

Perioperative Optimization

AAHKS 2017

Peter Caccavallo, MD, MS

Internal Medicine

Perioperative Orthopedic Hospitalist

Director of Indianapolis Perioperative Medicine

2003-Present

ppcaccav@yahoo.com

Disclosures

- Faris Medical – consultant
- DJO - consultant

Topics

- What is a Orthopedic Perioperative Specialist?
- Diabetes Screening
- Inpatient Diabetes Management
- Nutrition Screening

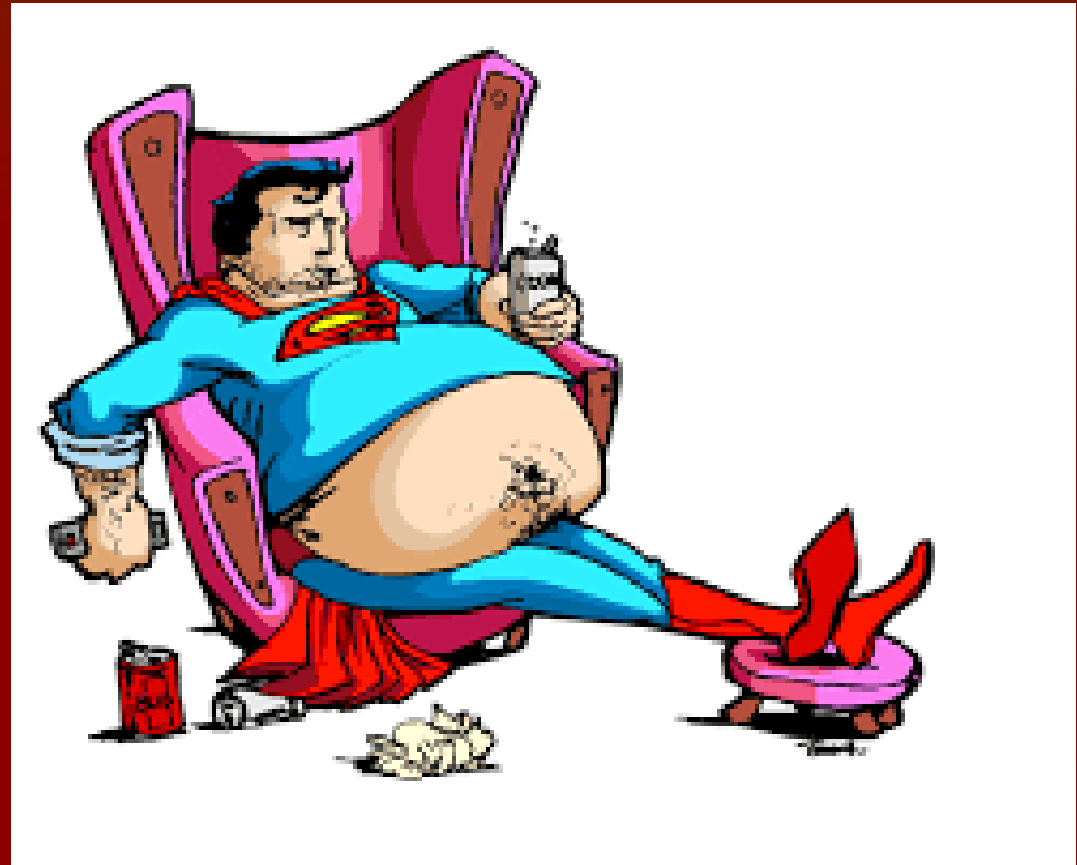
Perfect Patient

- Ideal weight
- Non-smoker
- Exercises regularly
- Proper nutrition
- Controlled cholesterol
- Controlled BP
- Controlled medical problems
- See MDs regularly



Typical Patient

- Obese
- Sedentary
- Non-compliant
- Diabetes
- CAD
- Poor nutrition



Good old days



HOME MEDICINES:

1. Aspirin 325mg po q4h
2. Metoprolol succ ER 25mg po qpm
3. Cozaar 100mg po qpm
4. Simvastatin 40mg po qhs
5. Cytomel 5mcg po bid plus 1 more tab po q Wed & Sun
6. Temazepam 30mg po qhs
7. Bupropion HCL 100mg po tid
8. Flurazepam 30mg po qhs
9. Alprazolam 0.5mg 1-2 tabs po q4h prn anxiety
10. Sleep Aid Maximum Strength diphenhydramine HCL 50mg po qhs
11. Dicyclomine 20mg po qpm
12. Wal-finat allergy tablets chlorpheniramine maleate 4mg po q4-6h prn allergy symptoms
13. Mupirocin 2% ointment apply bid prn impetigo
14. Hydrocortisone ointment 2.5% apply sparingly to affected area 1-4x daily prn itching
15. Ketoconazole 2% cream apply bid groin irritation
16. Nicotine Gum polacrilex 2mg chew prn
17. Antibiotic & Pain Relief Maximum Strength Cream neomycin sulfate/polymyxin B sulfate/pramoxine HCL 3.5mg/10,000 units/10mg apply 1-3x daily to affected area prn cuts/scrapes
18. Propoxyphen/APAP 100/650mg 1-2 tabs po q6h prn pain
19. Herbal Healing Salve apply to wounds and irritations
20. Chelated Iron 27mg
21. Vit. C 1000mg
22. B-Complex 100
23. Vit. E 400
24. CoQ10 30mg
25. Folic Acid 800mcg
26. Phosphatidyl Choline with B-12 & Folic Acid
27. Omega-3 Fatty Acids Fish Oil 1200mg
28. D-3 1000
29. Zinc 75mg
30. Digest Gold
31. L-Lysine 500mg
32. L-Carnitine 500mg
33. Chromium 200mcg
34. Selenium 200mcg
35. Biotin 5000mcg
36. CO-B-Plex B-Complex Co-Enzyme
37. CO-ZYME 6
38. No-Flush Niacin 400mg
39. Food Carotene 10,000
40. Methyl B-12 3000mcg
41. Ginkgo Biloba Plus 60mg
42. Malic Acid with Magnesium Plus 5-HTP
43. Evening Primrose Oil
44. NU Plus Concentrated Herbal Food
45. Metabolol II High-Energy Meal Supplement
46. Pre-Load Creatine Complex
47. Spuru-tein High Protein Energy Meal
48. Superior Amino 2222
49. 4Life Transfer Factor
50. Copper Sebacate 22mg
51. Choline Cocktail Energy Drink with DMEA & Ginkgo Biloba
52. Me-Cofactors
53. Aangamik DMG 125mg
54. Action Caps
55. Phosphatidylserine DMAE Complex
56. Royal Jelly 500mg
57. Z-88
58. Wild Yam 400mg
59. Ginger Root
60. ImmoPlex Glandular
61. Scullcap 425mg



What is a Orthopedic Perioperative Specialist?

Perioperative Medicine

- Improved outcomes
- Fewer delays/cancellations
- Decreased length of stays
- Reduced testing
- Increased patient satisfaction

Perioperative Medicine

The challenge is not how to manage a medical problem but rather how to manage the problem with an *orthopedic* patient.



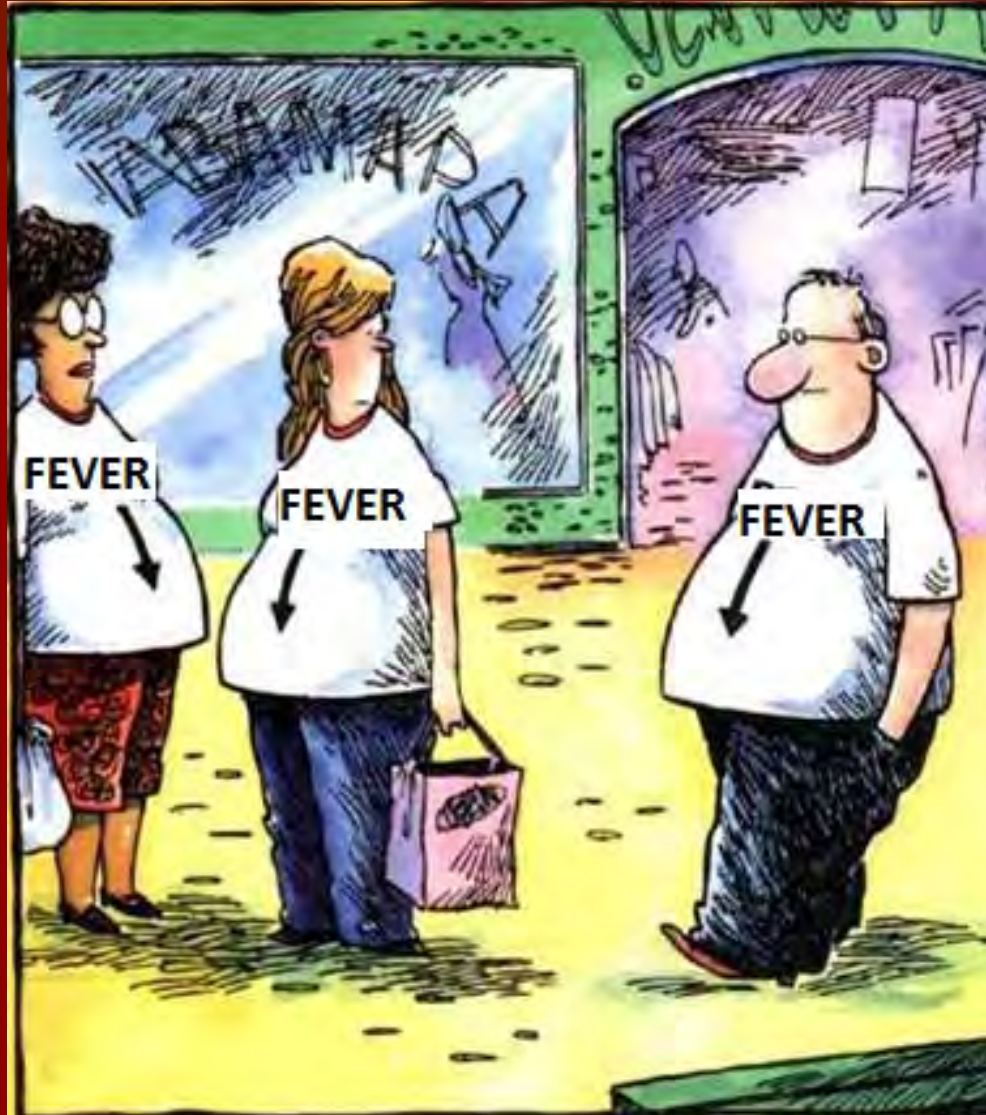
Perioperative Medicine

The Effects of a Hospitalist Comanagement Model for Joint Arthroplasty Patients in a Teaching Facility

“Any potential benefit of a hospitalist comanagement model for this patient population may be outweighed by increased cost.”

The Effects of a Hospitalist Comanagement Model for Joint Arthroplasty Patients in a Teaching Facility. By: Duplantier NL, Briski DC, Luce LT, Meyer MS, Ochsner JL, Chimento GF, The Journal Of Arthroplasty, 1532-8406, 2016 Mar, Vol. 31, Issue 3

Perioperative Medicine



Routine Workup of Postoperative Pyrexia Following Total Joint Arthroplasty Is Only Necessary in Select Circumstances

- 25k patients
- POP occurred 46% of TJA
- 0.2% had positive CXR
- CXR responsible for \$4,613,182.00 (99.5% of total workup costs)
- **\$384,431.83/year**

Perioperative Medicine

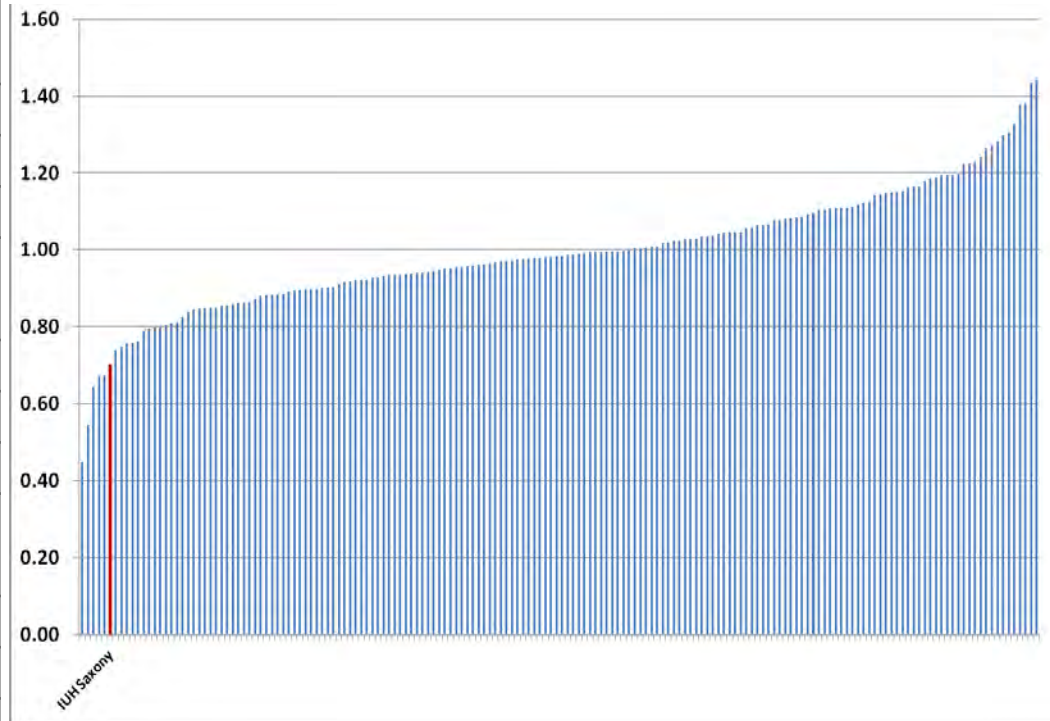
Number of tests/procedures/consults ordered on 1,000+ patients:

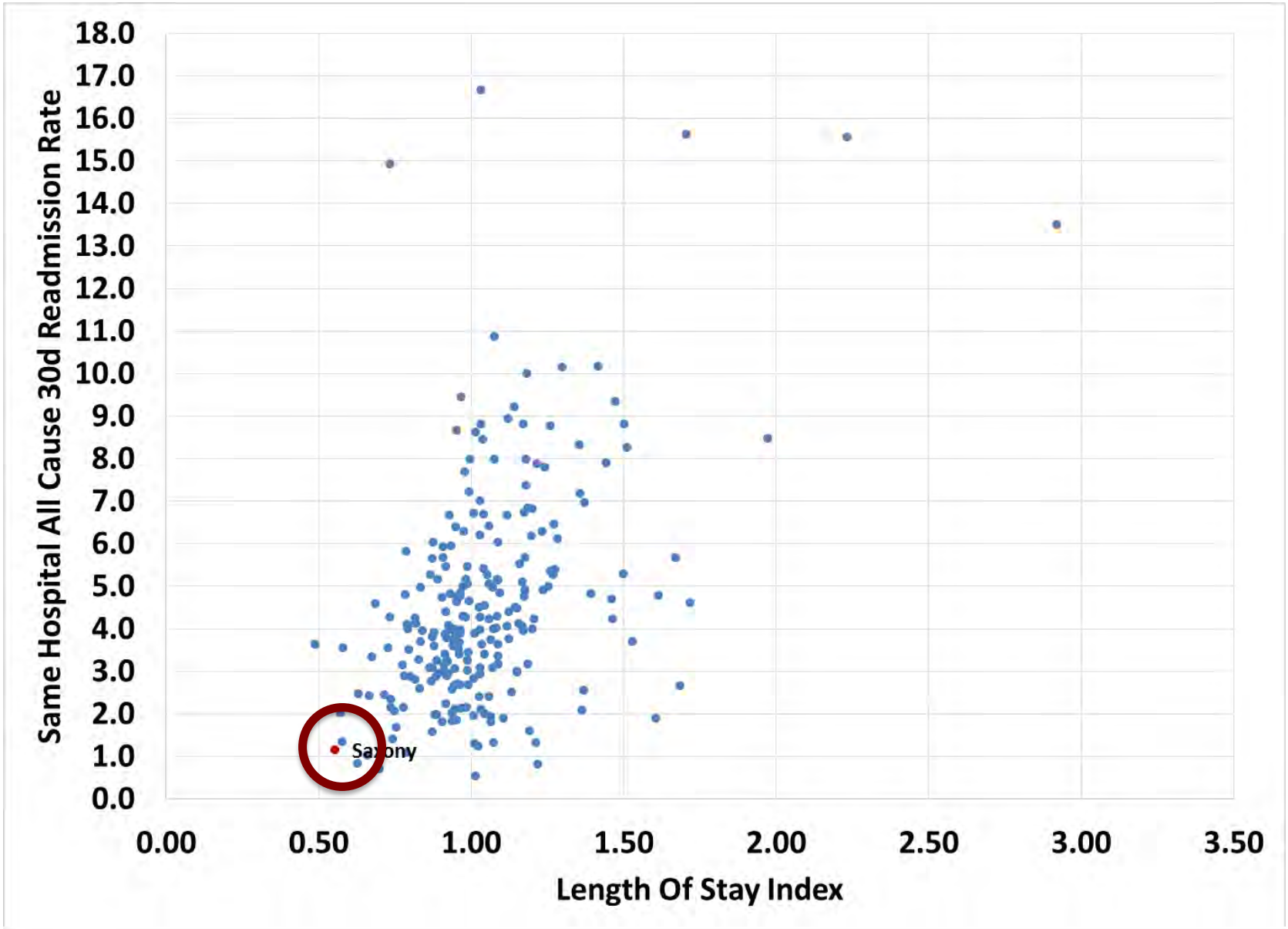
- CT angiograms: less than 5
- Renal ultrasounds: less than 5
- Head CT: less than 5
- Cardiology consults: less than 5
- Non dialysis renal consults: less than 5
- Hematology consults: less than 5



UHC 2015 LOS Index

Rank #	Hospital	LOS Index
1	110082 EMORY_SJHA	0.49
2	159956 IU_HEALTH-SAXONY	0.55
	260162	
3	BJC_BARNESJEWISHWEST	0.57
4	110010 EMORY	0.58
5	040016 ARKANSAS	0.58
6	360087 CC-LUTHERAN	0.63
	260032	
7	BJC_BARNESJEWISH	0.63
8	100289 CC-WESTON	0.66
9	210029 JHHS-BAYVIEW	0.67
10	520030 WAUSAU	0.67
	150006 IU_HEALTH-LAPORTE	0.69
11	150161 IU_HEALTH-NORTH	0.70
12	390174 TJEFFERSON	0.72
	140211	
14	NORTHWESTERN_DELNOR	0.73
15	140015 BLESSINGHOSP	0.73

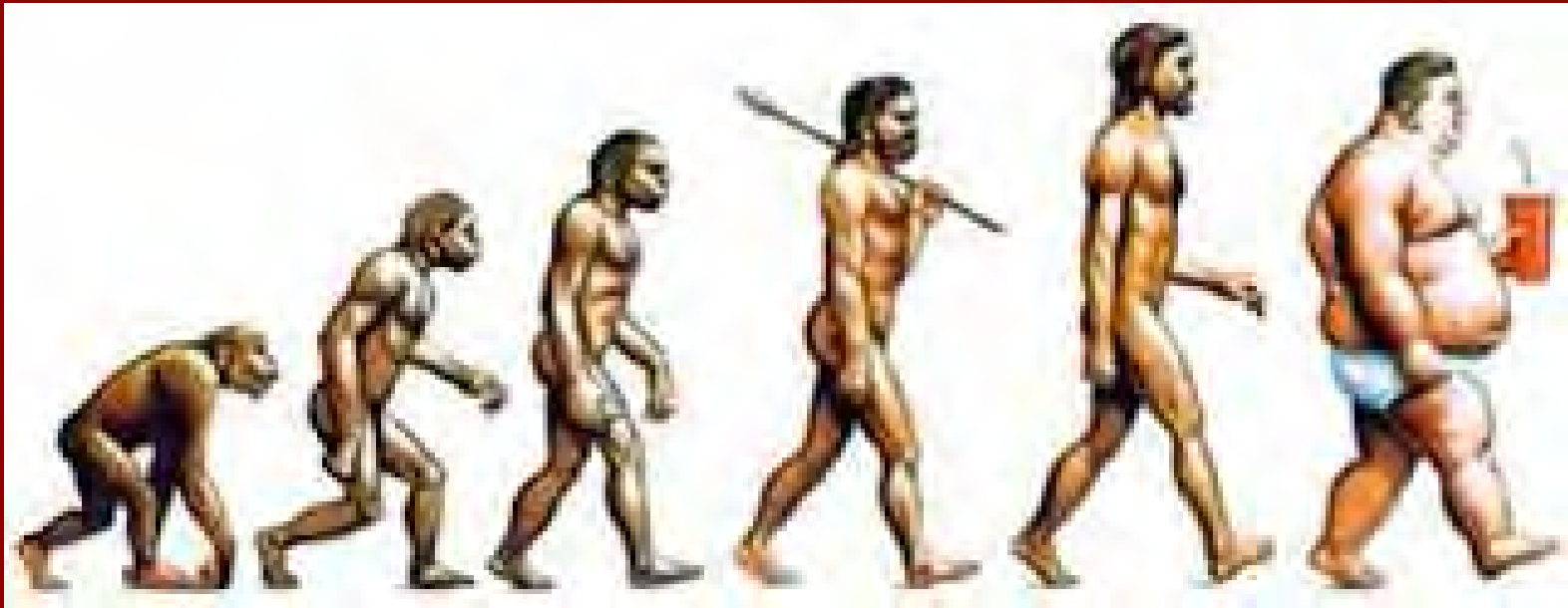




Topics

- What is a Orthopedic Perioperative Specialist?
- **Diabetes Screening**
- Inpatient Diabetes Management
- Nutrition Screening

Diabetes and Hyperglycemia



Diabetes and Hyperglycemia⁷⁻¹⁸

- There have been many studies linking diabetes with increased risk⁷⁻¹⁸
 - Deep infection
 - MI
 - DVT
 - PE
 - Readmission
 - Mortality
 - Length of stay
 - Cost

Diabetes and Hyperglycemia

Study limitations:

- Retrospective studies
- Wide variance of study designs and outcome measures
- Lack of correction for comorbidities
- Inconsistent patient populations
- Small N of complication rates

Diabetes and Hyperglycemia

Two questions:

- Is it truly a risk factor?
- What *is* the risk factor?
 - Hyperglycemia
 - Diabetes
 - Uncontrolled diabetes
 - Diabetes with secondary disease

Diabetes and Hyperglycemia

Surgical Outcomes of Total Knee Replacement According to Diabetes Status and Glycemic Control, 2001 to 2009.

Journal of Bone & Joint Surgery Am. 2013 Feb 27.

Conclusions: No significantly increased risk of:

- Revision
- Deep infection
- DVT
- Incident MI
- All cause rehospitalization

Diabetes and Hyperglycemia

Relationship of Hyperglycemia and Surgical-Site Infection in Orthopaedic Surgery.

Richards, J et al. *Journal of Bone & Joint Surgery - American Volume*. 2012 Jul 3;94(13):1181-6.

- Retrospective study of fractures in NON diabetic patients
- Hyperglycemia (BS>200 x 2) *was* an independent risk factor for thirty-day surgical-site infection

Diabetes and Hyperglycemia

What's a good minimum preoperative cutoff?

Diabetes and Hyperglycemia

What's a good minimum preoperative cutoff?

- A1c <8.0 (Average BS of 180 last 2-3 months)

Diabetes and Hyperglycemia

What's a good minimum preoperative cutoff?

- A1c <8.0 (Average BS of 180 last 2-3 months)
- 90% of qid BS <180 for one week

Diabetes and Hyperglycemia

What's a good minimum preoperative cutoff?

- A1c <8.0 (Average BS of 180 last 2-3 months)
- 90% of qid BS <180 for one week
- Fructosamine (Average BS last 1-2 weeks)

Diabetes and Hyperglycemia

Who should be screened?

Diabetes and Hyperglycemia

Who should be screened?

ADA Standards of Medicare Care in DM - 2017

- Suggest that all patients with a prior diagnosis of diabetes or hyperglycemia have A1c if not performed in the prior 3 months.

Diabetes and Hyperglycemia

Who should be screened?

ADA Standards of Medicare Care in DM - 2017

- Suggest that all patients with a prior diagnosis of diabetes or hyperglycemia have A1c if not performed in the prior 3 months.

The Prevalence of Diabetes Mellitus and Routine Hemoglobin A1c Screening in Elective Total Joint Arthroplasty Patients - J of Arthro. Capozzi et al. 1-2017

Diabetes and Hyperglycemia

Who should be screened?

ADA Standards of Medicare Care in DM - 2017

- Suggest that all patients with a prior diagnosis of diabetes or hyperglycemia have A1c if not performed in the prior 3 months.

The Prevalence of Diabetes Mellitus and Routine Hemoglobin A1c Screening in Elective Total Joint Arthroplasty Patients - J of Arthro. Capozzi et al. 1-2017

- 33.6% of pts. had previously undiagnosed dysglycemic patients

Diabetes and Hyperglycemia

Who should be screened?

ADA: BMI > 25kg/m² AND one risk factor (45, 1st degree relative, sedentary, HTN, high risk group, GDM, dyslipidemia, PCO, vascular disease)

USPTF: 40 to 70 AND overweight

CDC: 45 OR 1st degree relative, sedentary, GDM, high risk ethnic group, risk factors

Topics

- What is a Orthopedic Perioperative Specialist?
- Diabetes Screening
- **Inpatient Diabetes Management**
- Nutrition Screening

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Withhold oral medications starting the morning of surgery

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Withhold oral medications starting the morning of surgery
- Insulin with basal, correctional, and carb coverage

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Withhold oral medications starting the morning of surgery
- Insulin with basal, correctional, and carb coverage
 - CPOE recommended

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Withhold oral medications starting the morning of surgery
- Insulin with basal, correctional, and carb coverage
 - CPOE recommended
 - Sliding scales strongly discouraged

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Withhold oral medications starting the morning of surgery
- Insulin with basal, correctional, and carb coverage
 - CPOE recommended
 - Sliding scales strongly discouraged
 - Could resume orals when stable

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Withhold oral medications starting the morning of surgery
- Insulin with basal, correctional, and carb coverage
 - CPOE recommended
 - Sliding scales strongly discouraged
 - Could resume orals when stable
 - Reduce chronic meds at d/c if needed

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Withhold oral medications starting the morning of surgery
- Insulin with basal, correctional, and carb coverage
 - CPOE recommended
 - Sliding scales strongly discouraged
 - Could resume orals when stable
 - Reduce chronic meds at d/c if needed
- Target glucose range for the perioperative period should be 80–180 mg/dL (4.4–10.0 mmol/L).

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Strong emphasis on avoiding hypoglycemia but using long acting basal insulin when needed

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Strong emphasis on avoiding hypoglycemia but using long acting basal insulin when needed
- ADA now defines clinically significant hypoglycemia as glucose values $<54\text{mg/dL}$ (70 trigger for adjustment)

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Strong emphasis on avoiding hypoglycemia but using long acting basal insulin when needed
- ADA now defines clinically significant hypoglycemia as glucose values $<54\text{mg/dL}$ (70 trigger for adjustment)
- Severe hypoglycemia is defined as that associated with severe cognitive impairment regardless of blood glucose level

Diabetes and Hyperglycemia

Postoperative Inpatient Management:

ADA Standards of Medicare Care in DM - 2017

- Strong emphasis on avoiding hypoglycemia but using long acting basal insulin when needed
- ADA now defines clinically significant hypoglycemia as glucose values $<54\text{mg/dL}$ (70 trigger for adjustment)
- Severe hypoglycemia is defined as that associated with severe cognitive impairment regardless of blood glucose level
- The ADA does not endorse any single meal plan or specified percentages of macronutrients, and the term “ADA diet” should no longer be used.

Topics

- What is a Orthopedic Perioperative Specialist?
- Diabetes Screening
- Inpatient Diabetes Management
- **Nutrition Screening**



Nutrition

The Questions:

Nutrition

The Questions:

- How is malnutrition defined?

Nutrition

The Questions:

- How is malnutrition defined?
- How much malnutrition increases postop complications?

Nutrition

The Questions:

- How is malnutrition defined?
- How much malnutrition increases postop complications?
- Does correcting malnutrition decrease complications?

Nutrition

How is malnourishment diagnosed?

Nutrition

How is malnourishment diagnosed?

- Academy of Nutrition/ASPEN recommend 2 or more for diagnosis:

Nutrition

How is malnourishment diagnosed?

- Academy of Nutrition/ASPEN recommend 2 or more for diagnosis:
 - Insufficient energy intake
 - Weight loss
 - Localized or generalized fluid that may mask weight loss
 - Loss of subcutaneous fat
 - Loss of muscle mass
 - Decreased hand strength

Nutrition

How is malnourishment diagnosed?

- Academy of Nutrition/ASPEN recommend 2 or more for diagnosis:
- Screening tools

Nutrition

How is malnourishment diagnosed?

- Academy of Nutrition/ASPEN recommend 2 or more for diagnosis:
- Screening tools
 - Mini Nutrition Assessment Short Form (MNA-SF)
 - The Malnutrition Universal Screening Tool (MUST)
 - The Nutrition Risk Screening 2002 (NRS-2002)
 - The Subjective Global Assessment of Nutritional Status
 - The Nutritional Risk Screening Tool
 - Rainey-MacDonald nutritional index

Nutrition

Screening Tools

Comparing the adequacy of the MNA-SF, NRS-2002 and MUST nutritional tools in assessing malnutrition in hip fracture operated elderly patients

- All screening tools were adequate in assessing malnutrition parameters in hip fracture operated elderly patients
- Only the MNA-SF could also predict readmissions and mortality

Comparing the adequacy of the MNA-SF, NRS-2002 and MUST nutritional tools in assessing malnutrition in hip fracture operated elderly patients. By: Koren-Hakim T, Weiss A, Hershkovitz A, Otzrateni I, Anbar R, Gross Nevo RF, Schlesinger A, Frishman S, Salai M, Beloosesky Y, Clinical Nutrition (Edinburgh, Scotland), 1532-1983, 2016 Oct, Vol. 35, Issue 5

Nutrition

How is malnourishment diagnosed?

- Academy of Nutrition/ASPEN recommend 2 or more for diagnosis:
- Screening tools

Nutrition

How is malnourishment diagnosed?

- Academy of Nutrition/ASPEN recommend 2 or more for diagnosis:
- Screening tools
- LABS (albumin, transferrin, pre-albumin, lymphocytes)

Nutrition

There are many recent studies showing low albumin (<3.5 g/dl) have worse outcomes:

- Hypoalbuminaemia-a marker of malnutrition and predictor of postoperative complications and mortality after hip fractures - Injury 2017 Feb
- Hypoalbuminemia independently Predicts Surgical Site Infection, pneumonia, LOS, and readmission after Total joint arthroplasty -J. of Arthroplasty 8-2016
- Malnutrition and Total Joint Arthroplasty- J Nat Sci 6-2016
- Malnutrition Increases With Obesity and Is a Stronger Independent Risk Factor for Postoperative Complications A Propensity- J. Of Arthroplasty 4-2016
- Malnutrition a marker for increased complications, mortality, and length of stay after total shoulder arthroplasty-J Shoulderand Elbow Surgery 2-2016
- Effect of Malnutrition and Morbid Obesity on Complication Rates Following Primary Total Joint Arthroplasty - J Surg Orthop Adv 2016

Nutrition

How is malnourishment diagnosed?

- Academy of Nutrition/ASPEN recommend 2 or more for diagnosis:
- Screening tools
- LABS (albumin, transferrin, pre-albumin, lymphocytes)

Nutrition

How is malnourishment diagnosed?

- Academy of Nutrition/ASPEN recommend 2 or more for diagnosis:
- Screening tools
- LABS (albumin, transferrin, pre-albumin, lymphocytes)
 - Nutrition labs falsely abnormal
 - Associated with inflammatory processes
 - Negative acute phase reactants
 - Can be low for other non-diagnosed illnesses

Nutrition

Does routine supplementation or correcting “malnutrition” decrease complications?

Nutrition

Does routine supplementation or correcting “malnutrition” decrease complications?

- There are studies showing benefit with immunonutrition supplementation with GI surgery

Nutrition

Does routine supplementation or correcting “malnutrition” decrease complications?

- There are studies showing benefit with immunonutrition supplementation with GI surgery
 - Methodological flaws
 - Variance of supplementations
 - Surgical patients with highest risks were excluded

Nutrition

Does routine supplementation or correcting “malnutrition” decrease complications?

- There are studies showing benefit with immunonutrition supplementation with GI surgery
 - Methodological flaws
 - Variance of supplementations
 - Surgical patients with highest risks were excluded
- Minimal/no studies showing correction of the malnutrition parameter improves outcomes with TJA

Nutrition

Conclusions?

- Variability of defining “malnutrition”

Nutrition

Conclusions?

- Variability of defining “malnutrition”
- Minimal supportive studies showing correction lead to improve outcomes with TJA

Nutrition

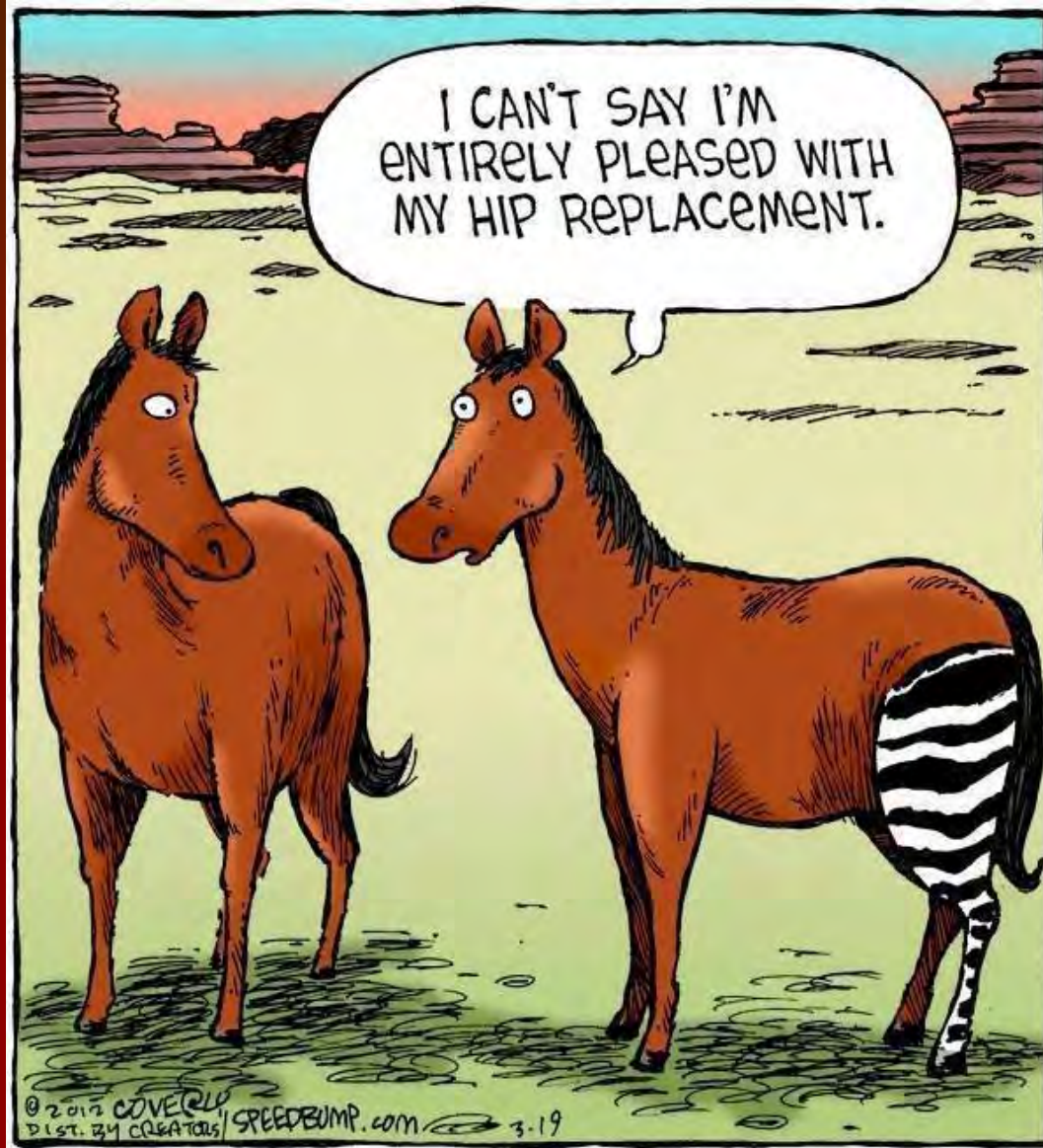
Conclusions?

- Variability of defining “malnutrition”
- Minimal supportive studies showing correction lead to improve outcomes with TJA
- Supplements choice? Cost?

Nutrition

Conclusions?

- Variability of defining “malnutrition”
- Minimal supportive studies showing correction lead to improve outcomes with TJA
- Supplements choice? Cost?
- Until higher quality data demonstrating unequivocal benefit are available, nutritional supplementation cannot be recommended as a routine addition to surgical patients.



Thank you.

ppcaccav@yahoo.com