



How Physical Therapists Drive Value in the Care of Hip and Knee Osteoarthritis

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Objectives

1. Discuss challenges and problems confronting high quality, cost-effective care of hip or knee osteoarthritis in America
2. Describe the vital role of the physical therapist in innovative, multidisciplinary hip or knee osteoarthritis care models in the US and around the world
3. Identify tools and approaches that physical therapists can use to better address the functional, psychological, behavioral and social needs for patients with hip or knee osteoarthritis
4. Discuss the development, implementation, and outcomes of one innovative osteoarthritis care model at Duke, the Joint Health Program

Outline

- **Current state of health and osteoarthritis care**
- Payment model changes
- Osteoarthritis background
- Osteoarthritis assessment
- Osteoarthritis management
- Duke Joint Health Program

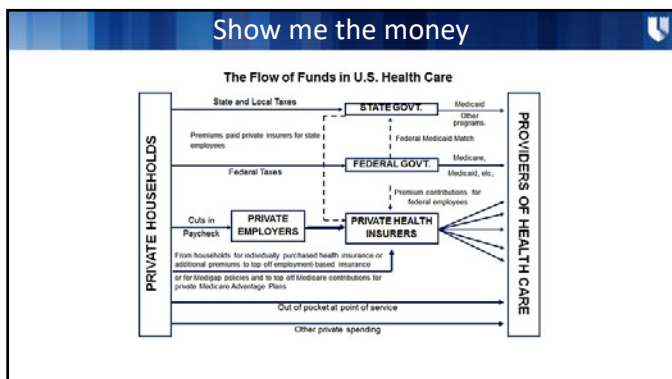
Big problems in healthcare

Health Care Spending as a Percentage of GDP, 1980-2013

Which Physicians Are Most Burned Out?

EXHIBIT ES-1 OVERALL RANKING

Country	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
USA	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	0	0	0	0	0
Canada	10	9	8	7	6	5	4	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK	8	7	6	5	4	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Show me the money

- Funds flow in healthcare
- Costs v Charges v Payments
 - Valuation (RVUs, registrar)
 - Accountability (quality, outcomes)
 - Appropriateness

What is quality?

Meaningful measurement

Costs and quality in osteoarthritis

- Costly, prevalent, disabling
- Poor/variable implementation of non-operative clinical practice guidelines
- Unaddressed needs for behavioral health
- Arthroplasty is effective definitive treatment, but challenges with appropriateness

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Alternative payment models in TJA (total joint arthroplasty)

- Acute Care Episode (2009)
- Bundled Payment for Care Improvement (2013)
- Comprehensive Care for Joint Replacement Program (2016)
- (now) BPCI-Advanced (2018)
- (future) condition-based?

Condition-based?

How to fund:

- Appropriate TJAs, disincentivize inappropriate TJAs
- Fundamental non-operative conservative management
- Unfunded areas (mental/behavioral health)

Policy, practice, and payment

Volume → Value



Practice Innovation Unit

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Osteoarthritis

- Disorder involving movable joints
- Characterized by extracellular degradation initiated by micro and macro-injury that initiates **maladaptive repair** and pro-inflammatory pathways
- OA begins as molecular derangement followed by anatomic and/or physiologic derangements

Kraus et al, 2015

Osteoarthritis

- OA is heterogenous condition with variability in:
 - Disease mechanisms
 - Clinical features
 - Treatment response
 - Pain mechanisms

Mobarshi and Batt, 2017

Mechanisms of pain in osteoarthritis

Mechanism	Details
Joint nociception	Structural changes: bone marrow lesions, subchondral bone remodelling, osteophyte formation Inflammation (synovitis) New nerve growth in cartilage and menisci
Peripheral sensitization	Neovascularization Stimuli Neuronal hyperexcitability
Central sensitization	Pain hypersensitivity in spinal cord and brain
Types of OA pain	Dysfunction of ascending and descending signals Nociceptive, inflammatory and neuropathic pain
Mediators	Cytokines, proteases, neuropeptides, chemokines, prostaglandins, neurotrophins, gaseous mediators and lipids Mediators at dorsal root ganglion: NGF, CGRP, VIP, TRPV1, ORs, CCL2, CCR2 Mediators at brain level: substance P, serotonin and glutamate
Contextual aspects	Psychosocial factors, such as racial/ethnic background, sleep, fatigue, obesity/BMI, psychological distress, beliefs and weather, etc.

Fu et al, 2017

Osteoarthritis phenotypes

- This variability suggests different clinical phenotypes of OA
 - Biochemical markers, biomechanical, psychological and clinical factors
 - No clear consensus on type of phenotypes
 - May guide treatment pathways

Mobarshi and Batt, 2017

Imaging and osteoarthritis

- Imaging findings of OA correlate poorly with pain and dysfunction
 - Almost 1 in 2 people without pain or injury over the age of 40 have knee changes on MRI
 - Almost 1 in 5 people without pain or injury under the age of 40 have knee changes on MRI
 - 30-50% of individuals with severe OA related joint damage are asymptomatic

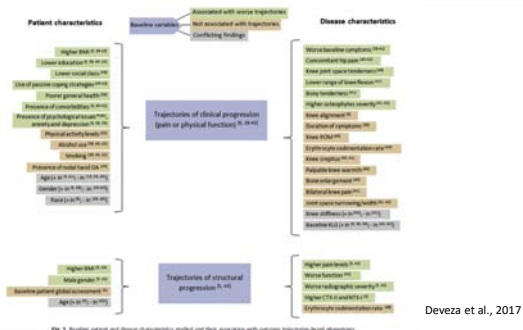
Culvenor et al., 2018
Arendt-Nielsen et al., 2017

Risk factors for developing osteoarthritis

- Genetic factors
 - Up to 40-60%*
- Constitutional factors
 - Age, obesity, female sex, high bone density
- Local/biomechanical factors
 - Trauma, repetitive trauma, reduced muscle strength, joint laxity, joint malalignment

NICE Guidelines, 2014

Baseline predictors of OA progression



Deveza et al., 2017

Modifiable factors that impact progression of OA

- Physical activity and exercise
- Weight management
- Psychological distress
- Sleep quality

Physical activity and osteoarthritis

- Physical activity and exercise in individuals with OA decreases pain and improves function
- Physical activity is essential for overall health
 - musculoskeletal, cardiovascular, mental and metabolic health

Mobarshi and Batt, 2017
Mills et al., 2017

Weight management and osteoarthritis

- 5-10% weight loss or weight gain can significantly impact pain and function in knee OA
 - RACGP Guidelines 2nd edition: 5-7.5% weight loss is recommended
- 1 kg of weight loss reduced peak knee load by 2.2 kg during walking

Riddle and Stratford, 2013

Aaboe et al., 2011

Psychological distress on osteoarthritis

- Depression, anxiety, pain catastrophizing and fear avoidance are associated with:
 - higher pain levels, lower quality of life, higher psychological and physical disability and less optimal outcomes in patients with OA
- Pain catastrophizing is most predictive of poorer outcomes following total joint surgery

Sharma et al., 2016; Mills et al., 2018
Somers et al., 2009

Riddle et al., 2010

Sleep and osteoarthritis

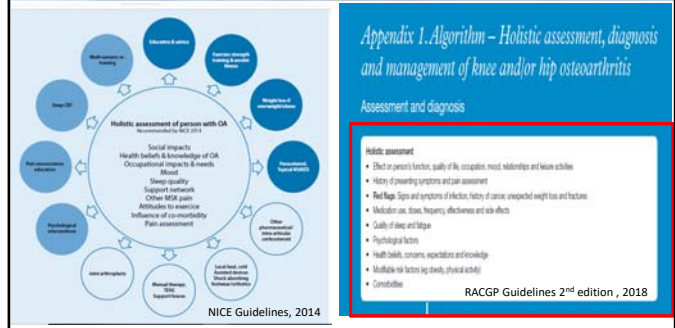
- > 50% of people with OA exhibit significant sleep disturbances
 - initiating, maintaining, and duration of sleep
- Impaired sleep habits have been linked to:
 - persistent pain, depression, disability, pro-inflammatory states and even joint degradation in animal studies

Mills et al., 2018

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Osteoarthritis requires a holistic assessment



Patient reported outcomes (PROs) for OA

- Numeric Pain Rating Scale (NPRS)
- Visual Analog Scale (VAS) for Pain
- Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire
- Knee Injury and Osteoarthritis Outcome Score (KOOS)
- Hip Disability and Osteoarthritis Outcome Score (HOOS)

RACGP Guidelines 2nd edition, 2018

Physical assessment of osteoarthritis

- General (PT) physical exam
- Physical performance measures
 - 6 minute Walk test
 - 40 meter fast-paced walk test
 - Stair- climb test
 - Timed Up and Go test
 - 30-seconds chair-stand test

RACGP Guidelines 2nd edition, 2018

Setting a plan of care for osteoarthritis

- Individualized
- Shared decision making
- Goal oriented
- Active role of the patient
- Long term follow up

RACGP Guidelines 2nd ed, 2018
Mills et al., 2017

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Osteoarthritis management

“What can I do myself to decrease symptoms and to prevent the OA from getting worse?”

Claassee et al., 2018



Osteoarthritis education

- Break down misconceptions
 - Radiographs do not correlate well with pain and dysfunction
 - Not a wear and tear disease
- Risk factors for progression
- Evidence-based guidance for active self-management
- Watch your language
 - Avoid use of “bone on bone” and “wear and tear”

RACGP Guidelines 2nd ed, 2018

Pain education

- Pain education
 - Decreases fear of structural damage and pain catastrophizing
 - Reduces pain intensity
- Preoperative pain education > biomedical explanation and procedural education in managing postoperative pain after TJA

Mills et al., 2018

Louw et al., 2012

Exercise and physical activity

- Land-based
 - Strengthening
 - Quadriceps
 - Tai Chi, Hatha Yoga, stationary cycling
 - Aerobic exercise
- Graded exercise (modifications/pacing)
- Personalized and sustainable

Ojestad et al., 2015; Xie et al., 2018

RACGP Guidelines 2nd ed, 2018
NICE Guidelines, 2014

Nutrition and weight management

- Nutrition
 - No specific diet recommendations for arthritis
 - A wholesome nutritious diet is recommended
 - Mediterranean diet
 - Evidence suggesting improvements in pain, function, quality of life and decreased biomarkers of inflammation and cartilage degradation related to OA

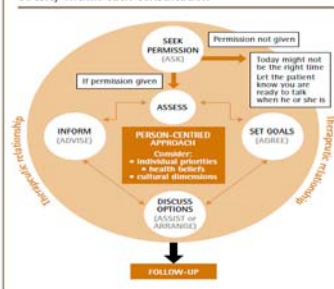
Morales-Ivorra et al., 2018

Nutrition and weight management

- 5 As Framework
 - Ask
 - Assess
 - Advise
 - Agree
 - Assist
- CBT- weight management

Sturgiss and van Weel, 2017

Figure 2. Proposed model for the management of obesity within each consultation



Role of PT in nutrition and weight management

- Screen and refer to appropriate services
- General nutrition principles and guidance
- Education on the importance of nutrition/weight management for managing OA pain and function

Morris et al., 2009

Psychological health

- Education
 - OA and pain
- Physical exercise
- Sleep
- Cognitive behavioral therapy (CBT)
 - The key idea behind CBT is that what you THINK and DO impacts the way you FEEL

Mills et al., 2017

Khanzada et al., 2015

Nijs et al., 2018

Psychological health

- CBT/Pain Coping Skills Training (PCST)
 - Decreases pain and improves psychological well-being and self-efficacy in individuals with knee OA
 - Pain coping skills
 - Relaxation, activity-rest cycling, value based goal setting, problem solving, behavioral analysis, cognitive restructuring.
 - PTs can be trained to deliver these skills effectively
 - More effective when combined with other interventions

Nielsen et al., 2014
Ismail et al., 2018

Sleep health

- Sleep hygiene
- Positioning
- Exercise and pain management
- CBT-Insomnia
 - Efficacious in reducing sleep maintenance insomnia and clinical pain in knee OA

Smith et al., 2018

Non-surgical management for knee and/or hip OA

Core long-term management

- STRONG: Optimisation and maintenance of body weight management and programme
- STRONG: Last best practice
- STRONG: Weight management path to lose 10% body weight (or weight in stone)

Notes to sleep health and multidisciplinary care in required before for existing services

Optional adjunctive management - Test for short term and assess if effective

- CONDITIONAL: Legal case-control
- CONDITIONAL: Thermal therapy in hot/cold
- CONDITIONAL: Massage, manipulation and mobilisation
- CONDITIONAL: Acupuncture (strong evidence)
- CONDITIONAL: Cognitive behavioural therapy (CBT) for pain coping or psychological symptoms
- CONDITIONAL: Transcutaneous electrical nerve stimulation (TENS)
- CONDITIONAL: Non-invasive neuromodulation (spinal cord stimulation)

Notes to a possible: Functional exercise with advice/feedback, Equipment needs for self-management

Advanced pharmacological therapies - Test for short term if symptoms still present

- CONDITIONAL: May reduce pain but not functional or quality of life in long term
- CONDITIONAL: Consider off label use

Holistic assessment of person with OA
Recommendation by NICE 2014

RACGP Guidelines 2nd ed, 2018 NICE Guidelines, 2014

$$\text{Value} = \frac{\text{Outcomes}}{\text{Cost}}$$

Traditional Management	Physical Therapy
Corticosteroids injections Viscosupplementation Pharmacology PRP- injections Stem cell injections Arthroscopy Total joint arthroplasty	Physical exercise Self-management education Neuromuscular re-ed Pain education Weight/nutrition guidance Sleep health Psychological informed PT Behavioral health modifications Manual therapy Assistive devices Bracing Orthotics/shoe wear

Outline

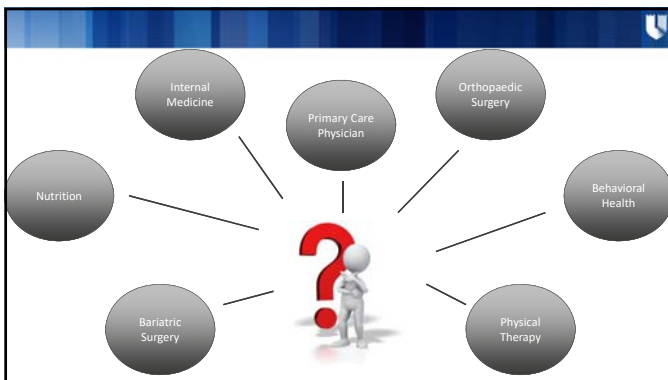
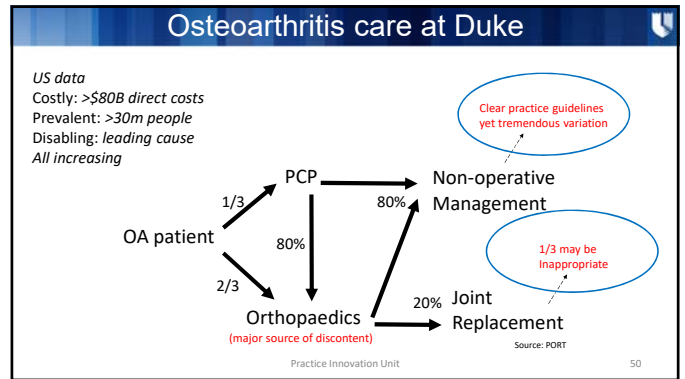
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Models of osteoarthritis care

- Several international examples:
 - Amsterdam Osteoarthritis Cohort- Netherlands
 - Better management of patients with OA- Sweden
 - Enabling Self-management and Coping with Arthritic Pain Using Exercise- UK
 - Good Life with Arthritis in Denmark
 - Joint Implementation of OA Guidelines –UK
 - Osteoarthritis Chronic Care Programme- Australia

Nelson et al., 2014

Duke Joint Health Program



Core development team

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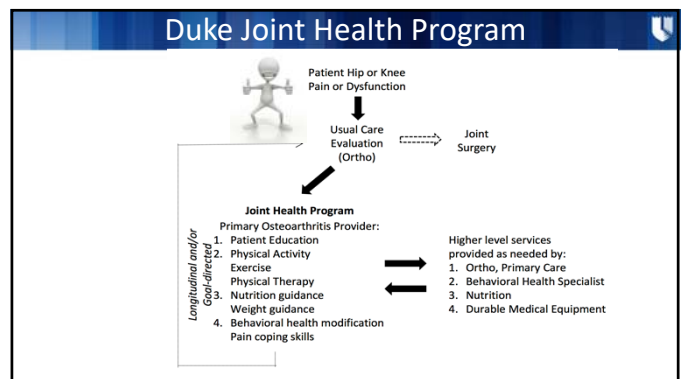
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 Primary Osteoarthritis Provider

Our conceptual response

Primary Osteoarthritis Provider
PT + CBT
Management and Coordination

Patient Education
Nutrition, Weight Loss
Exercise, Physical Therapy
Behavioral Health

- Patient-informed
- Goal-directed
- Longitudinal relationship
- Multi-modal contact



Domain	Type	Tool	Frequency of Assessment
Pain	Patient reported outcome	Numeric Pain Rating Scale	Baseline, each 12 weeks, visit, 6 weeks, 12 weeks, 6 months, 1 year
Function Assessment	Patient reported outcome	1. HOODS Jr 2. Patient Specific Functional Scale	Baseline, 6 weeks, 12 weeks, 6 months, 1 year
	Physical performance measure	1. Timed walk test 2. Timed sit and stand 3. Timed sit to stand	Baseline, 12 weeks, and as needed
Physical Impairments	Physical activity	Two-part question: 1. "On average, how many days per week are you physically active?" 2. "On those days, on average, how many minutes are your physically active?"	Baseline and as needed
	Open ended questions	1. What are the most important activities that you would like to do, along with your symptoms, if any? 2. What services offered by the JHP they would like the plan of care to focus on: learn, physical function and exercise, nutrition and weight management, mental stress, anxiety or other mood strategies associated with OA?	Baseline
Psychological Distress and Behavioral Health	Patient reported outcome	1. How is your pain bothering you compared to your previous visit? 2. How do you rate the level of your osteoarthritis pain compared?	4 weeks, 12 weeks, 6 months, 12 months
	Patient reported outcome	1. OSFRO Young-Fling Assessment Tool 2. PHQ-2 or PHQ-9	1. Baseline, 6 weeks, 12 weeks, 6 months, 12 months 2. As needed
Nutrition	Patient reported outcome	DETERMINE your nutritional health survey	Baseline, 6 weeks, 12 weeks, 6 months, and 12 months
	Economics	Weight (BMI)	Baseline, as needed based on patient goals
Sleep	Patient reported outcome	Two-part question: 1. On average how many hours of sleep do you get a night? 2. On a scale of 0-100% please rate the quality of your sleep (0% is you are not sleeping at all and 100% you are sleeping through the night)	Baseline, as needed based on patient goals
	Patient reported outcome	Three-part question: At this point, how satisfied are you with your level of: 1. Joint pain 2. Joint function 3. Joint limitations	Baseline, 6 weeks, 12 weeks, 6 months and 1 year
Program Satisfaction	Patient reported outcome	Net Promoter Score	8 weeks, 12 weeks, 6 months, 12 weeks, 6 months, 1 year

OSPRO-YF Assessment Tool

- Asses 3 domains of psychological distress:
 - Fear avoidance
 - Negative mood
 - Positive affect/coping
- 17, 10 and 8- item questionnaire that predicts scores on 11 different PROs

Lentz et al., 2016

OSPRO-YF Assessment Tool

Parent Questionnaire	Total Score Estimate	Yellow Flag?
FABQ-W	20.502	YES
FABQ-PA	15.367	
TSK-11	31.184	YES
PCS	40.795	YES
STAI	47.286	YES
STAXI	24.933	YES
PHQ-9	17.032	YES
PASS-20	66.949	YES
PSEQ	41.565	
SER	80.83	YES
CPAQ	62.321	

Abbreviations:
 CPAQ, Chronic Pain Acceptance Questionnaire
 FABQ-PA, Fear-Avoidance Beliefs Questionnaire physical activity subscale
 FABQ-W, Fear-Avoidance Beliefs Questionnaire work subscale
 PASS-20, Pain Anxiety Symptoms Scale
 PHQ-9, Patient Health Questionnaire-9
 PSEQ, Pain Self-Efficacy Questionnaire
 SER, Self-Efficacy for Rehabilitation
 STAI, State-Trait Anxiety Inventory
 STAXI, State-Trait Anger Expression Inventory
 TSK-11, Tampa Scale of Kinesiophobia.

Lentz et al., 2016

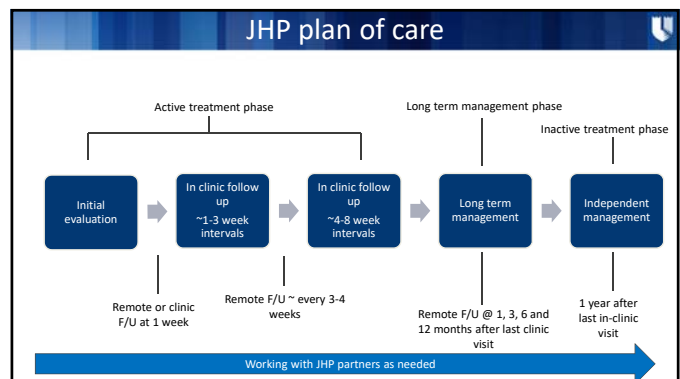
6 CORE PRINCIPLES OF THE JOINT HEALTH PROGRAM

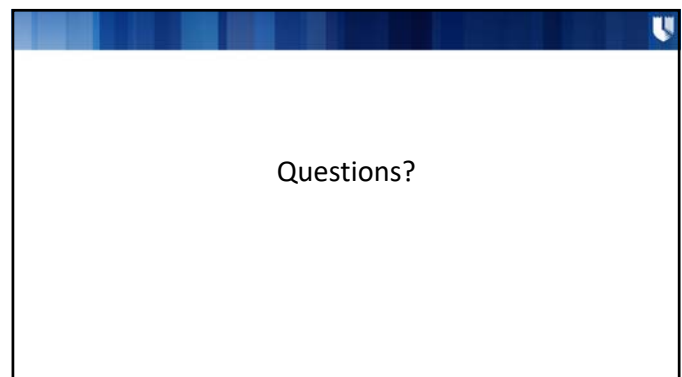
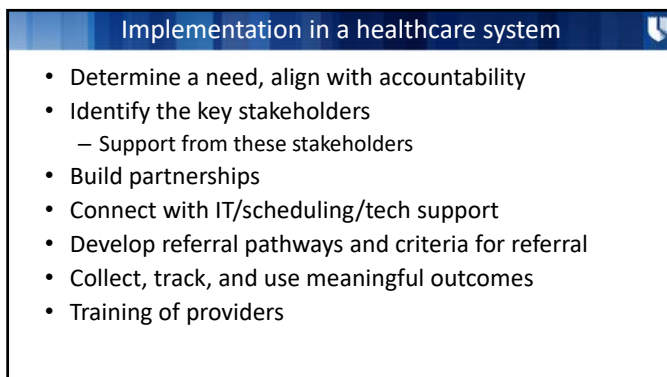
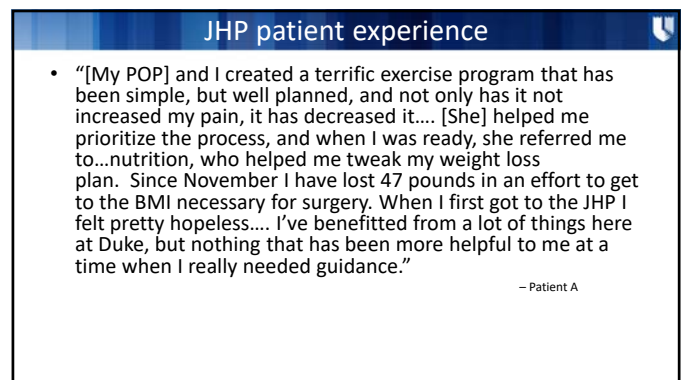
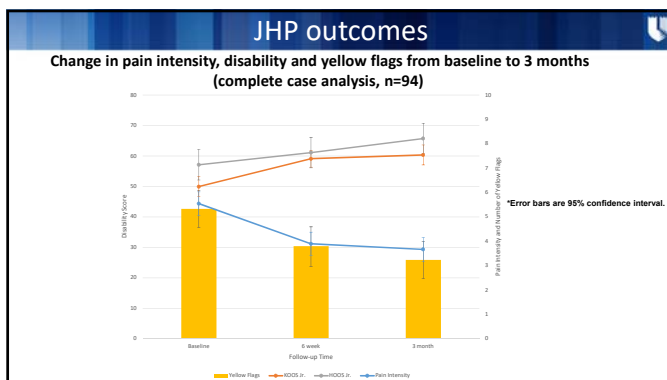
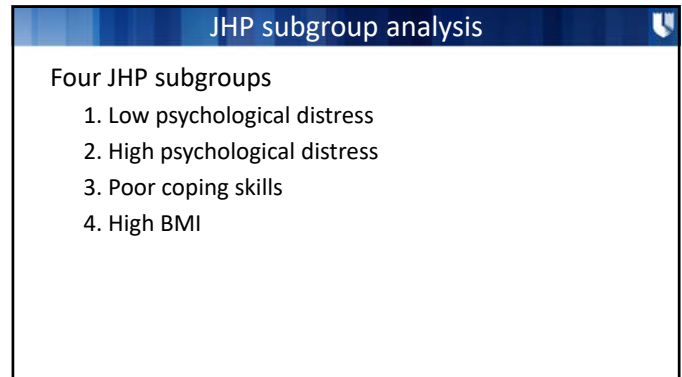
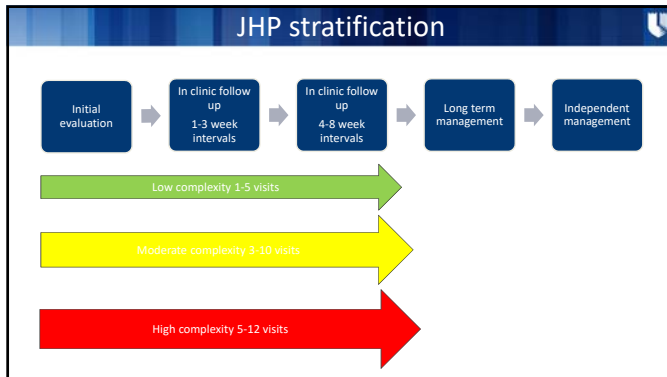
Osteoarthritis (OA) and the pain associated with OA are complex, but the JHP can help teach you strategies to help manage your pain and improve your quality of life. At the JHP we are focused on these 6 guiding principles to help you achieve your goals.

- 1** Pain does not always indicate tissue damage. Your X-ray or MRI does not account for all of your symptoms.
- 2** Sleep, stress, self-efficacy, nutrition, weight, and other psychological factors play a role in pain and function.
- 3** Arthritis may be slowed and symptoms significantly decreased through a comprehensive treatment plan.
- 4** The POP (primary OA provider) coaches you to make sustainable lifestyle modifications.
- 5** Focus on your values to set meaningful goals that motivate your actions and behavior.
- 6** Taking an active role in managing your joint pain is essential to achieving your goals.

Criteria for referral to partners in the JHP

Orthopaedic	Nutrition	Behavioral Health
<ul style="list-style-type: none"> Presence of red flags 4-6 weeks of worsening pain 8-10 weeks of no change in pain from initial visit or after progress (plateau) New injury/trauma with unclear dx Met goals and candidate for surgery Patient request 	<ul style="list-style-type: none"> BMI > 25 and goals for weight loss/nutrition guidance High BMI >40, uncontrolled DM, cardiac, pulmonary, kidney, GI and/or liver disease and evidence of poor eating habits on DETERMINE Nutrition Screen. BMI > 40 and upcoming surgery with no success with self-managed weight loss. Osteoporosis/osteopenia- with evidence of poor eating habits on DETERMINE Nutrition Screen Refer to Physician-led program if no success after meeting w/ RD and BMI >40 and upcoming surgery.. Patient request for referral 	<ul style="list-style-type: none"> Documented mental health history and/or associated medication, not following up with BH specialist, and elevated yellow flags on OSPRO-YF. No documented mental health history, but patient reports signs and symptoms of depression, anxiety, and/or emotional/stress at home or work When mental health is primary issue Patient request





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