Preparing Your Patient For Surgery and Beyond

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Disclosures

- Scott Russo, MD- speaker
  - Nutrifuel Nutrition- owner
  - On Becoming a Warrior life coaching-owner

Prepare for a better clinical outcome

PREOPERATIVE MEDICAL OPTIMIZATION

PREHABILITATION

For Surgery Patients : The Path From Illness to Wellness

Introduction

- Medical problems, not surgical ones, are more commonly associated with postoperative complications
- Optimizing medically complicated patients before surgery results in fewer complications and better outcomes
- Leveraging the surgical experience to change (patient behavior)
- Better patient lifestyle changes lead to sustainable health benefits
- *Optimal patient care is a team sport*

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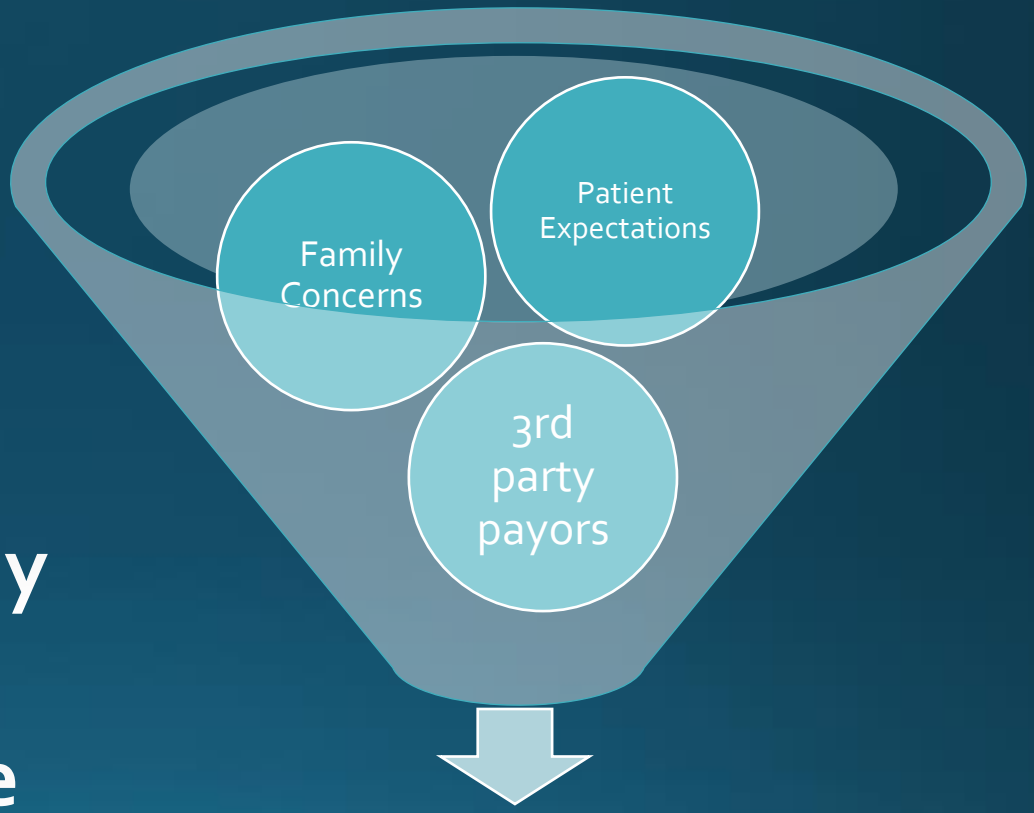
Triple Aim

Challenges to Providers and the Healthcare System

- Sicker patients
- Lack of personal responsibility
- Mental fragility
- Physically and nutritionally depleted
- The increasing cost of care



My Story 2008

My Story

- After 18 years as a practicing surgeon
- I developed a systemic staph infection, spinal abscess and heart valve infection
- 8 days in the hospital
- 20 pounds of weight loss
- Discharged home- a PICC line, a bag of antibiotics, and an infectious disease appointment
- Did not receive any dietary counseling, physical therapy or behavioral/emotional support

My Patients Story 2014

My Patients Story

- 63 y/o F- chief complaint of constant axial back pain, inability to stand upright, and heaviness in her legs with walking

Exam

- Weakness and numbness in the lower extremities
- Fixed thoracolumbar kyphosis
- Walk 100 feet

Doctor, I need your help I just can't live this way anymore!

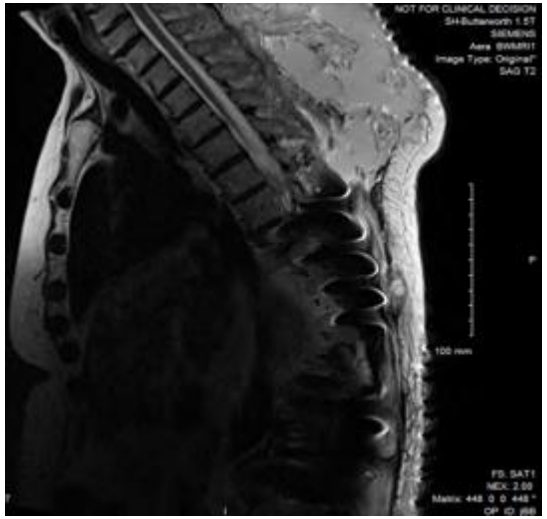
My Patients Story

- Multiple medical comorbidities:
  - Diabetes- HgA1c- 7.5
  - Non-Alcoholic Steatohepatitis
  - Obesity
  - Hypothyroid
  - Osteoporotic
  - Anemia- 10.5 gm
  - Thrombocytopenia- 82,000
  - Gastric bypass- Albumin 3.3

This patient was cleared for her 8-hour surgery by her family doctor.
But no one appreciated how physically and mentally debilitated she was and hence in need of prehabilitation.
This would have avoided her post-op infection, hospital readmission, and significant cost to health care system.

Integrated Whole-Person Optimization

- Surgical trauma hurts patients
- Preexisting conditions
- Physically debilitated
- Patients are malnourished
- Patients are not mentally prepared for recovery



What are the Costs of Illness to society?

Heart disease/ Stroke- $363 billion/ yr.

Diabetes- $327 billion/yr.

Alcohol abuse- 140,000 deaths, $249 billion/yr.

Cancer- $240 billion/ yr. 2030

Cigarette smoking- $240 billion/yr.

Behavioral illness- $225 billion/yr.

Obesity- $173 billion/yr.

Arthritis- $140 billion (direct medical)+$164 billion (lost productivity)/year

Physical inactivity- $117 billion/yr.

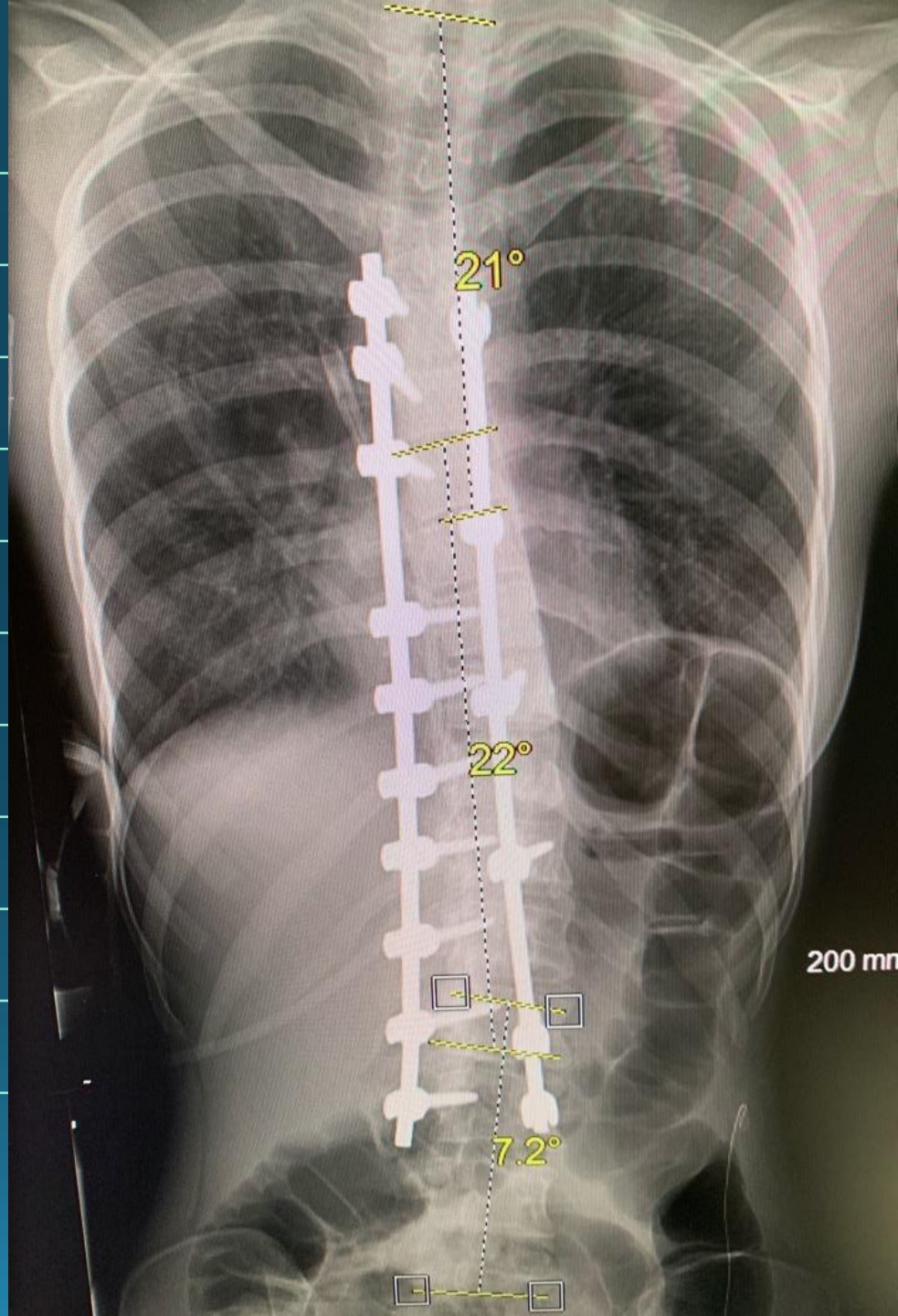
https://www.cdc.gov/chronicdisease/about/costs/index.htm

https://openminds.com/intelligence-report/the-u-s-mental-health-market-225-1-billion-in-spending-in-2019-an-open-minds-market-intelligence-report/

2018 Average Costs for Common Surgeries:

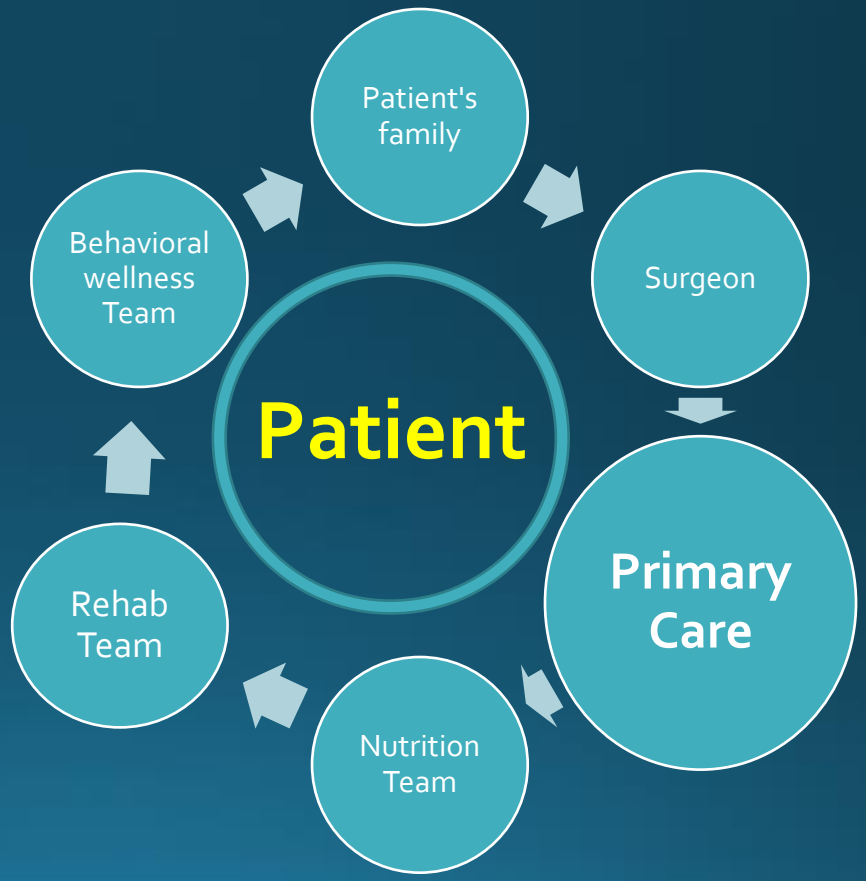
- heart valve replacement: $170,000
- heart bypass: $123,000
- spinal fusion: $110,000
- hip replacement: $40,364
- knee replacement: $35,000
- angioplasty: $28,2000
- hip resurfacing: $28,000
- gastric bypass: $25,000
- cornea: $17,500
- gastric sleeve: $16,000

Statista



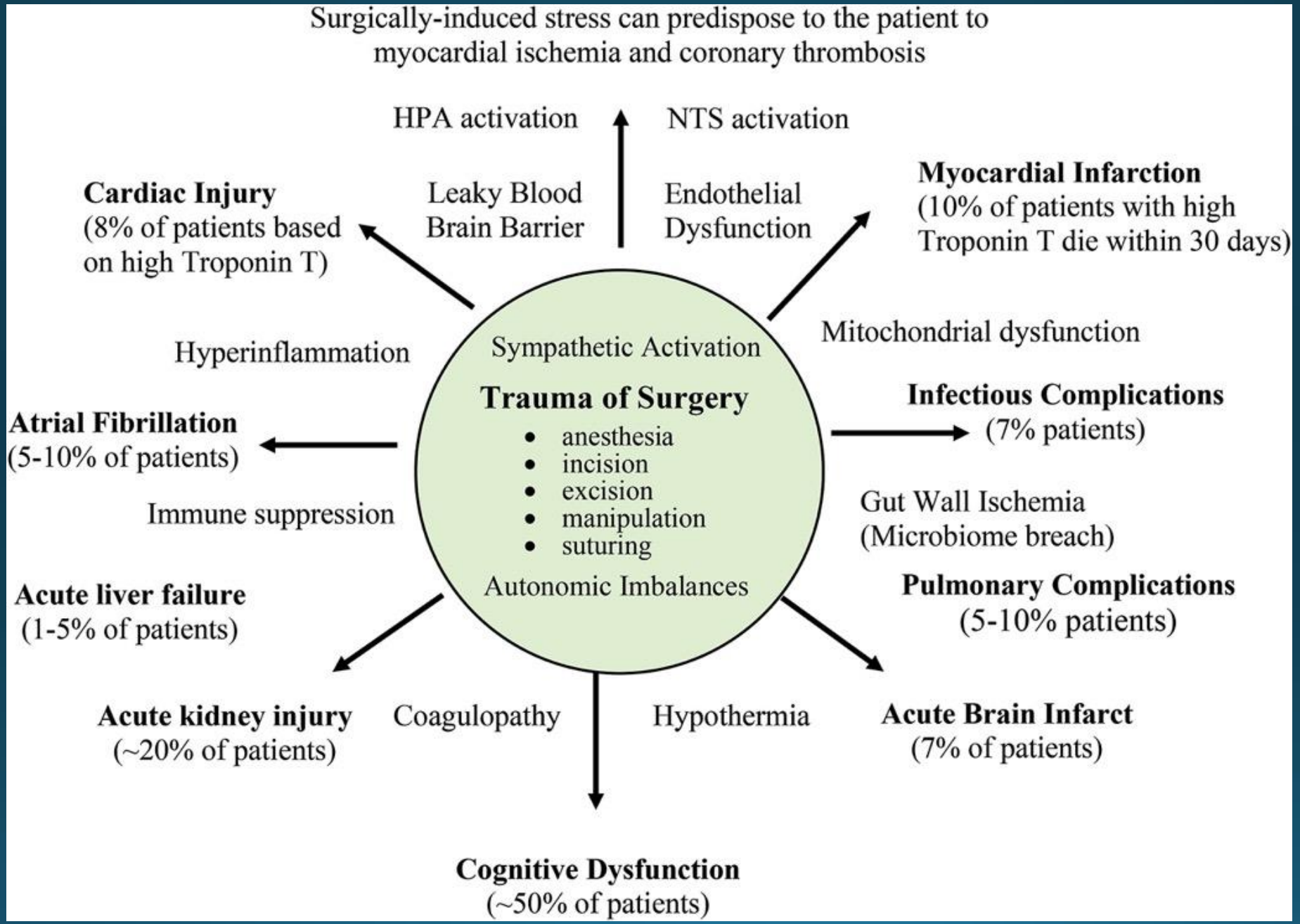
The Solution!

- Needs to be patient-centered team-based care
- Messaging critical
- Shared decision making
- Patient Empowerment



Surgical Stress

- How does the body respond?
- How do we limit the impact of surgical stress?
- How do we prepare the patient preoperatively?



Trauma of major surgery: A global problem that is not going away
https://doi.org/10.1016/j.ijsu.2020.07.017

Leveraging the surgical experience

- Medical Risk Assessment
- Procedure Specific
- Condition Specific
- Lifestyle Specific

Medical Risk Assessment

Risk Factors and Complications

- ASA III
- BMI <20/>30
- Smoking >25 PY
- Alcohol >3 drinks/day
- Hgb < 7 mmol/L (11.3gm/dl)
- Chemotherapy
- Malnutrition

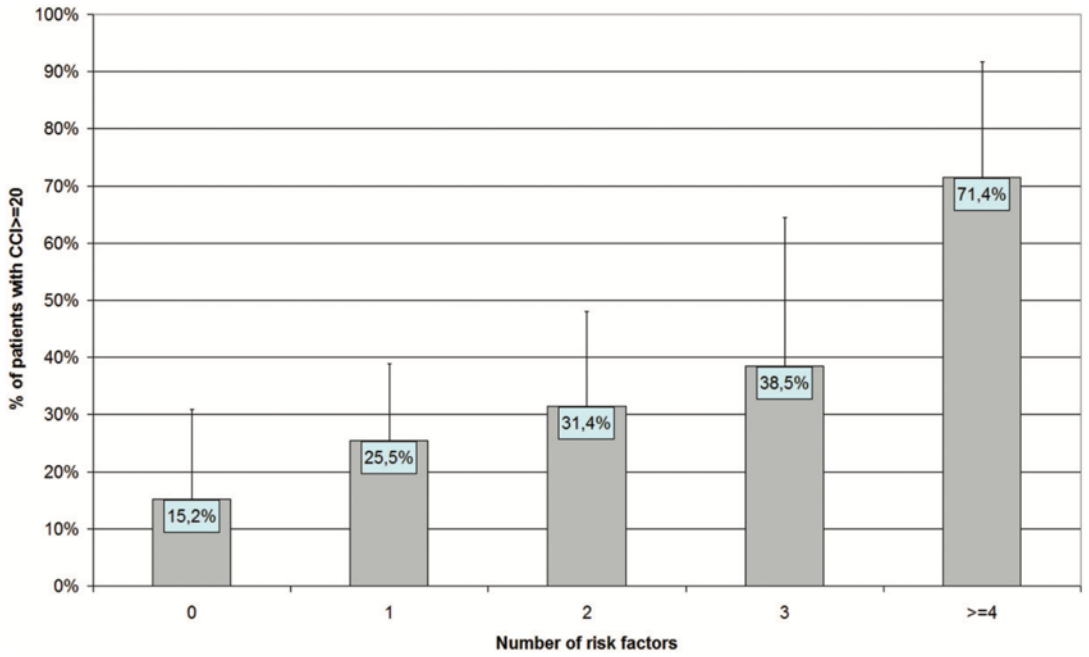


Figure 1. Percentage of colorectal cancer patients with severe postoperative complications (CCI score ≥20), related to the number of preoperative risk factors [ASA III, body mass index (BMI) < 20/>30, pack years (PY) > 15, alcohol (AH) > 3 units/day, hemoglobin level (Hb) < 7 mmol/l, Short Nutritional Assessment Questionnaire (SNAQ) > 3, neoadjuvant therapy]. Y-bars indicate upper 95% confidence limits. Percentages are displayed within the bars.

Preoperative modifiable risk factors in colorectal surgery: an observational cohort study identifying the possible value of prehabilitation

Stefanus van Rooijen, Francesco Carli, Susanne O. Dalton, Christoffer Johansen, Jeanne Dieleman, Rudi Roumen & Gerrit Slooter

Outcomes:

lower costs

↓LOS

↓ Readmissions

- BMI <35-40
- Hgb >11-12 g/dl
- HgbA1c <7-7.5
- Off nicotine for > 30 days
- Albumin >3-3.5 g/dl
- CPAP
- MRSA

Preoperative Risk Factor Screening Protocols in Total Joint Arthroplasty: A Systematic Review

William L. Johns, MD [a], Daniel Layon, MD [b], Gregory J. Golladay, MD [b], Stephen L. Kates, MD [b], Michael Scott, MD [c, d], Nirav K. Patel, MD, FRCS [b, *]

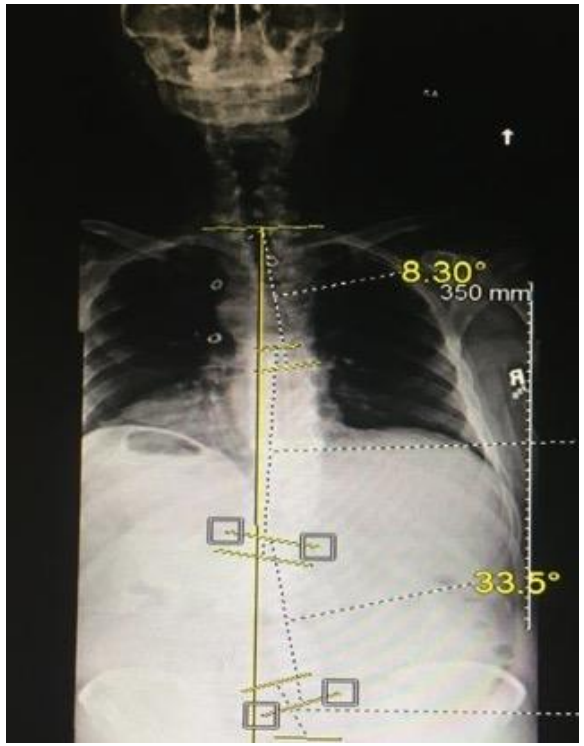
Procedure Specific Assessment

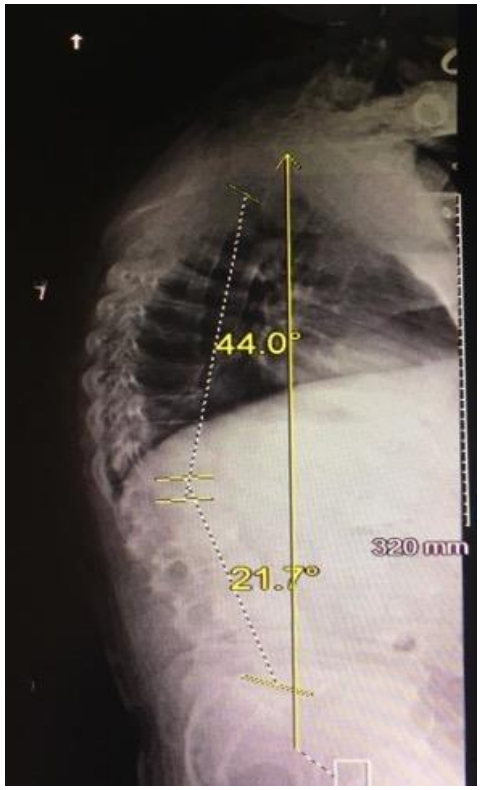
Patient Selection

- Complexity of the procedure
- Patient's health
- Risk factors
- Social support network
- Shared decision making

Procedure Specific

- Vascular surgery
- Cardiothoracic surgery
- Solid organ transplantation
- Cancer-related
- Revision spine and total joint arthroplasty
- Length of procedure- >6 hours
- High-volume blood loss





Medical Condition Assessment

Medical Condition Specific

- Diabetes
- Anemia/thrombocytopenia
- Obesity
- Behavioral conditions
- Cancer
- Osteoporosis/penia

Diabetes

Hyperglycemia and ↑ A1C >8% - ↓neutrophilic function, ↑inflammation and oxidative stress and endothelial dysfunction

Approx. 65% of diabetic patients didn't have an A1C within 3 mo of surgery

↑complications(wound), mortality, infections and LOS

A1C levels ideally < 6.5%, <7.5% acceptable, hold and optimize >8.0%

Patient Blood Management Anemia

Detection- upper/lower GI, urologic

Labs- CBC, Fe , B12, folate, serum creatinine/GFR

Goal- 13 gm/dl, hold major elective surgery if less <12 females, < 13 males

Hematology consult- hgb <8,↓platelets, WBC's, RBC's

Nephrology consult- eGFR<60ml/min

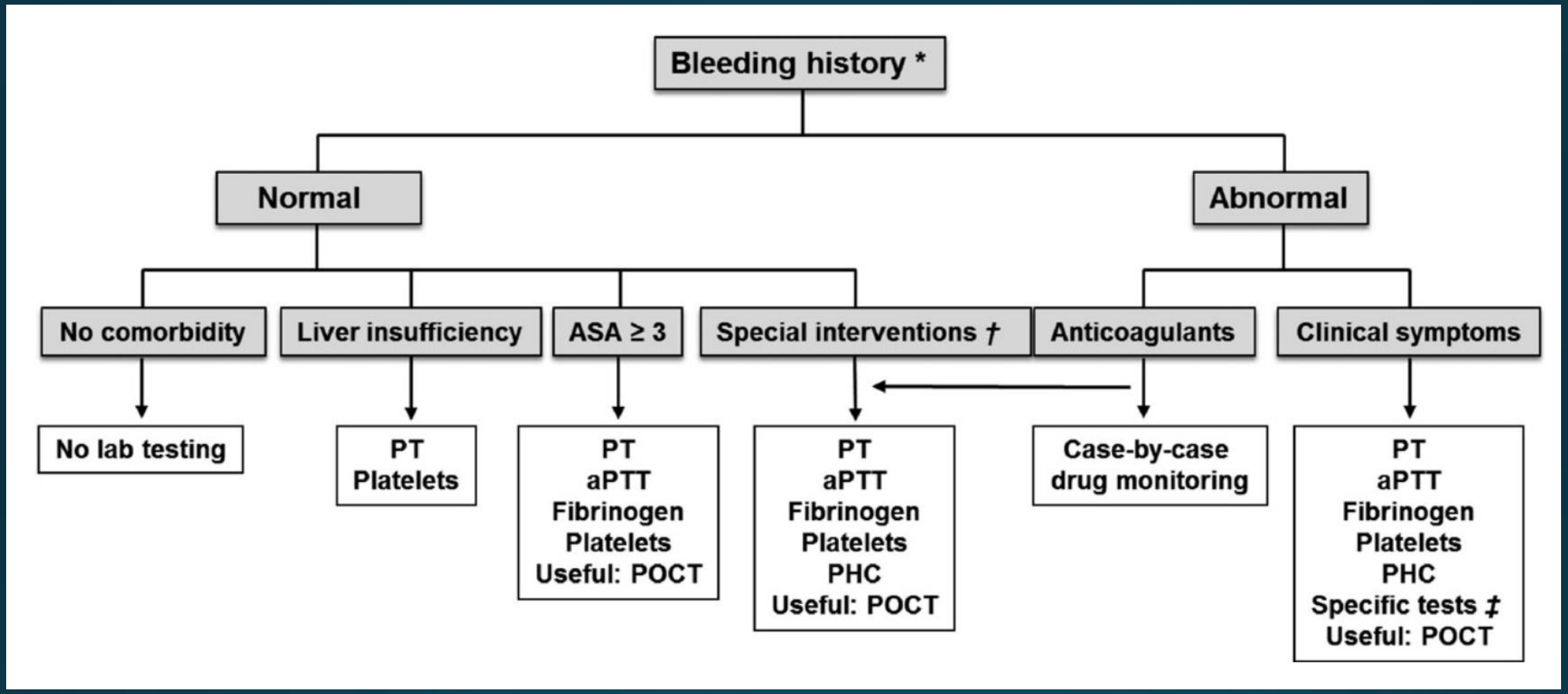
Treatment-Fe deficiency- oral, IV replacement -w or w/o Erythropoetin

Vitamin deficiency

Known coagulopathy
Unexplained epistaxis
Unexplained haematoma, petechial lesions on the torso or an unusual location
Defective wound healing
Prolonged bleeding after accidental or surgical cuts, including dental work
Abnormal requirement for blood products after previous surgery
Hypermenorrhagia requiring > 7 tampons per day, bleeding > 7 days since menarche
Medication affecting coagulation: pain killers, anti-thrombotic and anti-platelet drugs, over-the-counter drugs and dietary factors

Patient Blood Management Bleeding

- Bleeding questionnaire
- Physical exam
- Surgery
  - Brain
  - Spinal
  - Retinal
  - Neuraxial blocks



Patient Blood Management Assessment

Lifestyle Assessment

Lifestyle Specific

Deconditioning/Cardiopulmonary Dysfunction	↓Wound healing ↓Fracture/fusion healing ↑ Infections ↑Blood loss ↑OR times ↑DVT/PE ↑Mortality
Obesity/Malnutrition	Immune incompetence Organ dysfunction
Smoking	Depression
Alcohol/Drug/Opioid misuse	

Tobacco Misuse

- Nicotine, carbon monoxide, > 4000 chemicals→ impaired immunity, wound and bone healing
- Tolerance and dependence → ↑postop pain
- Higher 30 day- mortality, morbidity (wound, pulm, cardiac)
- Begin ≥ 6 weeks preop
- Major surgery doubles the likelihood of quitting

	Smokers	Reduced cigarette use	p*	Stopped smoking	p†
Complications					
Wound	12 (26%)	7 (27%)	0·98	0	0·0004
Any	20 (44%)	12 (46%)	0·89	4 (10%)	0·001

*Difference between smokers and those who reduced their cigarette use.
†Difference between smokers and those who stopped smoking.

Alcohol Misuse

3-5 drinks ≥ 30- 60 g ethanol/day

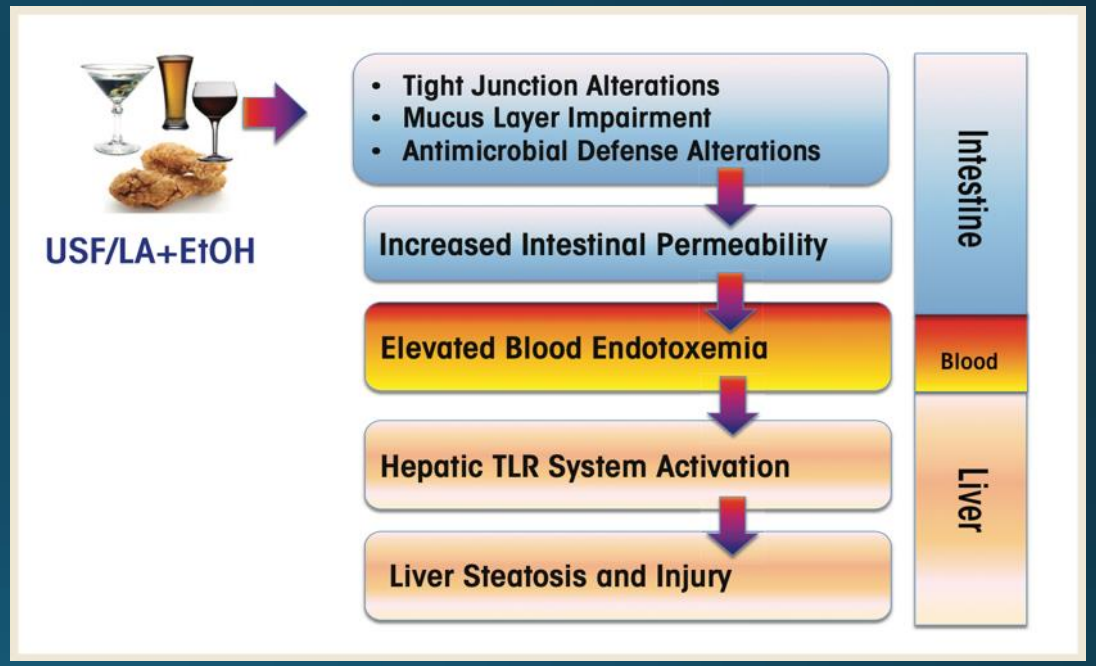
↑H-P-A axis (cortisol, interleukin 6), hypoxemia (myocardial ischemia, wound)

↑surgical stress, cardiac dysfunction immunosuppression, coagulopathy, Sleep dysfunction, malnutrition

↑LOS, hospital costs, complications, mortality

Abstinence 1 month, withdrawal preop

Fewer complications, less nursing care, ↓cardiac and pulmonary issues



Prepare

Optimizing the surgical experience

Prehabilitation

The process of enhancing one's functional and mental capacity to buffer against potential deleterious effects of a significant stressor.

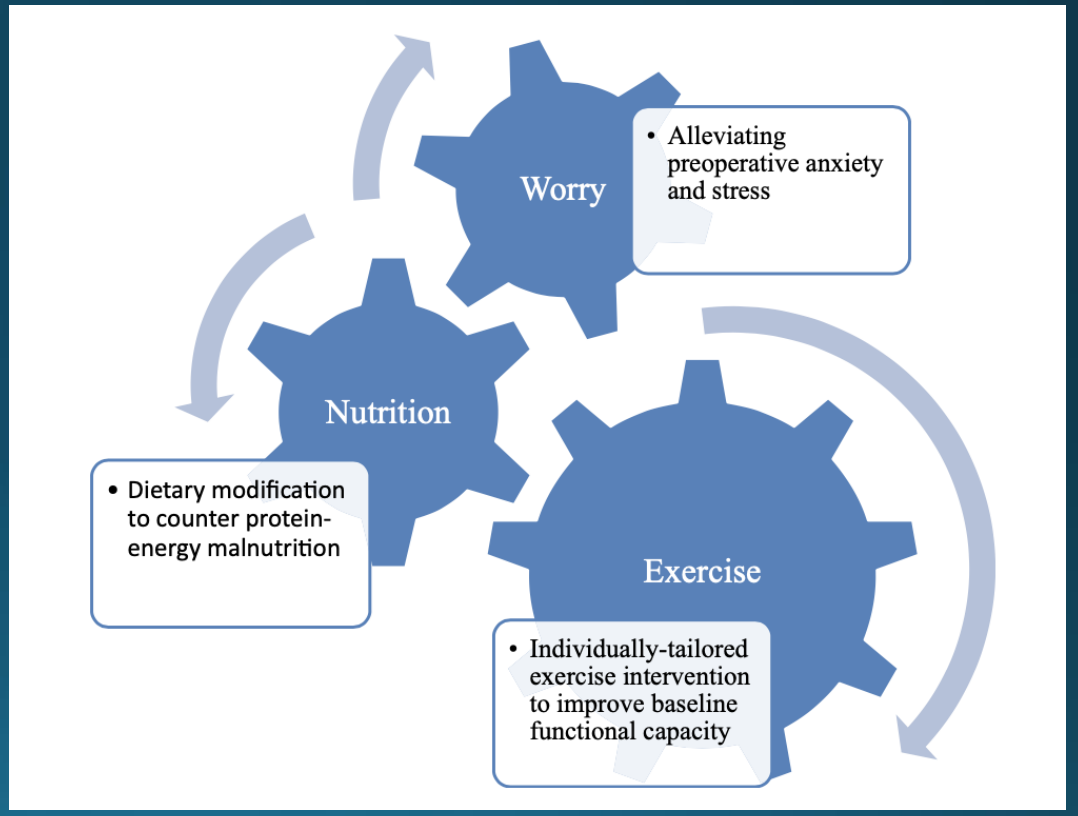
(Carli, Zavorsky-2005)

Components of Prehabilitation

Behavioral well-being and mental resilience training

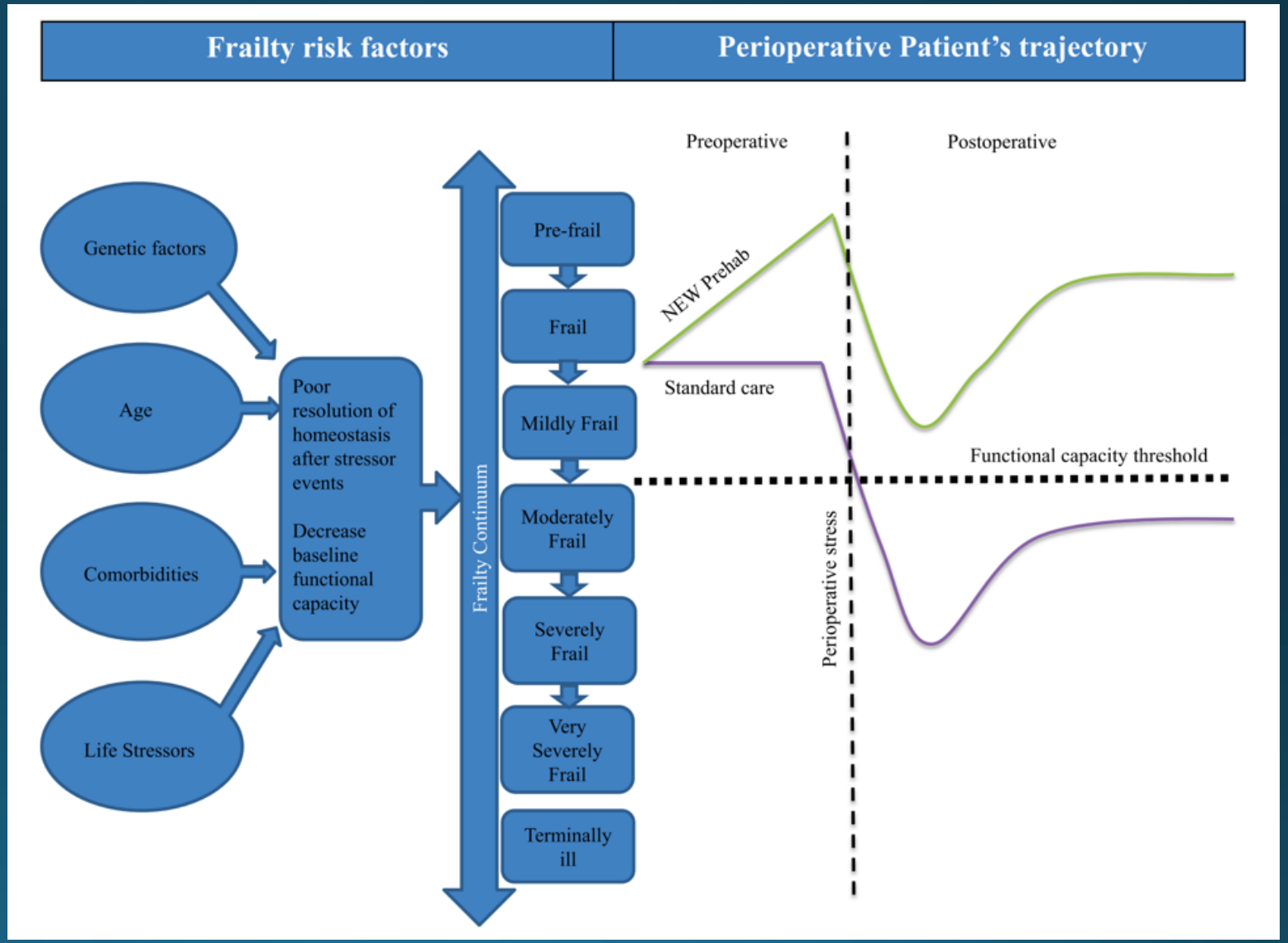
Nutritional optimization (diet and supplementation)

Physical/cardiopulmonary conditioning



Arora et al. Canadian Journal of Cardiology 34 (2018) 839e849

Goals of Prehabilitation From Frail to Fit



The Benefits of Prehabilitation

- Better value-Lower total cost of care/ improved quality
- Reduce complications
- Shorter LOS and unplanned readmissions
- Less anxious more resilient (mentally and physically)
- Faster recovery less disability
- Shared decision making
- Happier and healthier patients and their families

Patient, physicians and their staff

Understanding and Commitment

Timeline to surgery

Financial concerns

Program availability

What are the challenges?

When to begin the Integrated approach to prehabilitation!

Surgeon- Decision for surgery visit

Critical -That all questions re: planned procedure are answered

Follow with Mr. or Ms. Smith would you like to learn more about preparing yourself for surgery

Primary care- medical clearance visit

Identifying the medical factors that warrant

Optimizing the surgical experience

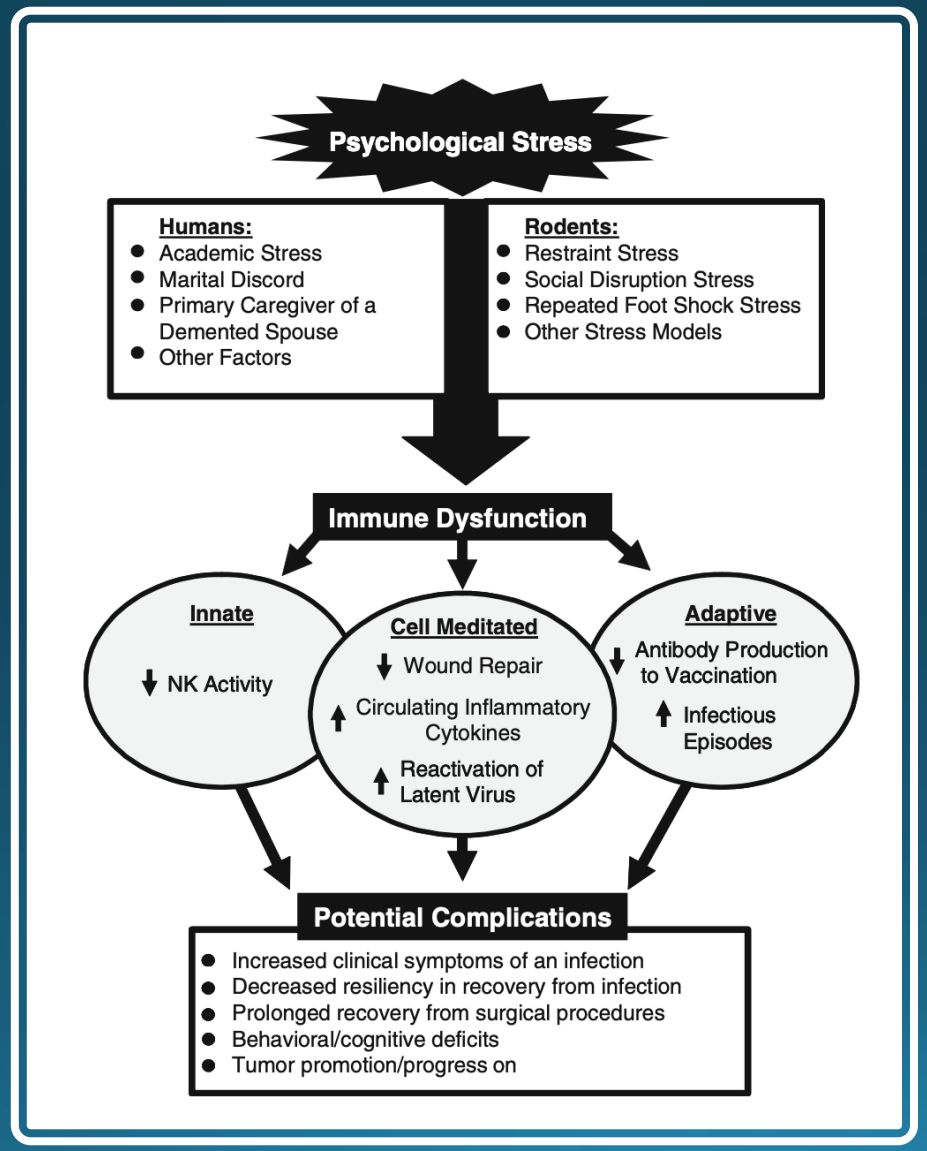
- Behavioral Wellness
- Physical Conditioning
- Nutritional Optimization

Behavioral Prehabilitation

Causes and Effects of Behavioral Dysfunction

- Fear and anxiety of the unknown
- Worried how surgery will affect their family
- Poor health Locus of Control
- Lack social support
- Stress- poorer wound healing, slower recovery
- Depression- ↑pain, ↓ function, QOL, lack engagement in preop prep
- Poor coping- ↑ pain behavior ↓function, problem solving, motivation

Psychoneuroimmmunology



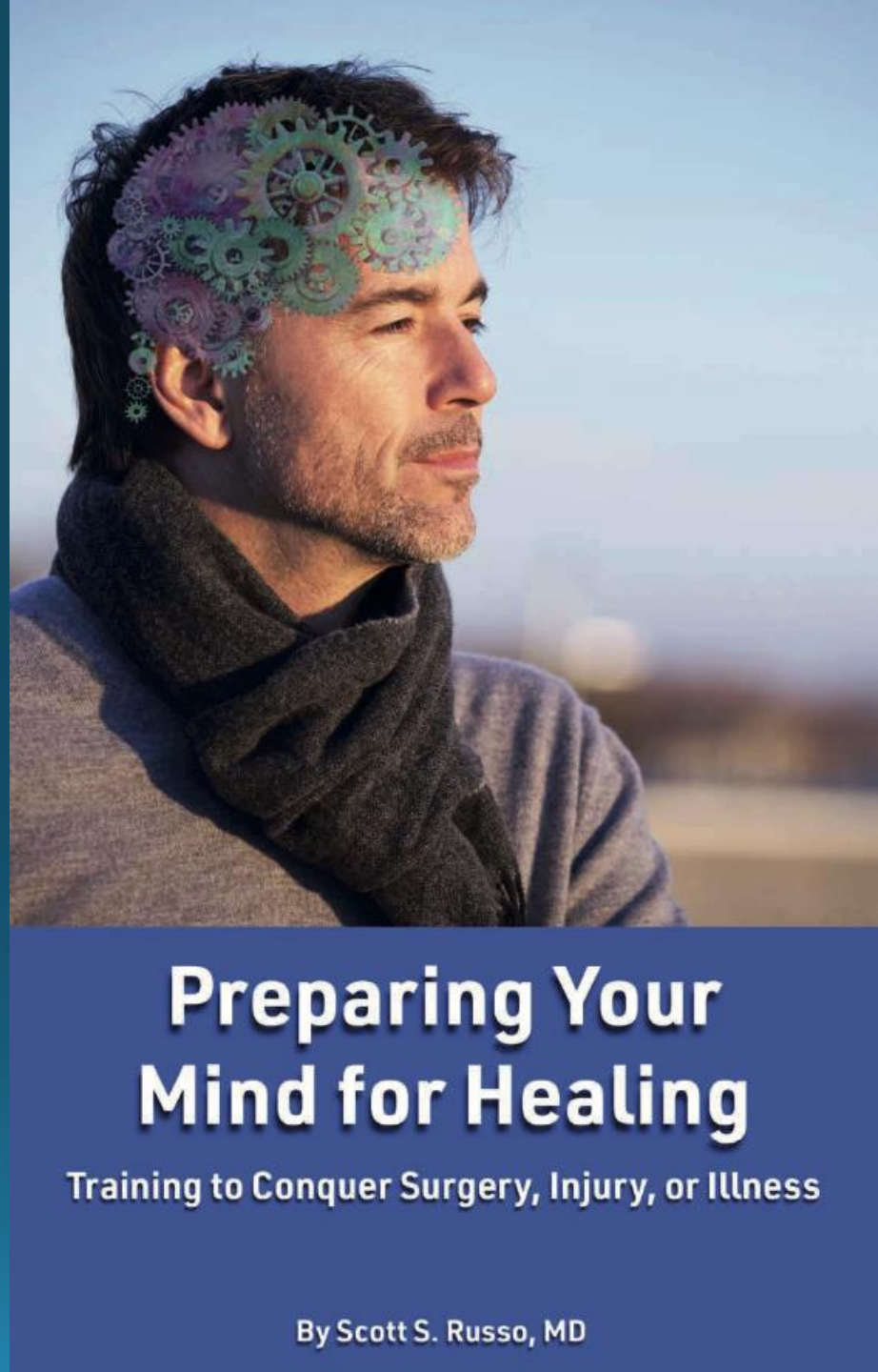
Mental Preparation

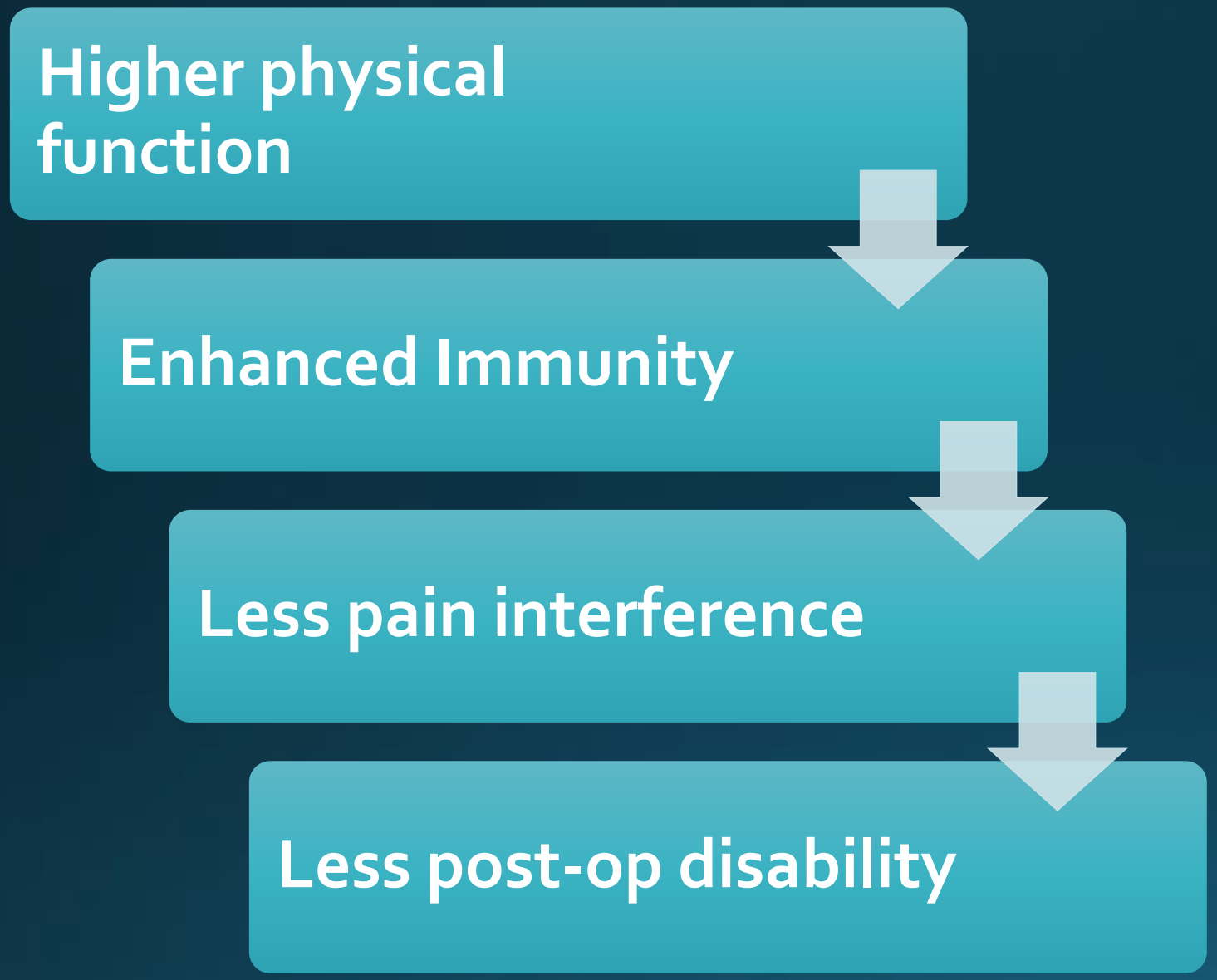
Resilience- process of adapting well in the face of adversity, trauma, tragedy, threats, or significant sources of stress

Self-efficacy- an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments

Presurgical Mental Resilience Training to Recover from Surgery, Injury or Illness

- Setting an intention
- **" Identifying their WHY"**
- 4 principles for self management
  - Arousal control-mindfulness
    - Breath control
  - Attention control
    - Positivity
  - Visualization for health and healing
  - Goal setting (SMART-P)





Outcomes-Behavioral Prehabilitation with Resiliency training

Physical Prehabilitation

Effects of Physical Deconditioning

- Higher mortality-Max aerobic capacity < 7.9 METS
- Disease related deconditioning
- Poorer quality of life
- Longer recovery
- ↑ LOS, subacute rehab, complications
- Higher cost of care

Physical Assessment

Supervised by PT, exercise physiologist, trainer

Defining the patients “WHY”

Contraindications- unstable angina, uncontrolled HTN, aortic stenosis …

Baseline screen- cardiopulmonary fitness, strength and balance training, flexibility, ADL’s

Physical Preparation
Cardio/Strength/Flexibility/Balance

6-8 weeks preop

Walking program
MIIT/HIIT Cardio
2-3 days/week

Strength
2 days/week

Flexibility

- Warmup
- Static stretch (hamstrings, quads, deltoid, back)

Balance training

- 30 %, > 65 y/o→ 1 fall / yr
- Cost effective

Journaling

Prehabilitation and early rehabilitation after spinal surgery: randomized clinical trial
Per Rotbøll Nielsen et al. Clinical Rehabilitation 2010; 24: 137–148

Prehabilitation Outcomes of Physical Conditioning

- No Adverse effects
- Acceptable with improved patient satisfaction
- Physically- increased muscle mass, immune enhancement
- Increased walking distance
- Shorter hospital stay, less complications, less pain

Per Rotbøll Nielsen et al. Clinical Rehabilitation 2010; 24: 137–148
Marchand et al. *Sci Rep* **11**, 11080 (2021).https://doi.org/10.1038/s41598-021-90537-4

Nutritional Prehabilitation


BIZARROCOMIC.BLOGSPOT.COM
DAN PIRARO
2-8-11
Take one a day with tomato and cucumber.
FARMACY
K2
Dist. by King Features

Impact of Malnutrition

15-57 % hospitalized geriatric patients

38%- no nutritional treatment

Nutritionally at risk- costs 35-75% higher

↑ LOS- $18 billion / year

↑ complications- 42% severely malnourished/ 16 % well nourished

↑ depression

Under-consumed- Protein, A,D,E,C, choline, calcium, mg, Fe, K, fiber

The economic costs of disease related malnutrition☆

Karen Freijer[a,*], Siok Swan Tan[b], Marc A. Koopmanschap[c], Judith M.M. Meijers[d], Ruud J.G. Halfens[d], Mark J.C. Nuijten[e]

Impact of Obesity

Spine

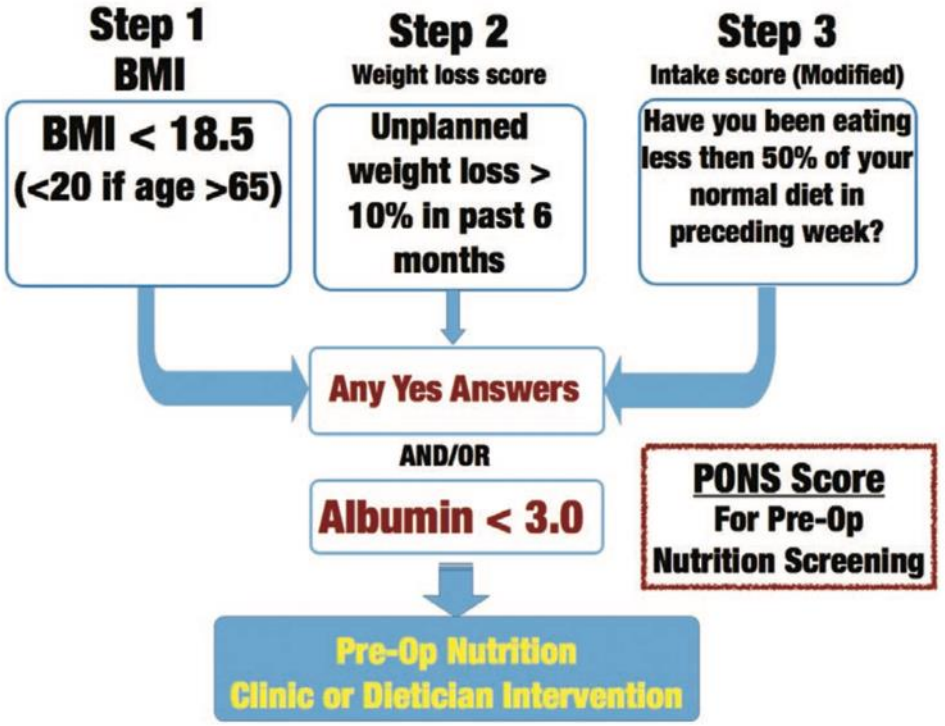
- Increased surgical time
- Higher SSI
- Increased wound issues
- Higher cost
- Greater LOS

Total joint Replacement

- Associated malnutrition
- Increased risk of infection
- Greater dislocation rate
- Higher aseptic loosening
- Longer hospital stay
- Increased readmissions

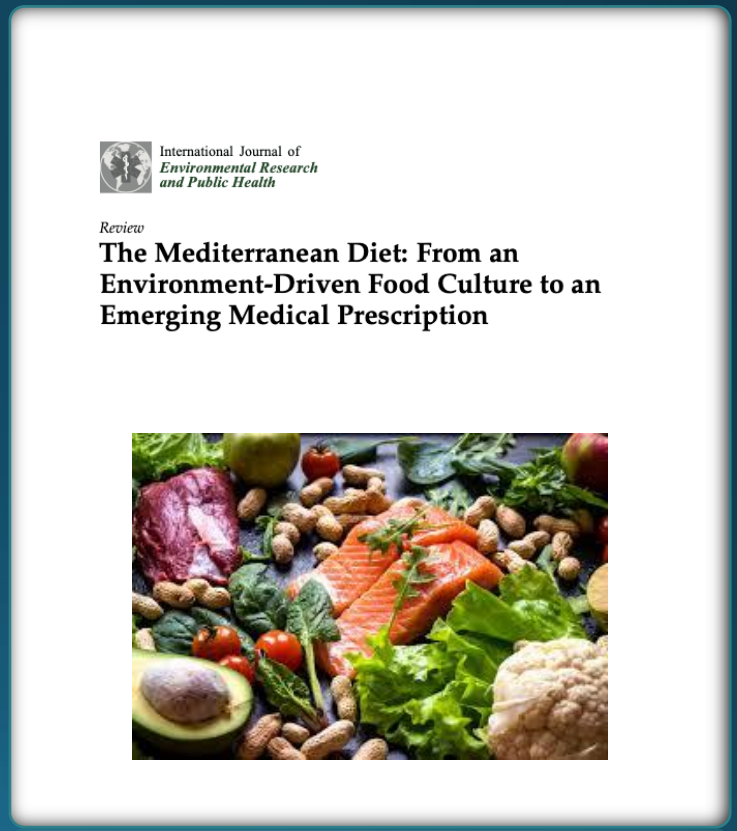
Assessing the Patient

- Dietician driven
- Body Composition Evaluation
- Laboratory
  - Albumin- < 3.5 gm/dl
  - Pre-albumin- sensitive for early diagnosis of malnutrition and response to treatment
  - Total lymphocyte count- < 1500/ mm^3 indicates malnutrition, <900/ mm^3 severe malnutrition



Nutrition
Preoperative Plan

- Dietitian Counseling
- Mediterranean Diet (best, lessen depression)
- Surgical supplementation- (immunonutrition) 2 weeks preoperative
- Optimize energy stores
  - Carbs - 8-12 gm/kg/d, (3-4 d preop)
  - Protein- 1.2-2.0 g/kg/d (20-40 gm servings q 3hr)
- Evening meal (6-12 hours)
- Amino acid/50 g carb drink > 2 hours preop



Nutrition
Postoperative Plan

- Postoperative fueling plan
  - Mediterranean diet
  - Protein 1.2-2.0 g/kg/day
  - 20-40 g servings
  - Hydration
  - Surgical supplementation- 2 weeks postoperative

Prehabilitation Outcomes of Nutrition

Patient Effects

- Accelerates return to normal function
- Improves wound healing
- Enhanced immune function
- Protects against depression

Healthcare System Effects

- Lower costs of care
- Less complications
- Shorter LOS
- Less readmissions
- Fewer deaths

Who Will Benefit from Prehabilitation

- Surgical and pre-surgical patients
- Patients recovering post-discharge from Illness or Injury
- Patients living with obesity and other chronic conditions
- Osteoporosis/osteosarcopenia
- Patients living with cancer

The Benefits of Prehabilitation to The Healthcare System

- Leveraging surgery, illness or injury for a healthier mindset & lifestyle
- Less anxious more resilient (mentally and physically) patients
- Shared decision-making and personal ownership
- Faster recovery less disability
- Lower complications, LOS and unplanned readmissions
- Happier and healthier patients and their families

Financial Benefits of Prehabilitation

Less 30-day readmissions- 18% to 3% (b)

Prehabilitation in frail patient- Lower complications, subacute rehab usage Savings/patient: $9,418/patient (c)

Pulmonary optimization- $8 saved for each $1 spent on PT

Addressing disease relate malnutrition- saving approx. $2500/Patient/Admission

Immunonutrition- savings/patient: - $ 2,943, $-3,896 and $-4,675 in the 30-, 90- and 180-day post-op period (c, d)

Behavioral wellness (LBP)- mindfulness $724 savings/patient

In Summary

	SCREEN	ASSESS	INTERVENE
	• Self-reported METs ≤ 4 • RCRI ≥ 1 • 6MWD < 400 m	• CPET • Timed Up-and-Go test • Sit-to-Stands • Stair climb test • Grip strength test • One arm curl test	• Aerobic exercise • Resistance exercise • Flexibility exercise
	• BMI <20 or >30 Kg/m² • Weight loss ≧5% in 3 months, or ≧10% in 6 months • Albumin <3.5 g/dL • PGS-GS ≥2, NRS-2002 ≥3	• Body composition • Specific impairment Dietary intake ↓ Substrate and energy requirement estimation	Nutrient-based intervention • Achieve energy requirement • 3 balanced meals • Protein intake: 1.5 g/kg IBW/d
	• HADS-Anxiety >7 • HADS-Depression >5	• Restlessness and insomnia • Emotional numbness • Apprehension, hypervigilance to symptoms and events	Cognitive-behavioral therapy • Explore irrational or unhelpful thoughts • Encourage active behavior modifications • Teach relaxation skills: breathing exercise, distraction and imagery techniques

In Summary

Leverage	Leverage the surgical experience to introduce change
Think	Think wellness all the time
Put	Put patients in control by helping them find their “Why”
Work	Work with a prehab specialist/program
Have	The team must have one message “ Prehabilitation can prepare you for a better surgical experience, better outcome and better future”

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Thank You