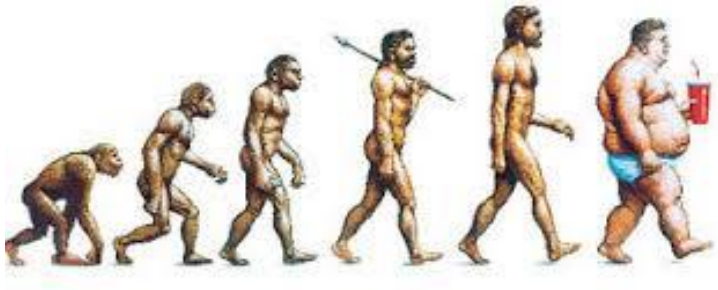
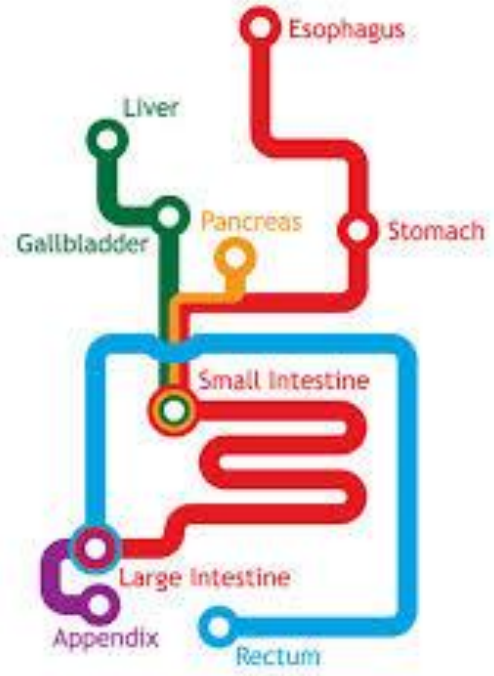


# The Evolution of Sedation in GI Endoscopy

Wade Weigel, MD
Anesthesiologist, Virginia Mason Medical Center
Pacific Northwest Gastroenterology Society Meeting
February 27, 2016
Seattle, WA

- Sedation continuum
- GI-Anesthesia trends
- The anesthesiologist’s perspective:
  - Versus the OR
  - Business
  - Endotracheal tubes
- Sedasys
  - Limitations
  - Implementation
  - Research
- Resource allocation

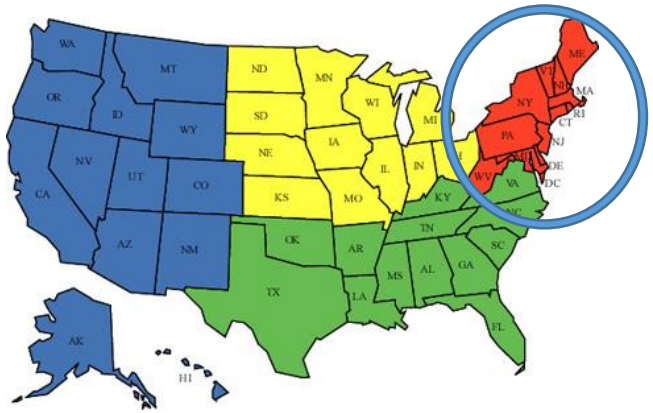


American Society of Anesthesiologists

| | *Minimal Sedation Anxiolysis* | *Moderate Sedation/ Analgesia ("Conscious Sedation")* | *Deep Sedation/ Analgesia* | *General Anesthesia* |
|---|---|---|---|---|
| *Responsiveness* | Normal response to verbal stimulation | Purposeful** response to verbal or tactile stimulation | Purposeful** response following repeated or painful stimulation | Unarousable even with painful stimulus |
| *Airway* | Unaffected | No intervention required | Intervention may be required | Intervention often required |
| *Spontaneous Ventilation* | Unaffected | Adequate | May be inadequate | Frequently inadequate |
| *Cardiovascular Function* | Unaffected | Usually maintained | Usually maintained | May be impaired |

# 2009 GI-Anesthesia predictions

Northeast > South > Midwest & West



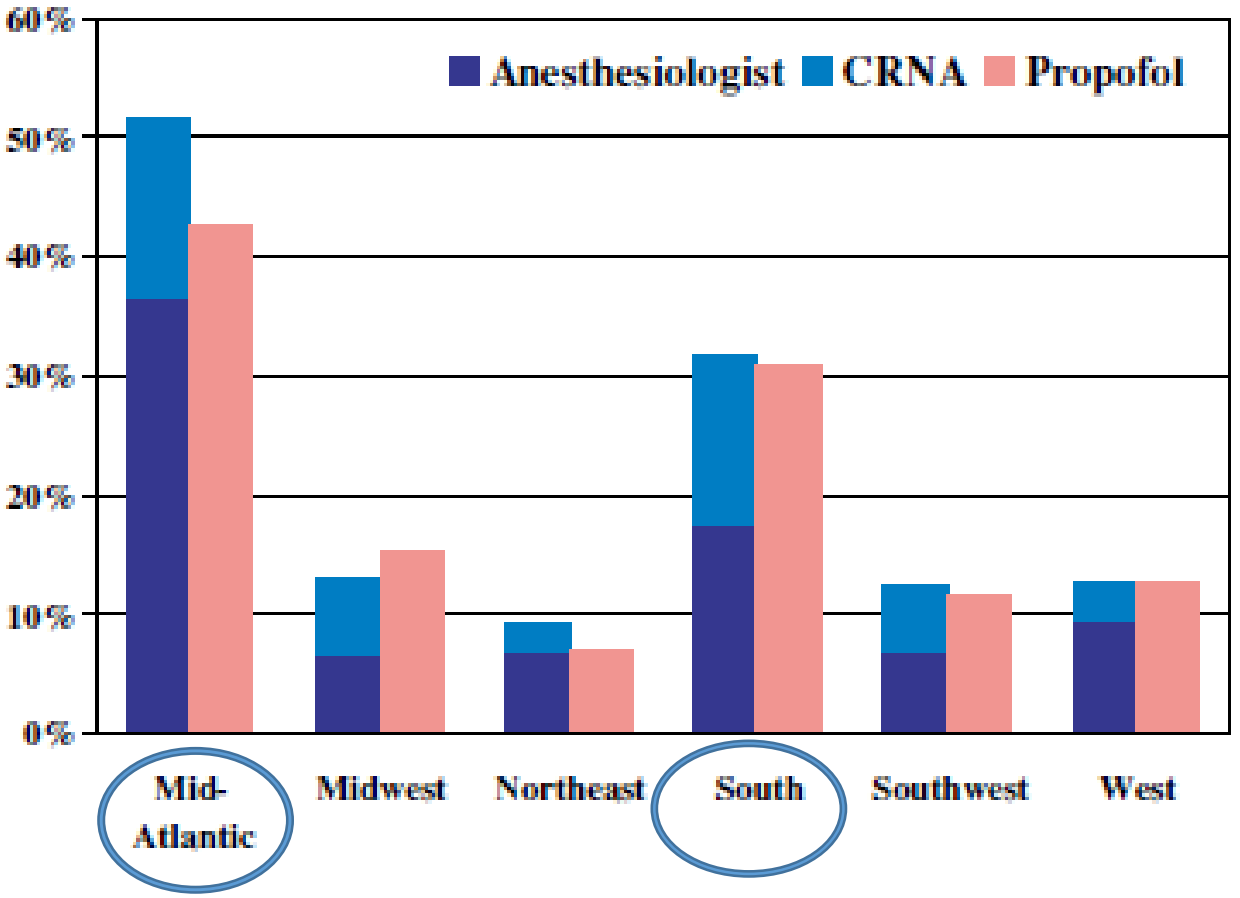

- 2003 overall ~10%
- 2007 overall 25%
- 2015 overall projected >50%

**TABLE 2. Percentage of anesthesia professional–delivered sedation for colonoscopy and EGD from 2003 to 2007 by U.S. Census region**

| | U.S. Census Region | | | | |
|---|---|---|---|---|---|
| | All | Northeast | Midwest | South | West |
| Colonoscopy | | | | | |
| 2003 | 8.75% | 12.00% | 6.76% | 9.03% | 7.50% |
| 2004 | 13.79% | 20.70% | 9.54% | 14.95% | 10.26% |
| 2005 | 17.18% | 28.57% | 11.04% | 19.65% | 9.24% |
| 2006 | 21.59% | 35.55% | 14.86% | 24.39% | 11.26% |
| 2007 | 25.01% | 39.71% | 17.96% | 29.28% | 11.65% |
| EGD | | | | | |
| 2003 | 9.80% | 12.46% | 7.03% | 10.72% | 9.11% |
| 2004 | 15.45% | 22.28% | 11.64% | 16.03% | 12.37% |
| 2005 | 18.03% | 28.99% | 11.79% | 20.29% | 11.29% |
| 2006 | 22.52% | 39.04% | 15.93% | 23.42% | 13.44% |
| 2007 | 25.95% | 41.23% | 17.98% | 29.81% | 14.45% |

Inadomi JM, Gunnarsson CL, Rizzo JA, Fang H. Projected increased growth rate of anesthesia professional-delivered sedation for colonoscopy and EGD in the United States: 2009 to 2015. Gastroint Endosc 2010; 72: 580-6.

# GI-Anesthesia Regional difference




Cohen LB, Wecsler JS, Gaetano BA, Benson AA, Miller KM, Durkalski V, Aisenberg J. Endoscopic sedation in the United States: Results from a nationwide survey. Am J Gastro 2006; 101: 967-74.

# Colonoscopy sedation by Anesthesiologist

| | Northeast | | Midwest | | South | | West | | |
|---|---|---|---|---|---|---|---|---|---|
| | Average | *P* Value | Average | *P* Value | Average | *P* Value | Average | SD | West *vs.* Other |
| Cases by anesthesia type | | | | | | | | | |
| Monitored anesthesia | **22%** | **0.000** | **17%** | **0.000** | **15%** | **0.001** | 13% | 16% | ⬇ |
| General anesthesia | **59%** | **0.000** | **65%** | **0.000** | 69% | 0.067 | 70% | 23% | ⬆ |
| Regional anesthesia | **13%** | **0.000** | **12%** | **0.003** | 10% | 0.563 | 10% | 14% | ⬇ |
| Obstetric anesthesia | 7% | 0.530 | 6% | 0.891 | 6% | 0.777 | 6% | 11% | |
| Cases by anesthesia provider | | | | | | | | | |
| Colonoscopy Delivered by anesthesia provider | **55%** | **0.000** | 27% | 0.327 | **45%** | **0.000** | 25% | 38% | ⬇ |
| Transesophageal echocardiogram Delivered by anesthesia provider | **38%** | **0.000** | 16% | 0.901 | **23%** | **0.032** | 16% | 32% | ⬇ |

Shows average percentages by region, followed by the full-sample SD. Bold values indicate statistically significant differences in the means for the West *vs.* the given region, after controlling for urban/rural, age, gender, and experience. Arrows indicate the direction of these differences, with, for example, a downward arrow indicating that the West has a lower mean than all other states.

Baird M, Daughert L, Kumar KB, Arifkhanova A. Regional and Gender Differences and Trends in the Anesthesiologist Workforce. Anesthesiology 2015; 123(5): 997-1012.

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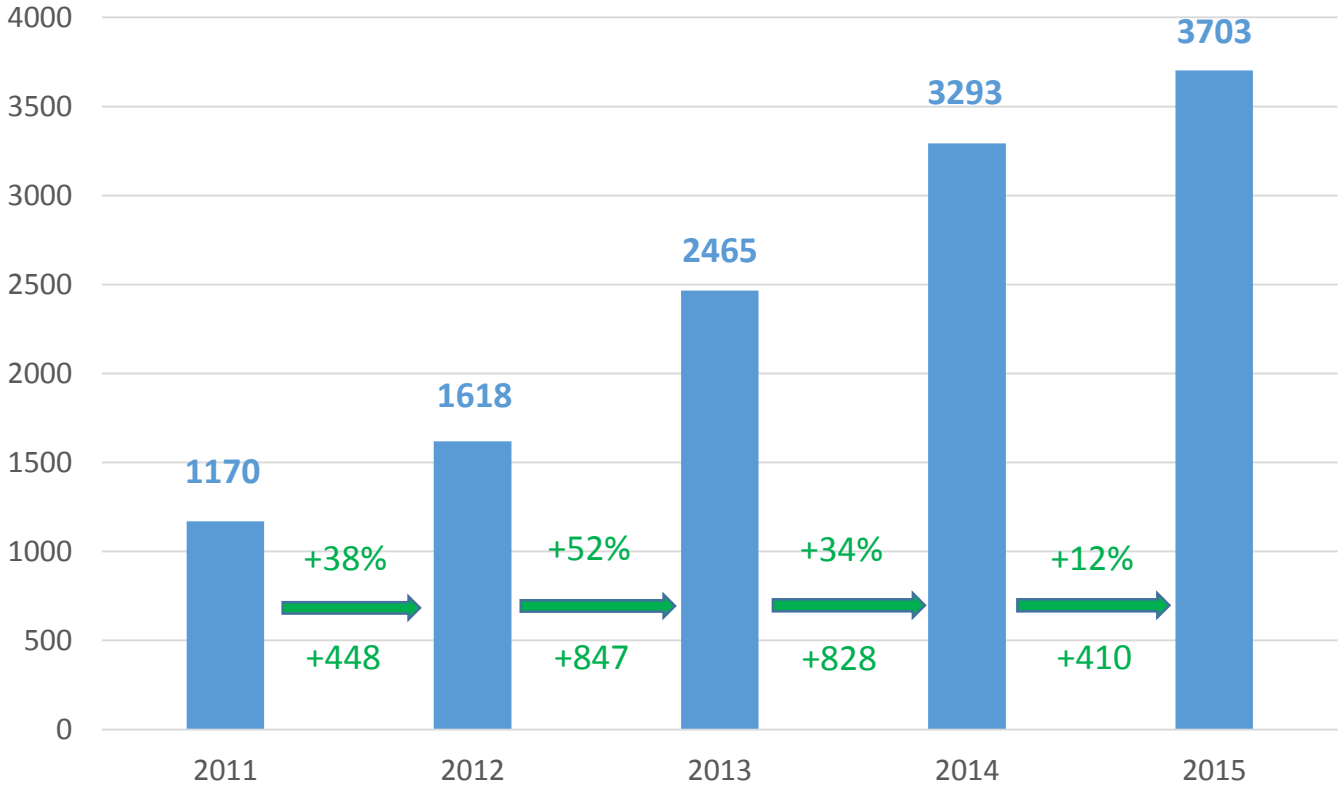
## Out-of-OR Case Volumes by Year



# Changing nature of GI sedation

- Complex GI procedures
- Endoscopist divided attention
- Sedation medication
- Need for escalated sedation ➡ GA

Goulson DT, Fragneto RY. Anesthesia for gastrointestinal endoscope procedures. Anesth Clin 2009; 27: 71-85

# Versus operating room anesthesia

- Physical plant
- Equipment:  Anesthesia vs. GI
- Personnel:  procedural & recovery

# The business of Anesthesia

- Standby
- Different services & locations
- Long delays between…or overlap

# The business of anesthesia

- 5 cases/day needed
- Current 3-team model: scheduled and urgent cases separated

# The cost of anesthesia

| ERCP + Anesthesia: Professional fee only | Insurance payment increase |
|---|---|
| Overall charges* | + 35% |
| Insurance payment* | +25-30% |
| Patient payment | No difference |

*does not include facilities fee, 1/3 to 1/5 lower percentage difference if all fees included


# Reimbursement considerations

- Multiple ICD codes for comorbidities:  DM, obesity, opioids, ETOH…
- History of failed sedation
- Complexity of procedure:  therapeutic versus screening

**Anesthesiologist**

- Aspiration
- Oxygenation/ventilation
- Hemodynamics


**Gastroenterologist**

- Airway maneuvers
- Oxygenation
- Hemodynamics

- Upper double balloon enteroscopy
- ERCP lasting >90  minutes
- Complicated ERCP technique
- Pancreatic pseudocyst drainage
- Gastric outlet obstruction
- Severe OSA
- H/o gastrointestinal surgery with blind pouch/limb from stomach (Gastric bypass for gastric cancer)

- Morning huddle
- Anesthesiologist determines anesthetic technique
- Pre-procedural time out:  no time out, no image

- End of case communication still a work in progress

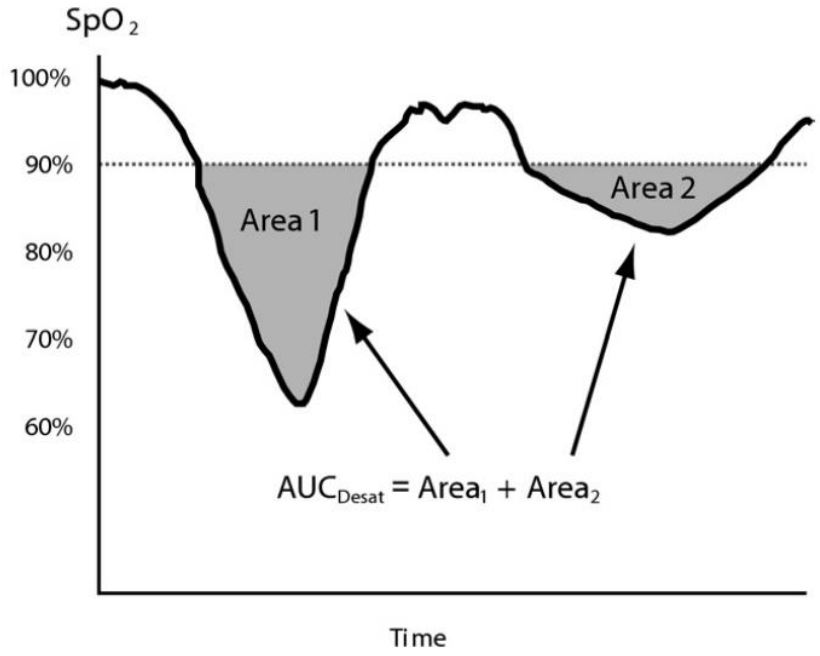
# Sedasys

- Capnography
- Pulse oximetry
- EKG
- HR
- BP
- Automated Responsiveness Monitor

- MIN-MOD sedation
- ASA 1 & 2
- EGD & Colonoscopy
- Anesthesia professional immediately available
- Identified member managing sedation should not be involved in procedure

# SEDASYS versus Midaz/Fent

- N=1000, 8 centers
- $AUC_{Desat}$: Sedasys 24 s·%, control 88 s·%, p=0.028
- Satisfaction higher in Sedasys group
- Adverse events: 5.8% sedasys, 8.7% control
- Bolus by Endoscopist in 77% of procedures, 27% of all propofol administered in trial by prn physician boluses




Pambianco DJ, Vargo JJ, Pruitt RE, Hardi R, Martin JF. Computer-assisted personalized sedation for upper endoscopy and colonoscopy: a comparative, multicenter randomized trial. GI Endo 2011: 73(4); 765-772
Cote, GA. The debate for non-anesthesiologist-administered propofol sedation in endoscopy rages on: who will be the "King of Prop?" GastroInt Endo 2011: 73(4); 773-5
FDA Executive Summary: the SEDASYS system computer-assisted personalized sedation system.

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- Gastroenterology and Anesthesiology coordinated training and implementation
- 3-4 hour online training
- 5 hour simulation training
- Completion of 4 observed (by sedasys team) cases
- Minimum yearly used required

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- Experience with 8,000 cases
- Unpublished data:

  Sedasys (n=244) versus Midazolam/Fentanyl (n=328)

  Recovery time: Sedasys 26 min, M/F recovery 39 min

  Equal desaturation/ hypotension events

  Physician satisfaction greater with Sedasys

# Resource allocation

- Patient safety
- Patient satisfaction
- Efficiency
- Cost
- Personnel utilization