The Partnership between Anesthesia and Orthopaedics for the Best Regional Anesthetic Care

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Challenges facing the Orthopaedic Surgeon in the ASC environment today

1. Maximizing operative time efficiency
2. Increasing range of cases performed in an ASC setting
3. Decreasing total patient time spent at the ASC
4. Implant and disposable equipment costs

Orthopaedic Surgery means extremity surgery

How can we perform these cases in a setting that will allow for :

1) Maximum patient comfort
2) Minimum patient side effects from anesthesia
3) Least amount of time spent in the ASC

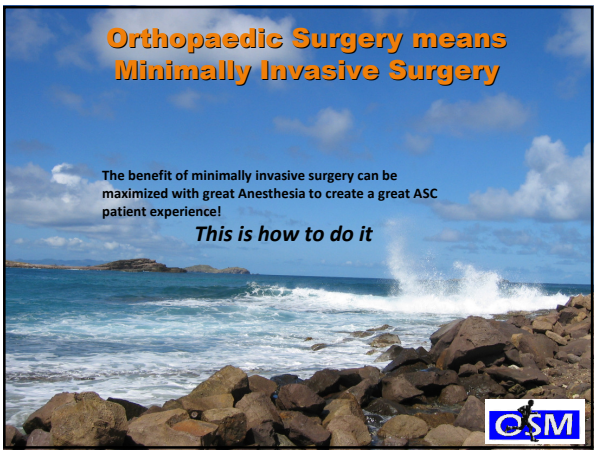
Orthopaedic Surgery means extremity surgery

For most ASCs Orthopaedic Surgery can be high volume and a potentially high revenue service line

But

Painful PACU stays make unhappy patients
Nauseated patients are not happy
Longer stays in the ASC decrease your bottom line

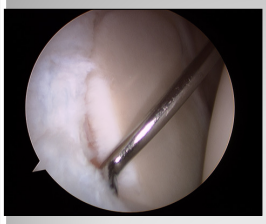
Orthopaedic Surgery means Minimally Invasive Surgery



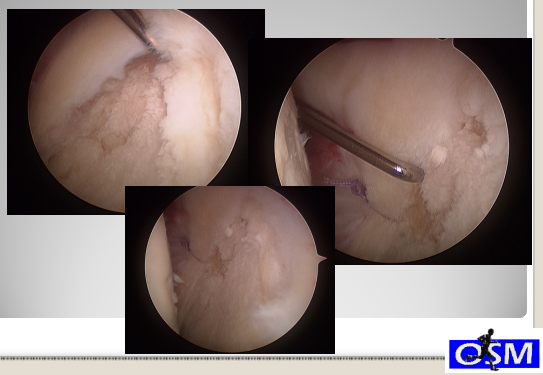
The benefit of minimally invasive surgery can be maximized with great Anesthesia to create a great ASC patient experience!

This is how to do it

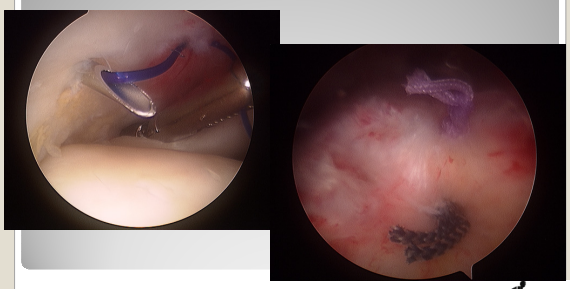
Arthroscopic Labrum (Bankart) Repairs



Arthroscopic SLAP Repairs

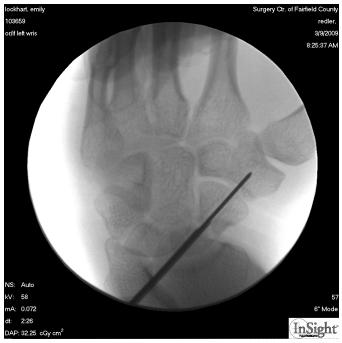


Arthroscopic Rotator Cuff Repairs



Scaphoid Fractures

Percutaneous Screw Placement

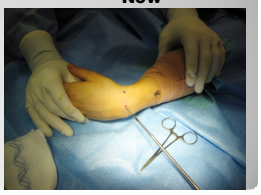


Orthopaedic Surgery means Minimally Invasive Surgery

ORIF Scaphoid Fractures

Before

Now



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Minimumaly Invasive Approach
Means Shorter recovery
Excellent Healing
Gets the patient back on the field
Or as the case may be back in the water

Orthopaedic Surgery means New Product lines

Uni-compartmental knee arthroplasty

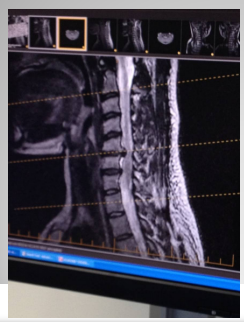
- Becoming more routine in the ASC setting
- Anesthesia and patient selection are the keys to success
- Educate the staff
- Make certain implants are paid for

Orthopaedic Surgery means New Product lines

Uni-compartmental knee arthroplasty

- Consider use of indwelling femoral nerve catheter
- Some Medicare products will pay for the implants on an outpatient basis
- Educate your total joint surgeon on the pleasures of outpatient surgery

Orthopaedic Surgery means New Product lines



Spine

Lumbar

Cervical

ACDF

One level

Two level

Orthopaedic Surgery means New Product lines

Spine

Lumbar

Cervical

ACDF

One level

Two level

What about Anesthesia?

Orthopaedic Surgery means Regional Anesthesia

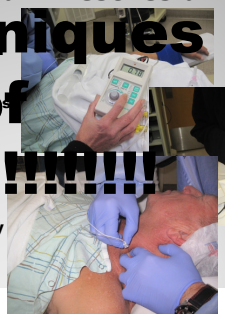
1. **Decreased morbidity vs. General anesthesia**
2. **Block Room increases efficiency and decreases OR minutes**
3. **PACU times are decreased with greater patient comfort, decreased nausea and decreased overall time spent in the ASC facility**

Interscalene Block

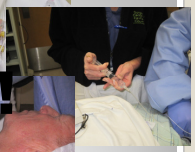
Orthopaedic Surgery means Regional Anesthesia

Techniques Out of Date!!!!!!!!

1. Decreased **morbidity** vs. General anesthesia
2. **Block Room** increases efficiency but decreases OR minutes
3. **PACU** times are decreased with greater patient comfort, decreased nausea and decreased overall time spent in the ASC facility



Interscalene Block



CSM

PARADIGM SHIFT

CURRENT CARE → OBAMACARE

Volume-Based Reimbursement → Value-Based Reimbursement

Claims & Encounter Driven → Quality & Outcome Driven

What is "Value"? Quality/Cost

What is "Quality"?

CMS and Performance/Quality Measures

1. **Clinical Process of Care (45%) – SCIP protocols (timely abx, glucose control, VTE prophylaxis, etc**
2. **Outcomes (25%) - Mortality rate, infection rate, hospital (re) admission rate, hospital-acquired complications, etc**
3. **Patient Experience/Satisfaction (HCAHPS) (30%)**

Bottom Line – Reimbursement to reward high quality/low cost care – Zero Sum

How do we improve QUALITY/OUTCOMES?

1. Appropriate patient selection
2. Better coordination of patient care (Partnership between Anesthesia and Orthopaedics)
3. Patient satisfaction (HCAHPS – 30%) – Minimize Pain and PONV
4. Know and implement "Best Practices" – e.g., ASA Task Force on Acute Pain Mgmt, 2012 SAMBA Consensus Statement
5. Internal Benchmarking – JCAHCO, AAAHC requirements
6. Monitor Outcomes (External Benchmarking) – Report outcomes to a national clinical outcomes registry:
   - National Surgical Quality Improvement Program (NSQIP)
   - National Anesthesia Clinical Outcomes Registry (NACOR)
   - SAMBA Clinical Outcomes Registry (SCOR)

2 Big Ticket Quality Items in Ambulatory Anesthesia

1. Post-Op Nausea & Vomiting (PONV)
   - 20-30% of all surgical patients experience some level of PONV
   - After pain, PONV is the next most important factor contributing to delay in patient discharge and hospital admission after ambulatory surgery
2. Post-Op Pain Management

- 77-89% of Patients complain of pain post-operatively
  - PAIN is the NUMBER ONE cause for patient dissatisfaction in ambulatory surgery patients according to HCAHPS surveys
  - PAIN is the most common cause for re-admission for same-day surgery
  - 95% of Patients receive opioid-based medications for pain management (Common side effects - sedation, dizziness, nausea, vomiting, constipation, urinary retention, and respiratory depression)

HCAHPS Survey Pain Questions

YOUR EXPERIENCES IN THIS HOSPITAL

10. During this hospital stay, did you need help from nurses or other hospital staff in getting to the bathroom or in using a bedpan?

1 ☐ Yes
2 ☐ No → **If No, Go to Question 12**

11. How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

12. During this hospital stay, did you need medicine for pain?

1 ☐ Yes
2 ☐ No → **If No, Go to Question 15**

13. During this hospital stay, how often was your pain well controlled?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

14. During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

Best Practice – Multimodal Pain Management (MMPM)

"Whenever possible, anesthesiologists should use multimodal pain management therapy….Unless contraindicated, patients should receive an around-the-clock regimen of NSAIDs, COXibs, or acetaminophen…."
– ASA Task Force on Acute Pain Management, Anesthesiology 2012; 116:248-73.

Effective Multimodal Pain Therapy Includes:

- NSAIDs (Toradol) /COX-2 Selective Inhibitors (Celebrex)
- Acetaminophen (Tylenol)
- Gabapentin (Neurontin) / Pregabalin (Lyrica)
- Tramadol (Ultram)
- Clonidine/Dexmedetomidine (Precedex)
- **REGIONAL ANESTHESIA – PERIPHERAL NERVE BLOCKS**

Goals of Multimodal Pain Management (MMPM)

1. Effective Pain Control
2. Minimal Side Effects (Minimal Opioid Use)
3. High Patient Satisfaction
4. Good Outcome

Regional Anesthesia Considerations

1. Suitability for the type of surgery
2. Post Op Motor Function/PT Requirements
3. Patient Preference – Non-GA Option
4. Surgeon Preference – Need to document a request by surgeon
5. Anesthesiologist skill and proficiency
6. Physiological and Psychological State of the Patient
7. Ultrasound
8. Dedicated Block Room or Operating Room

Benefits of Regional Anesthesia

1. **Better Pain Control**

- Up to 40% of ambulatory surgery patients experience "severe" pain with conventional treatment regimens (i.e. opioids)
- Single Injection provide effective post-op analgesia for 2-24 hrs depending upon the LA used
- Continuous perineural catheters may provide 48 hrs or more of post-op analgesia
- Less pain→ Less Opioid Use → Less Opioid Side Effects → Higher Patient Satisfaction → Higher $$ in VBP Reimbursement
- Less respiratory depression/shallow breathing in PACU and at home → Less likelihood of pneumonia → Less likelihood of ED visit/hospital readmission → Higher $$ in VBP Reimbursement
- Earlier Mobility → Earlier Effective Post-Op Rehab → Better Outcome → Higher $$ in VBP Reimbursement

Benefits of Regional Anesthesia (Continued)

2. **Less PONV**

- Less Opioid Use → Less PONV → Increased Patient Satisfaction → Higher $$ in VBP Reimbursement
- Complete avoidance of GA or minimize the amount and concentrations of medications necessary for GA

3. **Increased Efficiency**
- Decreased time spent in PACU and less use of PACU resources
- Block administration typically adds 10-15 min pre-operatively. This time is more than made up for in PACU post-operatively.

BOTTOM LINE –> RA improves pain scores, lowers the incidence of PONV (and other opioid side effects), and allows earlier discharge to home with greater patient satisfaction

Impact of Obesity on Nerve Block Efficacy

Table 4. Unadjusted Outcomes

Variable	Category	BMI <25	BMI 25–29	BMI ≥30	All Patients	P
Block failure	Yes	9.5%	10.7%	12.7%	10.9%	0
	No	90.5%	89.3%	87.3%	89.1%	
Acute block complications	Yes	0.2%	0.1%	0.7%	0.3%	0
	No	99.8%	99.9%	99.3%	99.7%	
Pain requiring opioids in PACU	Yes	11.4%	10.2%	11.9%	11.2%	0
	No	88.6%	89.8%	88.1%	88.8%	
Pain score at rest on VAS ± SD	–	0.3 ± 1.4	0.3 ± 1.3	0.3 ± 1.4	0.3 ± 1.4	1
Pain score with movement on VAS ± SD	–	0.4 ± 1.5	0.3 ± 1.3	0.4 ± 1.5	0.4 ± 1.4	1
PONV requiring treatment in PACU	Yes	1.2%	0.7%	1.2%	1.0%	0
	No	98.8%	99.3%	98.8%	99.0%	
PACU length of stay ± SD (min)	–	264 ± 211	274 ± 211	268 ± 221	266 ± 215	1
Unplanned admission to the 23 h observation unit or hospital	Yes	3.1%	3.2%	3.3%	3.2%	0
	No	96.9%	96.8%	96.7%	96.8%	
Complete satisfaction with regional anesthesia procedure 24 h postoperatively	–	96.7%	97.1%	97.1%	97.0%	0

* *P* values are based on unadjusted comparisons among different BMI categories.
Complete satisfaction is defined as 5/5 on satisfaction scale.
As a result of rounding, not all percentages total 100%.
BMI = body mass index; PACU = postanesthesia care unit; PONV = postoperative nausea and vomiting; SD = standard deviation; VAS = verbal analog
Table 4. Unadjusted Outcomes

Nielsen, Karen C. M.D. et. al. Influence of Obesity on Surgical Regional Anesthesia in the Ambulatory Setting: An Analysis of 9,038 Blocks . Anesthesiology 2005 Vol 102 pp 181-187

Risks of Regional Anesthesia

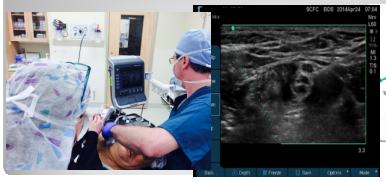
1. Acute Local Anesthetic Systemic Toxicity → Seizure/Cardiac Arrest
2. Development of a transient or chronic paresthesia
3. Permanent nerve damage from nerve trauma, intraneural injection or LA neurotoxicity
4. Vascular trauma, hematoma
5. Pneumothorax
6. Infection
7. Block Failure

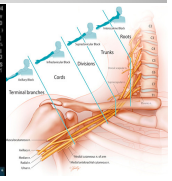
Contraindications to Regional Anesthesia

1. Combative/Uncooperative patient
2. Bleeding Disorder
3. Pre-existing peripheral nerve neuropathy
4. Severe COPD (for Interscalene and Supraclavicular Blocks)
5. Anticoagulation Medications (Coumadin, Plavix)
6. LA allergy

Interscalene Approach to the Brachial Plexus (Roots)

-- Commonly used for shoulder surgery – rotator cuff repairs, total shoulder arthroplasty, clavicle surgery
-- Associated with paresis of the phrenic & RLN – may be inappropriate for patients with severe COPD or pre-existing phrenic/RLN damage



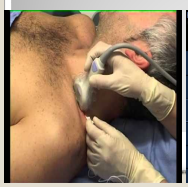


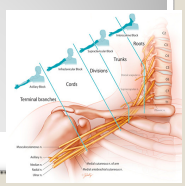
Supraclavicular Approach to the Brachial Plexus (Trunks/Divisions)

-- Commonly used for surgery on the distal 2/3 of the arm, forearm, and hand

-- Also associated with paresis of the phrenic and RLN

-- Ultrasound technology has renewed interest in this block (PTX risk)





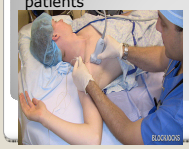
Infraclavicular Approach to the Brachial Plexus (Cords)

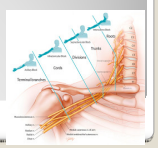
-- Also commonly used for surgery on the distal 2/3 of the arm, forearm, and hand

-- NOT associated with paresis of the phrenic and RL nerves

-- More conducive location to secure a perineural catheter (vs Supraclavicular)

-- Deeper location of the brachial plexus cords can make ultrasound visualization more challenging, especially in obese or muscular patients





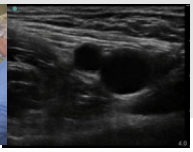
Femoral Nerve Block

-- Commonly used for knee surgery – ACL Repairs, Uni-Compartmental Knee Replacements, Total Knee Arthroplasties

-- Better than intra-articular or IV opioids for post-op pain and early mobilization

-- Use of intra-articular LA is declining as a result of evidence indicating chondrotoxicity

-- Blocks BOTH sensory and motor function

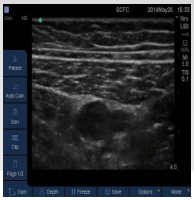
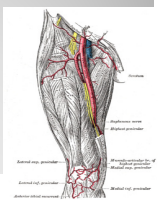




Saphenous Nerve Block

-- Increasing in popularity

-- Commonly used for surgery on the anteromedial knee, leg, and ankle

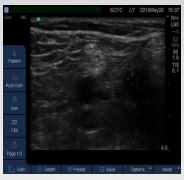
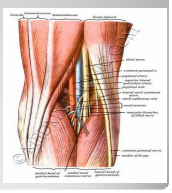
-- Sensory branch of the femoral nerve so (unlike FNB) no quadricep weakness, less risk of falling post-op, and no delay in starting PT/rehab

Popliteal Nerve Block

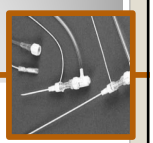
-- Branch of the sciatic nerve that bifurcates more distally in the leg into the posterior tibial and common peroneal nerves

-- Commonly used for surgery on the lateral leg and ankle (but can be combined with a SNB to cover both the medial and lateral ankle)

Orthopaedic Surgery means Regional Anesthesia



Continuous Peripheral Nerve Blocks

PERINEURAL CATHETERS

1. More common due to the trend toward performing more complex and painful orthopedic procedures in ASCs (e.g. joint replacements, total knee arthroplasties, unicompartmental knee replacements, etc)
2. Provide prolonged analgesia by administering a dilute, low volume continuous basal infusion of long-acting LA
3. Associated with better outcomes – early PT (motor preservation) and better alertness (minimal narcotics)

Nerve Catheters vs. IV Opioids

Table 5. Visual Analog Scale Pain Scores by Catheter Location

Location	Mean VAS Scores 24 h	48 h	72 h	Maximum VAS Scores 24 h	48 h
Infraclavicular	$P < .001$	$P < .001$	–	$P < .001$	$P < .001$
Catheter	1.0 (0.3–1.7)	0.6 (0.0–1.3)	–	2.5 (1.7–3.3)	1.5 (0.7–2.3)
Opioid	4.3 (3.1–5.5)	4.0 (2.9–5.1)	–	6.1 (4.8–7.4)	5.1 (3.9–6.3)
Number of studies	1	1	–	1	1
Interscalene	$P < .001$	$P < .001$	–	$P < .001$	$P = 0.05$
Catheter	1.4 (1.1–1.7)	0.5 (0.3–0.7)	–	3.8 (1.9–5.7)	3.9 (2.0–5.8)
Opioid	3.6 (2.0–4.2)	2.3 (1.9–2.7)	–	8.0 (6.7–9.3)	6.5 (4.5–8.5)
Number of studies	6	6	–	1	1
Femoral/Lumbar Plexus	$P < .001$	$P < .001$	$P < .001$	$P < .001$	$P < .001$
Catheter	2.1 (1.5–2.7)	1.6 (1.2–2.0)	1.5 (1.3–1.7)	3.8 (3.2–4.4)	2.7 (2.3–3.1)
Opioid	4.0 (3.7–4.3)	3.2 (2.9–3.5)	2.7 (2.1–3.3)	5.4 (4.8–6.0)	4.6 (4.1–5.1)
Number of studies	8	8	3	3	3
Sciatic	$P < .001$	$P < .001$	$P < .001$	$P < .001$	$P < .01$
Catheter	0.9 (0.6–1.2)	0.9 (0.6–1.2)	1.6 (1.4–1.8)	1.9 (0.2–3.6)	2.6 (0.9–4.3)
Opioid	4.6 (4.0–5.2)	3.5 (2.9–4.1)	3.2 (2.8–3.6)	7.2 (6.4–8.0)	5.6 (4.4–6.8)
Number of studies	2	2	1	1	1

Table 6. Side Effects

Side effects	Catheter	Opioid	*P* value	Odds ratio	NNT
Nausea/vomiting	38/182 (20.9%)	95/195 (48.7%)	<0.001	0.28	4
Sedation	12/45 (26.7%)	23/44 (52.3%)	<0.012	0.33	4
Pruritus	11/113 (9.7%)	29/109 (26.6%)	<0.001	0.30	6
Sensory/motor block	22/70 (31.4%)	9/60 (15.0%)	<0.023	0.39	

Richman, JM, Lui SS et. al. Does Continuous peripheral nerve block provide superior pain control to opioids? A meta analysis. Anesth Analg 2006 102: 248-57

Improved Analgesia After Catheter Removal

Catheter removed at 8:00 am on POD #2

Table 4. Systemic Analgesic Requirements Through the Morning of POD 3

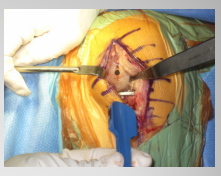
	SFNB	CFNB	*P* value
Morphine IV-PCA (mg)	25 (12)	16 (10)	0.02*
Oxycodone (mg)			
POD 1	40 (14)	15 (12)	<0.0001*
POD 2	43 (22)	20 (12)	0.0004*
POD 3	26 (19)	10 (6)	0.002*
Total	109 (39)	45 (20)	<0.0001*

Values are mean (± SD).
* $P < 0.05$ significant.
CFNB = continuous femoral nerve block; SFNB = single-injection femoral nerve block; IV-PCA = IV patient-controlled analgesia; POD 1 = first day after surgery; POD 2 = second day after surgery; POD 3 = third day after surgery.

Salinas FV, Liu SS, Mulroy MF. Anesth Analg. 2006 Apr;102(4):1234-9.

Femoral Nerve Catheters for Total Knee Arthroplasty

- Improved pain control vs. conventional pain treatment (i.e. Narcotics)
- Decreased incidence of PONV, pruritis, and sedation
- Improved patient satisfaction
- More rapid resumption of unassisted standing and lavatory use
- Earlier tolerance of passive knee flexion
- Prolonged duration of pain control vs. single shot block
- Improved analgesia even after the catheter is removed



Complications of Perineural Catheters

- Infection rates cited are less than 1%
- Infection risk factors include:
  - -- catheter duration > 48 hrs
  - -- no antibiotic prophylaxis
  - -- catheter insertion site in axilla or groin
  - -- infusion pump not filled under sterile conditions
- Neurologic cx, LA toxicity, catheter migration are very uncommon

Exparel

- Approved by the FDA in 2010
- Bupivicaine suspended in multivesicular liposomes for prolonged LA duration
- Infiltration at the surgical site has been shown to provide effective analgesia for up to 96 hours
- A single injection has been reported to delay the use of opioids for between 48 and 72 hours
- May be an alternative to continuous infusion perineural catheters
- The role of Exparel in regional anesthesia for PNBs still remains to be established

Spine Surgery

- Less invasive surgical approaches and pain mgmt techniques have resulted in increasing numbers of spinal surgeries in the outpatient setting
- ACDF and lumbar spine procedures are the most common neurosurgical procedures performed
- Safety and efficacy the ASC setting confirmed in recent studies
- Successful programs do the following:
  - Proper patient selection
  - Relatively short operative times (1.5 – 2 hrs)
  - **Multimodal Pain Management techniques**
  - **Modified intra-op anesthesia techniques**
  - Extended post-operative observation

Spine Surgery

- **Multimodal Pain Management techniques**
- **Modified intra-op anesthesia techniques**

1) **Minimal neuromuscular relaxation**
2) **Minimal volatile anesthesia (less gas)**
3) **Clonidine pre-op**
4) **Zofran, Decadron and Propofol infusion (decrease nausea and swelling)**
5) **Local Infiltration**

Spine Surgery

SIGNIFICANT COST SAVINGS

Erickson, et al – Cost savings from $4k to $8k with outpatient vs inpatient ACDF

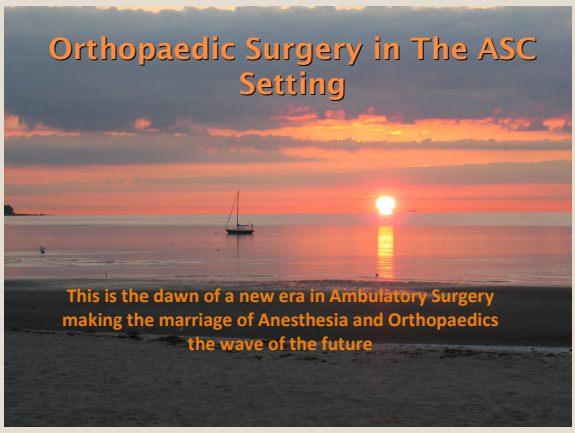
With 150,000 ACDF procedures performed annually in the US, total health cost savings associated with converting from inpatient to outpatient could exceed $100 million annually.

Implementation of a Regional Anesthesia and Spine Program

How do you get started?

Implementation of a Regional Anesthesia and Spine Program

- Anesthesiologists must be willing to learn and implement regional techniques
- Surgeons and administration need to recognize the value of RA and be patient as the program develops and proficiency improves
- Patient education about the benefits of RA should begin in the pre-op office visit to help expedite the pre-op process on the DOS
- Administration must provide adequate resources:
  - Nerve block equipment and supplies need to purchased and maintained
  - Separate medical documentation and consent needs to be prepared
  - Block room (?) and block nurse training
  - Communication with DON to coordinate scheduling and staffing issues
  - Education of PACU staff and preparation of patient d/c instructions
  - Emergency cart equipped with Intralipid and other emergency supplies




Thank You!