Current Concepts: Hip and Knee Arthroplasty

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OBJECTIVES

1. Introduction to Osteoarthritis
2. Impact of malnutrition in total joint patients
3. Review literature and cover affects of poor nutrition in arthroplasty patients
4. Multimodal Pain control
5. Peri-operative management of Blood loss/Importance of TXA
7. COMPARING readmission and cost of DC TO home/SNF/IR
8. Anterior vs posterior approach
Disclosures:

None
Epidemiology of Osteoarthritis

- Incidence
  - hip OA (symptomatic)
    - 88 per 100,000 per year
  - knee OA (symptomatic)
    - 240 per 100,000 per year

- >700K TKA done yearly in the US
- >300K THA
- 500K-550k Estimated THA to be done annually in the USA by 2030
Risk factors for OA

- Risk factors
  - modifiable
    - articular trauma
    - muscle weakness
    - heavy physical stress at work
  - Large body mass
  - high impact sporting activities
  - Metabolic syndrome
- non-modifiable
  - gender
    - females > males
  - increased age
  - Genetics
  - developmental or acquired deformities
    - hip dysplasia
    - slipped capital femoral epiphysis (SCFE)
    - Legg-Calvé-Perthes disease
NUTRITION IS KEY!

- Retrospective study on 4,500 revision knee surgeries
  - Malnourished definition was noted to be with albumin <3.5
- All complications were higher in malnourished patients
  - 2.74 times more likely to have a complication in the malnourished group than without being malnourished
    - Wound infection 2.57 X
    - Deep wound infection 2.38 X
    - PNA 2.84 X
    - UTI 3.01 X
    - Sepsis 5.30 X
    - Acute Renal Failure 7.89 X

- Journal of Knee Surgery 2016
OUR pre op lab targets

- Hgb > 12g/dl
- HgbA1C < 7
- Albumin >3.5mg/dl
- Transferrin >200mg/dl
- Pre-albumin >22.5mg/dl
- Total Lymphocyte count between >1500cells/mm³
- 25-Hydroxy vitamin D >30 ng/ml
- BMI <40

- NO SMOKING
- CD4+ >350
- Viral load < 0.75 copies per 1000ml
- HIV patients must be on at least 2 anti-retroviral meds
Nutrition \textsuperscript{(2)} cont

- Smith et al JBJS 2014

- Retrospective study of 1.2 million primary THA

- Reviewed and evaluated factors that affected and increased likelihood of perioperative periprosthetic fractures

- \textit{Malnutrition was found to increase risk of periprosthetic fracture by 10 fold}

- \textit{Malnutrition said to be an independent risk fracture for perioperative femur fractures}
Nutrition

- CORR 2008
- 300 primary and revision THA and TKA
- Examined factors that were associated with increased post op drainage after 48 hours in knees that would ultimately require revision arthroplasty for Periprosthetic joint infection
- Evaluated 14 factors and only found 2 that were significantly associated with a failure and requirement of revision for a PJI.
Nutrition (3)

- **2 main risk factors that** were associated with failure in TKA that would ultimately require revision arthroplasty for infx were:

  - **1. timing of surgery in OR**
  - **2. Patients who were malnourished**
    - **7X more likely to go on to failure for PJI**
PAIN CONTROL

- Pain stimulates
- We perceive it
- It causes suffering
- We then react to it and it ultimately increases costs
Pain

- 72 million surgeries performed yearly
- **Acute pain is the leading cause for delayed discharge (Anesthesia 2002)**
- Benefits of Superior Post operative pain management
  - Decreased LOS
  - Decreased Narcotic use
  - Early Mobility
  - Increased ROM
  - Decreased GI/GU complications
  - Decreased Cardio/pulmonary complications
Site of trauma releases Prostaglandins

- Can neutralize by less tissue trauma/NSAIDs/steroids
- We can block C fibers by local anesthetic or cryotherapy
- We can modify each stimulus that continues to go towards the CNS pathway with preemptive perioperative clonidine and opiates.
Multimodal Pain Control Approach

- Effective post op pain control for arthroplasty should address all mechanisms.

- Multimodal approach is IDEAL.

- Pain is modulated by a dynamically interlocking series of biological mechanisms. Signal can be modulated at 3 levels:
  - 1. peripheral
  - 2. central
  - 3. frontal cortex

  *basis of multimodal strategy of analgesia is to attack all of them*
PRE-EMPTIVE ANALGESIA given prior to TKA or THA

- Medications to be given before surgery.
  - **Goal is to prevent the central nervous system “shock” that is created by incisional/inflammatory injury during surgery**
  - Decrease narcotic use intra and post op
- **OXYCONTIN (OXYCODONE) 10 mg**
- Celecoxib 400 mg
- **Gabapentin (NEURONTIN) 600 mg**
- Tramadol (ULTRAM) 50 mg
RANAWAT COCKTAIL

- **INTRAOP Injection**
  - Marcaine 0.5% (5mg/cc) 200-400 mg
  - Morphine (8mg) 0.8 cc
  - Adrenaline (Epi) 1/1000 0.3 cc
  - Antibiotic (zinacef) 750 mg
  - Corticosteroids (depot) 40 mg
  - Normal saline 22 cc

- **Location of injection** is in posterior capsule and medial and lateral periosteum of the femur in the knee.

- **No steroids in**
  - DM
  - Immunocompromised
  - Age >80

- Multiple injections now either use ropivacaine vs bupivacaine (more cardio toxic) with Toradol 1 cc or clonidine .8 cc and epi .5 cc
  - Mixtures of all these injections

- Toradol is being used in CKD patients, with no issues thus far.
Post op Pain control

- Celebrex 200 mg/day
- Tramadol 50 mg/q6h
- Oxycodone CR 10 mg/day
- Acetaminophen 650 mg/q6h
- Ketorolac IV 15 mg or 30 mg/q6h
- Dexamethasone 10 mg in pacu
- Dilaudid 1 mg/q4hrs prn
- Oxycodone 5 mg/q4h prn

- IV PCA is a thing of the PAST
Perioperative intra-articular injection in TKA vs. Exparel (1)

- Liposomal bupivacaine vs traditional PAI (ropivacaine/epi/morphine) (JBJS 2013)
  - Retrospective study measuring pain in TKA patients
  - 85 PAI vs 65 Exparel
  - 1st 24 hrs post op showed no diff in Pain scores
  - After 24 hours, pain scores higher in the extended release bupivacaine (EXPAREL)
  - Concluded inferior pain management with liposomal bupivacaine (EXPAREL)
  - Data is lacking showing extended release liposomal bupivacaine is better than a PAI
  - Exparel costs $300 per vial ($$$$$)
Peripheral Nerve blocks slide

- ADDUCTOR CANAL BLOCK
- FEMORAL BLOCK
- SCIATIC BLOCK
Perioperative management of blood loss

TXA
What does post op bleeding cause in TKA and THA

- swelling, pain, stiffness
- Wound complications
- **Delayed rehab/dc**
- Anemia
- HTN
- **Transfusions**
  - Transfusion patients have 4-10 fold increase in infection. 7% risk of infection after allogenic transfusion (Bierbaum et al JBJS 1998)
- Medical comorbidities
Anti-fibrinolytics

- Gained popularity over the last few years
- 3 main types
  - Amincaproic acid
    - Second most popular, seen in cardio mainly.
    - Not as cost effective as TXA
  - Aprotinin-possible allergic reaction
    - Least popular of 3
    - Not cost effective
  - Tranexamic Acid (TXA)
    - Equally effective and more cost effective ($50 dollars)
    - Dec blood loss
Tranexamic Acid (1)

- Yang 2013 JBJS

A meta-analysis was performed to assess the effectiveness and safety of using tranexamic acid in TKA.
- 15 RCT met inclusion criteria
- They weighted difference in:
  - blood loss
  - # of transfusions per patient
  - PT, and postoperative activated PTT
  - odds ratio of transfusion
  - DVT/PE were calculated in the two groups

**RESULTS:**
- The amount of blood loss and the number of blood transfusions per patient were significantly less and the proportion of patients who required a blood transfusion was smaller in the TXA group compared with the placebo group.
RESULTS (CONT)
- No significant difference between the TXA and placebo group in:
  - PT
  - activated PTT
  - PE/DVT

CONCLUSIONS:
- Use of tranexamic acid for patients undergoing total knee arthroplasty is effective and safe for the reduction of blood loss.
Tranexamic Acid  

- JBJS 2013 Park et al
- Despite new technology avg blood loss per TKA is 1500-2000 cc
- Transfusion rate 4-40% for TKA and THA
- **TXA has reduced blood transfusion by 69%**
- 11,400 patients
- Park et Al described factors associated with increased risk of blood loss in hip and knee arthroplasty:
  - General Anes>regional anesth
  - Males undergoing THA
  - Patients with lower preop hgb <11
  - Increased case mix index(CMI)
  - Charleston comorbidities index> 3
  - Patient with preop autodonated blood
### Charlson Comorbidity Index

<table>
<thead>
<tr>
<th>Points</th>
<th>Conditions</th>
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<tbody>
<tr>
<td>1</td>
<td>MI, CHF, PVD, CVA, Dementia, COPD, PUD, Mild liver disease</td>
</tr>
<tr>
<td>2</td>
<td>Mod-severe CKD, CA w/o mets, DM with end-organ damage</td>
</tr>
<tr>
<td>3</td>
<td>Mod-severe liver disease</td>
</tr>
<tr>
<td>6</td>
<td>Metastatic solid CA, AIDS</td>
</tr>
<tr>
<td>1</td>
<td>Each decade in age &gt; 40 years</td>
</tr>
</tbody>
</table>

**Case Mix Index (CMI)**

- CMI = Sum of all DRG RWs divided by the number of cases/month/year
- Case Mix Index (CMI) more accurately reflects the type and severity of patients the hospital treats
- CMI continues to be an important factor with IPPS

Tranexemetic Acid (TXA)

- Can be given IV or Topical
  - no difference in efficacy however easier to be given IV due to topical must wait 5 minutes to allow for absorption

- Our institution TXA 1 gram IV just prior to incision. TXA 1 gram given IV at closure

- We’ve noticed Decreased bruising, swelling, ecchymosis, and pain

- Gilette et al compared hospital costs for TXA patient vs those without TXA
  - Hospital cost for TXA patient was 5% less than those patient’s who did not receive TXA
  - Journal of Arthroplasty 2013
When do we not use TXA

- Concerns are systemic risks
  - Caution in those with history of stroke, dvt or recent stents all within 1 year.
  - Contraindicated in patients with active arterial or venous clot
Adjunct hemostatic device to TXA: ARISTA

- Plant-based microporous polysaccharide hemostatic powder.
- Absorbable powder causes hyper concentration of fibrinogen and platelets.
- Completely cleared from wound site in 24-48 hours
- Decreases time range to hemostasis by 3 minutes
- Arista achieved complete hemostasis of lesion within 5 mins in 94% vs 85% of those without Arista.
- $100
- Aquamantus is 400 at HCA facilities
- Need more Orthopedic literature
Cost of transfusion

- Cost of transfusion (Economy Health Policy 2011)
  - Purchased from supplier for
    - $210 ± 37.9
  - Mean charge to the patient
    - $343.63 ± 135.
  - Prices Variable, typically wrapped into DRG
  - Acquisition cost of 1 unit PRBC costs $200
  - Actual overall cost is between $1,600-$2,400 to transfuse patient

Out institution:
- 1305 for transfusion
- 421.05 per unit
- 135 for post transfusion blood work
- **TOTAL=$2,000 for 1 unit PRBC transfused**

Blood (2008)
- **$3,433**
- This included multiple costs
  - A unit of RBC was US$ 1,158
  - Indirect overhead
  - Total transfusion process
  - Weighted average acquisition

Regular blood transfusion vs Italian blood transfusion
Enhanced Recovery Program in Total Hip Replacement

- JBJS 2013 Ibrahim et al

Enhanced Recovery programs are THA or TKA patient pathways that include:

- multimodal pain control regimen
- pre-operative education
- accelerated rehabilitation.

Several other terms also used for these pathways such as: “fast track, rapid recovery, and enhanced recovery Program (ERP)

Goal of these pathways is to:

- accelerate recovery
- reduce length of stay in association with better functional outcomes after THA
- thereby control hospital costs.

NON surgical intervention is a major key to these programs
Non surgical intervention in the Enhanced recovery program THA model

1. Non surgical PREOP education

- Pre-op education and preparation reduced LOS and post op medication and anxiety (Dalton et al)

- (Dawson et al) Investigated value of pre and post op education combined with home visits in comparison with a control group receiving “conventional” rehab.
  - More educated group had a significantly reduced LOS by 4 days
  - Greater Oxford hip scores in the more educated group
Non surgical intervention in the Enhanced recovery program THA model (1)

2. OPTIMIZING PREOP HGB levels

- Dwyer found that patients in an ERP with a **preop hb level \( \geq 14 \)** had a **significantly shorter LOS than those with a lower level**

- **Correction of Hb levels to >12 pre op has been found to reduce the chances of blood transfusion post op and accelerate discharge** (Rogers et al)
3. PREOP NUTRITION

- ALBUMIN and transferrin common markers tested preop

- Intentional weight loss is known to lead to subsequent weight gain after THA.

- Dwyer et al used calorie loading 48 hours prior to surgery as part of their ERP which reduced LOS to 5.3 days compared to 8.3 days for the NON–ERP patients

- Recommend preloading patient with carbohydrates prior to fasting time.
4. ANALGESIA

- NSAIDS still debated due to GI, bony, cardiac complications
- Rec high dose of methylprednisolone preop
  - this showed to help reduce pain w/in first 24 hrs of sx (Lunn et al)

- Local infiltrate Analgesia (LIA)
  - Kang et al compared 82 hemiarthroplasty patients for hip frx
  - 2 groups
    - Group 1 had preemptive analgesia with LIA (ropivacaine, morphine, toradol, epi, cefmetazole, NS)
    - Group 2 had preemptive analgesia without LIA
    - Group 1 had significantly less pain between days 1-4
    - Group 1 also had overall reduction in opiate use and inc in satisfaction on DC
Non Surgical intervention in the enhanced recovery THA model 

- ANALGESIA (CONT)
  - LIA vs placebo group
  - LIA group had less morphine consumption post op. (MURPHY et al)
  - IN THA patients

- LIA with epidural vs epidural alone produced similar pain relief with a significant reduction in narcotic consumption in the LIA group.
  - Mean LOS was 2 days shorter in the LIA group (Anderson et al)
  - FOR THA patients
Non Surgical intervention in the enhanced recovery program THA model (1)

5. ASA GRADE

- DWYER et al compared Patients with TKA or THA involved in an Enhanced Recovery program
  - They reported probability of those ASA grades 1 and 2 in the ERP program staying fewer than 3 days in hospital was 60%
  - ERP group with ASA 3 had a 20% shorter LOS than ASA 3 without ERP

- (Young et al) ASA 1 Patient undergoing THA with an ERP vs ASA 1 THA without ERP
  - With ERP had a LOS of 1.8 days shorter than the non ERP patient

<table>
<thead>
<tr>
<th>Category</th>
<th>Physical Status</th>
</tr>
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<tbody>
<tr>
<td>ASA 1</td>
<td>Normal healthy patient</td>
</tr>
<tr>
<td>ASA 2</td>
<td>Patient with mild systemic disease</td>
</tr>
<tr>
<td>ASA 3</td>
<td>Patient with severe systemic disease that is not a constant threat to life</td>
</tr>
<tr>
<td>ASA 4</td>
<td>Patient with severe systemic disease that is a constant threat to life</td>
</tr>
<tr>
<td>ASA 5</td>
<td>Moribund patient not expected to survive with or without surgery</td>
</tr>
</tbody>
</table>
Non Surgical intervention in the enhanced recovery program THA model (1)

6. Post Op hip precautionary measures

- ERP stresses early and aggressive rehab
- **Physical aids and precautions cost approximately 655$/patient**
- (Ververali et al) had prospective RCT on 1,024 Anterior and AL hips.
  - Divided into 2 groups. Group 1 THA had no restrictions,
  - Group 1 patients were matched with patients using standard rehab with all precautions Group 2 (pillows, restricted flexion >90 etc).
  - Early rehab incorporated with no restrictions or abduction pillows in group 1
  - No dislocations in either group, unrestricted patients recovered faster with higher hip scores at 1 year.
  - Group 1 (Non restricted group) was earlier to drive and earlier to discharge cane use
PHYSICAL THERAPY after TJA

- The old days

- “the tools were basic and inaffective”
  - verbal education day after surgery
  - packet of written instructions that is thin and in-affective
  - array of workers that give conflicting reports and education"

- We would send patient to highest care discharge facility which was IR/SNF
  - the most expensive

- This doesn't cut it!
PHYSICAL THERAPY AFTER TJA

- Give patient’s tools to be successful

- **Value=quality aka outcomes /cost**

- **4 pillars of future PT protocols**
  - Provide evidence based recovery protocols in a digital based format
  - coordinate care
  - Provide Joint class for education
  - Remotely monitoring outcomes and status of patient
    - this can prevent readmission for a MUA or a wound problem
Day of Surgery Mobilization Reduces the Length of Stay After Elective Hip Arthroplasty (JOA 2018)

- 126 patients divided into 2 groups
  - Group A (control) 68 patients were mobilized day after surgery
  - Group B (study group) 58 patients were mobilized on the day of surgery
- Measured
  - “readiness for discharge”
  - hospital LOS between the 2 groups
  - also kept readmission information for the 3 months after dc
“readiness for discharge was significantly shorter in group B which was the mobility on day of sx group.

Group B also had a shorter LOS (77 hrs vs 87 hours). This could prevent an overnight admission.

By 72 hours after SX, 83% of group B had been dcd with only 57% of group A being dcd.
- Length of stay
- DC to SNF/IR/home
Length of Stay. Should we vacation in the hospital? (1)

- Length of Hospitalization After Joint Arthroplasty: Does Early Discharge Affect Complications and Readmission Rates (JOA 2016)

- Using the NSQIP database they identified
  - 30 day complication and readmission rates based on date of discharge of THA, TKA, UKA.
  - They controlled for different demographics and comorbidities based on the date of discharge and selection for a rapid recovery d/c.

108,684 arthroplasty patients selected and divided into 5 groups.

- POD 0 d/c
- POD 1 d/c
- POD 2 d/c
- POD 3 d/c
- POD 4 + d/c

- Patients in group 5 (pod 4 + discharge) had the highest rates of complication including PNA, DVT, PE, UTI, stroke, Sepsis, readmission

- No statistically significant different in readmission rate or 30 day complication rate between POD 0 or POD 1 discharge TJA
Length of Stay. Should we vacation in the hospital? (1)

- Independent risk factors for readmission and 30 day complication for THA include:
  - >80 yoa or <50 yoa
  - BMI >30, smoking, COPD, CAD, Steroid use
  - WBC>12, Hct<36 Cr>1.2
  - ASA 3 or 4
  - Operative time> 120 mins
  - POD 3 and POD 4+ discharge

- Independent risk factors for readmission and 30 day complication for TKA include:
  - >80 yoa or <50 yoa
  - Male
  - Bmi > 30,
  - Smoking, COPD, CAD, male
  - WBC >12 HCT< 36 Cr>1.2
  - ASA 3 or 4
  - POD 4+ discharge
Length of Stay. Should we vacation in the hospital? (1)

- Patients discharged after POD 3 had a 30 day complication rate of:
  - 11% in THA
  - 11% in TKA
  - 10.6% in UKA
  - HIGHER than the Shorter Length of STAY COHORTS

- Important in cost of care
- Longer hospitalization, increased ASA class, and increased operative time are independently associated with higher readmission and complication rates

Despite significant comorbidities, the majority of patients can be safely dc’d on POD 0 or POD 1 without concern of readmission.
INPATIENT VS HOME, what to do? (2)

- **Continued Inpatient Care after TKA inc 30 day post d/c complications**
  - Medicare patients, 36% of episode of care payments were attributable to PAC (Post acute care aka after sx)
    - Payments to skilled care facilities account for most of these payments.
  - Readmission can cost 14k-22 k in healthcare costs.

- McLawhorn et al (JOA 2017) studied 100,000 TKA from NSQIP database
  - 70k went home and 30k went to skilled care facilities (no differentiating between snf and IRF)
  - **Compared minor complications and major complications along with readmission rates within 30 days**
INPATIENT VS HOME, what to do? (2)

- **Frequency of any post op dc complication** was 4.3% in the Skilled care group vs 2.7% in the Home group.

- **Major complication was 3% vs 1.8% in advantage of the dc to home group**
  - ex: Septic, respiratory, thromboembolic complications

- **Readmission rates higher in the Skilled Care facility group**

- Selection bias was adjusted for

- They demonstrated factors associated with non home d/c
  - Female, older age, elevated MBMI, higher ASA, general Anesthesia, non-independant preop functionality

- **Hospital of Special Surgery suggest “dc to care facilities represents low value service to patients, resulting in inferior medical and surgical care at higher cost, home DC should be encouraged”**

“Why don’t you just go HOME? That’s your HOME! Are you too good for your HOME? ANSWER ME!”
Discharge Destination after Total Joint Arthroplasty: An analysis of postdischarge outcomes, placement of risk factors, and recent trends (JOA 2016) (3)

- 64,000 TKA and 42,000 THA were analyzed
  - 70% discharged home
  - 19% SNF
  - 11% Inpatient Rehab (IRF)

Compared

- **Minor adverse events** (superficial wound infx, UTI, PNA)
- **Severe adverse events** (death, MI, CVA, sepsis, deep wound infx, return to OR)

**Readmission**

Also looked for modifiable risk factors
RESULTS:

- **Severe adverse events (1.9% vs 0.8%) and minor adverse events (1.1% vs 0.4%) were greater for nonhome vs home patients**

- **LOS tended to be longer in nonhome patients (3.8 days vs 3.1 days)**

- **Infectious complications, and unplanned readmission much higher in SNF/IRF vs Home discharger. 1.5X higher chance of these issues to occur in the SNF/IRF cohort.**

- Between IRF and SNF cohorts, rates of severe adverse events and minor adverse events along with LOS were greater in IRF (inpatient rehab facility)
Discharge Destination after Total Joint Arthroplasty: An analysis of postdischarge outcomes, placement of risk factors, and recent trends (JOA 2016) (3)

- Modifiable risk factors should be optimized prior to SX. Ex include:
  - morbid obesity
  - Smoking
  - DM
  - pulmonary disease
  - HTN

- Patients stratified by
  - # of strong risk factors they have
  - And compared rates of adverse events after DC by dc destination
    - the point of this was to see if the reason all these side effects and readmissions were because the more sick patients were going to rehab and not home.
    - This was not the case. DC to home yielded significantly lower rates of severe 30 day adverse events for 5 out of the 6 patient risk levels
    - Risk levels made up specific strong risk factors. So level 5 had 5 risk factors.

- Renal disease, ASA 3 or 4, and morbid obesity are strong predictors of discharge destination to SNF or IRF

- SNF and IRF are independent risk factors for unplanned 30 day readmission and post DC severe adverse advents.
In patient rehab facility vs Skilled Nursing Facility, jury is still out (4)

**IRF**
- Walsh and Herbold studied 87 TJA patient pairs matched in age, gender, type of procedure
  - found IRF patients had
    - lower LOS, need for walkers, better ambulation distance and less need for home services post IRF than SNF patients
- Dejong et al studied 2,000 TJA patients
  - IRF patients achieved larger functional independence scores with a shorter LOS as compared to SNF

**SNF**
- on the other hand Mahomed et al examined 312 TJA patients and found no significant difference in functional outcomes for IRF vs SNF.
Discharge to Inpatient Facilities after THA is associated with Increased post-discharge morbidity (5)

- FU et al 2017 JOA
- 55,457 THA patients
- Measured 30 day post op complications and their association to discharge location
- Divided groups into 2
  - Group 1 dc to home
  - Group 2 dc to inpatient facility (included IRF and SNF)
- **30 day Post op complication rate was 3.6%**
- 26% dc’d to Inpatient facilities
- **Septic complications had the greatest association with dc to inpatient facilities.**
- **Inc in respiratory complications, UTI, readmission rates, and wound complications and death associated with inpatient facility after DC for THA**
Discharge to Inpatient Facilities after THA is associated with Increased post-discharge morbidity (5)

- Rate of dc complications in THA that went to inpatient facility vs home (5.5% vs 2.9%)

- After controlling for confounding factors such as age, comorbidities, functional status, IRF still has a statistically significant higher association with post discharge morbidity.

- Most notably odds of septic complication, which can be catastrophic in THA, was 2.3 X higher when dc’d to inpatient facility.
Oldmeadow et al and Halawi both found that patient expectations are the single most important determinant of DC destination.

Halawi et al (JOA 2017) studied 372 patients and found that patient expectation was the strongest predictor by far of inpatient rehab after discharge.
Effects of the Length of Stay on the Cost of TKA and THA from 2002-2013 (1)

- (MOLLOY et al JBJS 2017)
- Examined trends in hospital costs for TKA and THA from 2002-2013
- Mean LOS from 2002-2013 decreased from 4.06 days (2002) to 2.97 days (2013)
  - 4.06 → 2.75 in THA
- Hospital Stays of > 5 days for TKA reduced from 24.7% in 2002 to 6.1% in 2013
  - 24.5%(2002) → 4.9%(2013) in THA
- IF LOS were set at the 2002 mean, the growth in cost for TKA would have been 70.8% instead of 52.4%
  - THA growth in cost would have been 67.4% instead of 49.8%
Reducing the length of stay appeared to be one successful approach to slowing the increase in hospital costs for joint arthroplasty. In the absence of those reduced length of stays seen in 2013 as compared 2002, the TKA and THA cost in 2013 would have been 18% and 17% higher than what they were. They attributed inc in hospital cost to total joint utilization due to expanding indications, aging population, inc obesity, elevated priced of implants.
Cost of readmission for Arthroplasty (2)

- Ellie Rizzo Becker's hospital review 2013
- Cost of Readmission for CMS Tracked Conditions
  - All causes of readmission
    - Avg cost of readmission: 11,200
    - Readmission rate: 25.1%
  - CHF readmission
    - Avg cost of readmission: 13k
    - 21.2% readmission rate
  - **THA and TKA readmission**
    - **Avg cost of readmission**
      - THA: 12,300
      - TKA: 10,700
      - 8.2% Readmission for THA
      - 5.3% readmission for TKA
Cost effectiveness of Accelerated Perioperative Care and Rehab after THA and TKA (JBJS 2009 Larsen et al) (3)

- Compared cost effectiveness of an Accelerated perioperative care and rehab protocol with a more standard protocol for patients with TKA and THA.

- Level 1 JBJS

- Also Compared:
  - LOS
  - gain in health quality of life within 3 months post op
  - adverse effects within 3 months post op

- 45 patients in each group
Cost effectiveness of Accelerated Perioperative Care and Rehab after THA and TKA (JBJS 2009 Larsen et al).(3)

- **Standard Protocol**
  - Information given separately to each individual on day of admission
  - Hospitalization on day before surgery
  - Pts treated with arthroplasty placed randomly among other patients
  - Various nurses in charge of care, and various OT and PT responsible for mobilization
  - **Nutrition screening**
  - **Mobilization and exercise started on POD 1**
  - Ind and gradual mobilization according to pat’s tolerance
  - **4 hours of mobilization daily**

- **Accelerated –Protocol Group**
  - Pat receive info in groups at an outpatient clinic prior to hospitalization
  - Hospitalization on day of surgery
  - All pat treated with arthroplasty placed together in one separate part of the ward
  - **One nurse in charge of a multidisciplinary team of nurses, OT, PT**
  - **Nutrition screening and special focus on 1.5 L intake of fluid/day and 2 protein beverages/day**
  - Intense mobilization of patients in teams after preset daily goals
  - **8 hours mobilization/day**
Cost effectiveness of Accelerated Perioperative Care and Rehab after THA and TKA (JBJS 2009 Larsen et al). (3)

- **Group 1** cost $18,000 in THA and 17K in TKA. This was the standard protocol group.

- **Group 2** or the accelerated protocol group cost $14,000 in THA and 14K in TKA.

- Gain in Quality of life 3 months post op was higher in Group 2 (accelerated group).

- No sig difference in adverse effects within 3 months between both groups.
Ambulatory surgery center vs Hospital cost difference

- 14,300 ASC vs 33,200 hospital for TKA
- Altoona pennyslvania
- 41% of cost dedicated to TJA is attributed to Post acute phase(aka after surgery)
DC to home with outpatient PT is 15,000$ less than discharging the same patient to an inpatient rehab facility (RAMOS et al JOA 2014).

They estimate that, in some cases, 5 or more days can be added to a patients hospitalization without exceeding the cost of an IRF admission.
DIRECT ANTERIOR APPROACH? What do we think? (1)

- (HaiYan et al JOA 2017)
- Comparison of early functional recovery after THA using a direct anterior vs posterior lateral approach. A randomized controlled trial
- 120 patients divided into 2 groups: DA (direct anterior) vs PL (posterolateral group)
  - Randomized preop and postop
- **DA had shorter hospital stay** (2.8 vs 3.3)
- **DA had lower self reported pain**
- **Serum inflammatory (CRP/ESR) and muscle damage (CK) Markers were lower in the DA group**
- **DA associated with better functional recovery at 3 months in HHS and UCLA activity scores, and gait analysis**
Direct anterior approach (2)

- Compares DA and PL approaches amongst 5 surgeons.

- (2016 JOA Sibia et al)

- The impact of surgical technique on patient reported outcome measures and early complications after THA

- 1450 DA vs 1241 PL. followed at 3, 6, 12 months.

- DA group had shorter LOS (2.3 vs 2.7) and a larger proportion were d/cd to home (79 vs 68).

- Hip scores favored DA in early follow up but were the same in 1 year.

- At 3 and 6 months f/u, DA patients were more likely to report:
  - no pain
  - no limp
  - walk unlimited distances
  - and climb stairs w/out the use of railing.

- Surgical and medical complications were equivalent.
Posterior Hip approach

- Dealer’s Choice
- Dr. Harker and Dr. Baumann dislocation rate 0.8%
- National avg 2.2%
The end