

Trillium
Gift of Life
Network

ANESTHESIA IN THE OR – WHAT'S NEXT

ANESTHESIA IN THE OR – WHAT'S NEXT

- Better pain control, more ambulatory surgery, less admissions
  - Neuraxial morphine as an adjunct to large laparoscopic procedures and open procedures
  - Less thoracic epidurals – more fascial plane blocks (equivalency?)

- Some surgeries can be done with minimal sedation with regional anesthesia

- Our block game – getting better and better.
  - Adding adjuvants to decrease length of blockade and decrease rebound pain
  - Forthcoming study regarding follow-up these blocks and further how to optimize

- Outpatient pain clinic? TBD…

ANESTHESIA IN THE OR – WHAT’S NEXT

ANESTHESIA AROUND THE HOSPITAL – SUMMARY

- Biggest outside OR involvement – blocks
  - Decreases opioid use
  - Decreases pain and delirium – potentially dec. admissions?

- Airway intervention and sedations - such great skill throughout but happy to be involved whenever needed

- Hospice – growing involvement, novel techniques, great area to practice with wide breath of skill

OUTSIDE THE HOSPITAL – IN COLLINGWOOD

REFERENCES

1. Callahan EC, Lee W, Aleshi P, George RB. Modern Labor Epidural Analgesia: Implications for Labor Outcomes and Maternal-Fetal Health. American Journal of Obstetrics and Gynecology. 2023.

2. Anim-Somuah M, Smyth RM, Cyna AM, Cuthbert A. Epidural Versus Non-Epidural or No Analgesia for Pain Management in Labour. The Cochrane Database of Systematic Reviews. 2018.

3. Liu EH, Sia AT. Rates of Caesarean Section and Instrumental Vaginal Delivery in Nulliparous Women After Low Concentration Epidural Infusions or Opioid Analgesia: Systematic Review. BMJ. 2004.

4. Au-Yong PS, Tan CW, Tan WH, et al. Factors Associated With an Increased Risk of Instrumental Vaginal Delivery in Women With Epidural Analgesia for Labour: A Retrospective Cohort Study. European Journal of Anaesthesiology. 2021.

5. Sultan P, Monks D, Sharawi N et al. Guidelines for postoperative care in cesarean delivery: Enhanced Recovery After Surgery Society recommendations (part 3)—2025 update American Journal of Obstetrics & Gynecology, 2025; 233, S184-S198

6. Bonnet et al. Eur J Pain. 2010. e1-e9.

7. Crawford, J. S., Burton, M., & Davies, P. (1972). Time and lateral tilt at caesarean section. *British Journal of Anaesthesia, 44*(5), 477–484.

8. Holmes, F. (1960). Tilt in obstetric anaesthesia. *Anaesthesia, 15*(3), 298–306.

9. Humphries, A., Mirjalili, S. A., Tarr, G. P., Thompson, J. M. D., & Stone, P. (2019). The effect of supine positioning on maternal hemodynamics during late pregnancy: An MRI study. *Journal of Physiology, 597*(3), 743–753.

10. McNicol ED, Ferguson MC, Schumann R. Single-Dose Intravenous Ketorolac for Acute Postoperative Pain in Adults. The Cochrane Database of Systematic Reviews. 2021.

REFERENCES

11. Motov, S., Yasavolian, M., Likourezos, A., et al. (2016). Comparison of intravenous ketorolac at three single-dose regimens for treating acute pain in the emergency department: A randomized controlled trial. *Annals of Emergency Medicine, 68*(3), 318–325.

12. A Randomized Controlled Trial of Ibuprofen Versus Ketorolac Versus Diclofenac for Acute, Nonradicular Low Back Pain.Academic Emergency Medicine : Official Journal of the Society for Academic Emergency Medicine. 2021. Irizarry E, Restivo A, Salama M, et al.

13. William K. Silverstein, David N. Juurlink and Jonathan S. Zipursky. CMAJ. November 01, 2021 93 (43). E1663;

14. Crews, K. R., Monte, A. A., Huddart, R., Caudle, K. E., Kharasch, E. D., Gaedigk, A., Dunnenberger, H. M., Leeder, J. S., Callaghan, J. T., Samer, C. F., Klein, T. E., Haidar, C. E., Van Driest, S. L., Ruano, G., Sangkuhl, K., Cavallari, L. H., Müller, D. J., Prows, C. A., Nagy, M., Somogyi, A. A., & Skaar, T. C. (2021). Clinical Pharmacogenetics Implementation Consortium guideline for *CYP2D6*, *OPRM1*, and *COMT* genotype and select opioid therapy. *Clinical Pharmacology & Therapeutics*, *110*(4), 888–896.

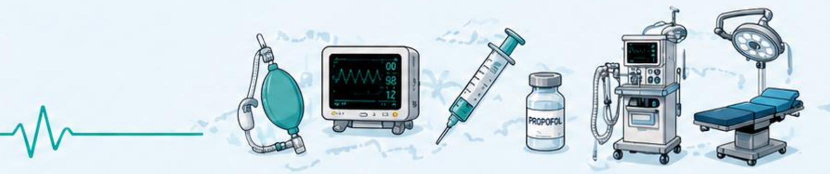
15. Kummer, I., Lüthi, A., Klingler, G., Andereggen, L., Urman, R. D., Luedi, M. M., & Stieger, A. (2024). Adjuvant analgesics in acute pain – Evaluation of efficacy. *Current Pain and Headache Reports*, *28*(11), 843–852.

16. Haywood, A., Good, P., Khan, S., Leupp, A., Jenkins-Marsh, S., Rickett, K., & Hardy, J. R. (2015). Corticosteroids for the management of cancer-related pain in adults. *Cochrane Database of Systematic Reviews*, (4), CD010756.

17. Yves Guay, Y., Michael Parker, M. J., Robin Griffiths, R., & Suzanne Kopp, S. (2017). Peripheral nerve blocks for hip fractures. *Cochrane Database of Systematic Reviews*, (5)

18. Casey, J. D., Janz, D. R., Russell, D. W., et al. (2025). Ketamine or etomidate for tracheal intubation of critically ill adults. *The New England Journal of Medicine*.

19. Semler, M. W., Casey, J. D., Lloyd, B. D., et al. (2023). Effect of noninvasive ventilation vs oxygen mask preoxygenation on hypoxemia during tracheal intubation among critically ill adults: The PREOXI randomized clinical trial. *The New England Journal of Medicine, 388*(23), 2165–2177.



REFERENCES

20. Saunders, H., Khadka, S., Shrestha, R., et al. (2024). *A systematic review and meta-analysis of prophylactic vasopressors for the prevention of peri-intubation hypotension. Diseases, 13*(1), 5.