



MAYO CLINIC ROBERT D. AND PATRICIA E. KERN  
**CENTER FOR THE SCIENCE OF  
HEALTH CARE DELIVERY**



# **Learning While Sprinting: A One-Year Retrospective from the NOHARM Pragmatic Trial**

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**NOHARM**

**N**on-pharmacological

**O**ptions in post-operative

**H**ospital-based

**A**nd

**R**ehabilitation pain

**M**anagement

# NOHARM: The Idea

- Opioids are necessary but insufficient in post-surgical care
- Guidelines recommend non-pharm pain care (NPPC)
- No studies showing how to make NPPC more viable
- EHRs can help elicit and advance patients' NPPC preferences
- Goal: test bundled pragmatic intervention w/in EHRs
  - Portal-based conversation guide
  - Clinician-directed decision support
- Improve pain & function as post-op opioid prescribing declines
- Testing usual care vs. EHR-facilitated guideline-based care

# Non-Pharm Pain Care – Validated for Post-Op Pain Management

## **Movement**

- Walking
- Yoga
- Tai Chi

## **Physical**

- Acupressure
- Acupuncture
  - Massage
  - Cold or Heat
  - TENS

## **Relaxation**

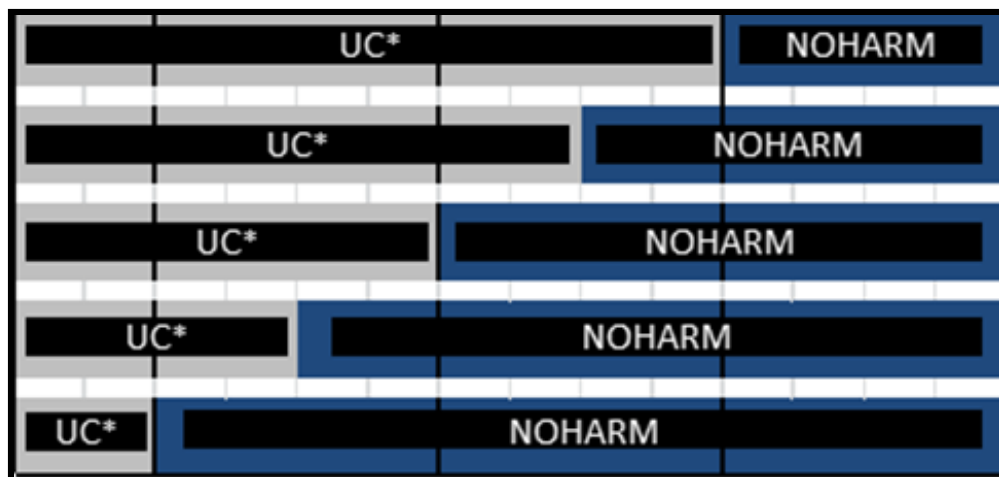
- Meditation
- Breathing
  - Music
  - Guided Imagery
  - Muscle Relaxation
  - Aromatherapy

Question: Can these help preserve function, mitigate pain, and maybe reduce opioid consumption?

# NOHARM

- NIA/NICHD UG3 planning grant
- Intervention: Epic NPPC bundle
  - Conversation guide
  - Decision support
- Outcomes: pain, function, anxiety, opioid use
- Eventual Trial: Stepped-wedge, Cluster-randomized
  - Rigorous pre-post design
- 2019-2020 Pilot Year

# NOHARM Stepped Wedge Design



## Tranche 1

**Rochester**  
Cardiac, C-section  
**Florida**  
Ortho  
**Eau Claire**  
Ortho, Colorectal,  
Gyn, C-section  
**La Crosse**  
Gyn, C-section

## Tranche 2

**Rochester**  
Ortho, Gyn, Lung  
**Arizona**  
Lung, Cardiac  
**Mankato**  
Colorectal

## Tranche 3

**Rochester**  
Colorectal  
**Arizona**  
Colorectal,  
Transplant, Gyn  
**Florida**  
Transplant

## Tranche 4

**Florida**  
Colorectal, Gyn, Lung,  
Cardiac  
**Eau Claire**  
Lung, Cardiac  
**Mankato**  
C-section

## Tranche 5

**Rochester**  
Transplant  
**Arizona**  
Ortho  
**Mankato**  
Ortho  
**La Crosse**  
Ortho, Colorectal

# NOHARM Cluster “go live” schedule

	Tranche 1	Tranche 2	Tranche 3	Tranche 4	Tranche 5
	<b>Rochester</b> Cardiac, C-section <b>Florida</b> Ortho <b>Eau Claire</b> Ortho, Colorectal, Gyn, C-section <b>La Crosse</b> Gyn, C-section	<b>Rochester</b> Ortho, Gyn, Lung <b>Arizona</b> Lung, Cardiac <b>Mankato</b> Colorectal	<b>Rochester</b> Colorectal <b>Arizona</b> Colorectal, Transplant, Gyn <b>Florida</b> Transplant	<b>Florida</b> Colorectal, Gyn, Lung, Cardiac <b>Eau Claire</b> Lung, Cardiac <b>Mankato</b> C-section	<b>Rochester</b> Transplant <b>Arizona</b> Ortho <b>Mankato</b> Ortho <b>La Crosse</b> Ortho, Colorectal
Control condition	Data collection 7/1/2020				
Step 1	Go live 1/1/2021				
Step 2		Go live 7/1/2021			
Step 3			Go live 1/1/2022		
Step 4				Go live 7/1/2022	
Step 5					Go live 1/1/2023





# Our Year In Hindsight

- Intervention Prototyping & Refinement
  - Epic Portal CG
  - Epic CDS
  - Self-management education & support
- Organizational Navigation
- Stakeholder Training & Engagement
- Piloting\* & Take Homes
- Next Steps

\* COVID-modified UG3

# Intervention Prototyping & Refinement

## PAIN CARE PLANNING ACROSS THE PERIOPERATIVE CARE CONTINUUM



### Choosing Surgery

Ambulatory care team members prepare patients to engage with the NOHARM intervention and a portal-based decision tool.



### Pre-operative Planning

Patients review non-pharmacologic pain management options and inform care team of selections via portal-based decision tool.



### The Inpatient Stay

Inpatient staff notice, acknowledge, discuss, and support provision of non-pharmacologic pain management modalities.



### Post-operative Recovery

Patients continue to access and use non-pharmacologic pain management resources and modalities.

# Intervention Prototyping & Refinement: Epic Portal CG

- CG content
- Epic portal functionality
- CG design
- Assignment logic & timing

# CG content

## 1. Pain is normal, requires a plan

### Healing after surgery

#### Introduction

## Pain and Surgery

Pain is a normal part of surgery

It is normal to experience some pain and discomfort after surgery.

Medicines and other techniques can usually reduce your pain to a tolerable level.

[Back](#)[Next](#)

# CG content

## 2. Opioids, blocks, PCAs, etc. are a short term fix, not long term

### Healing after surgery

Medicines for pain

#### Limiting the time on opioid medicines

For most people, it is best to limit the amount of time that they take opioid medications.

This helps avoid complications including constipation, dizziness, confusion, and possible addiction to the medications.

Back

Next



# CG content

## 3. Safer and beneficial tools exist

### Healing after surgery

Pain management techniques in addition to medications



# CG content

## 4. Start your plan, select modalities

Relaxation techniques to consider

**Relaxation**

Breathing

Muscle relaxation

Meditation

**Imagery**


Music

Aromatherapy

If you would like to use a technique, select it below

**Do not click continue until you have finished your selection**

| **Guided imagery**



About Plan for Practice doing it

Select the relaxation techniques that you'd like to use

Select all that apply

Breathing	<b>Muscle relaxation</b>	Meditation	Imagery	Music	Aromatherapy
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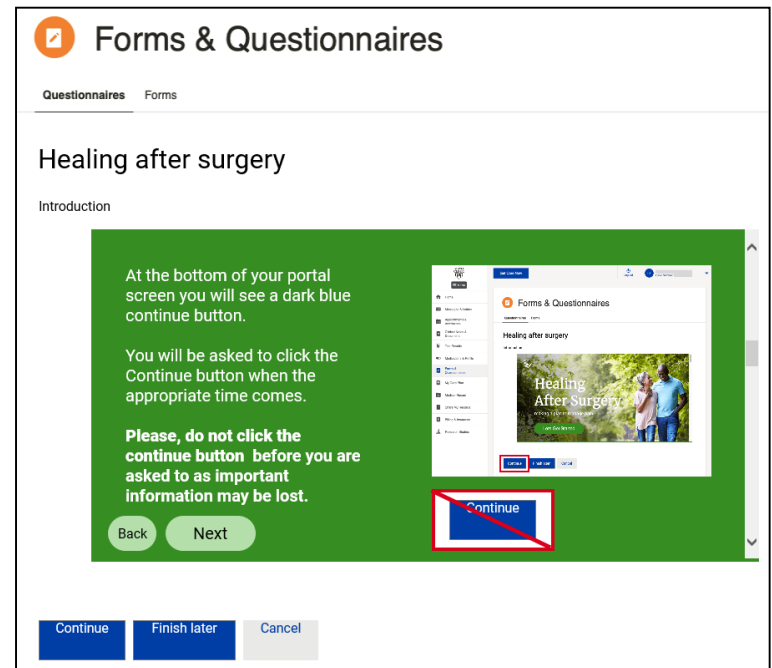
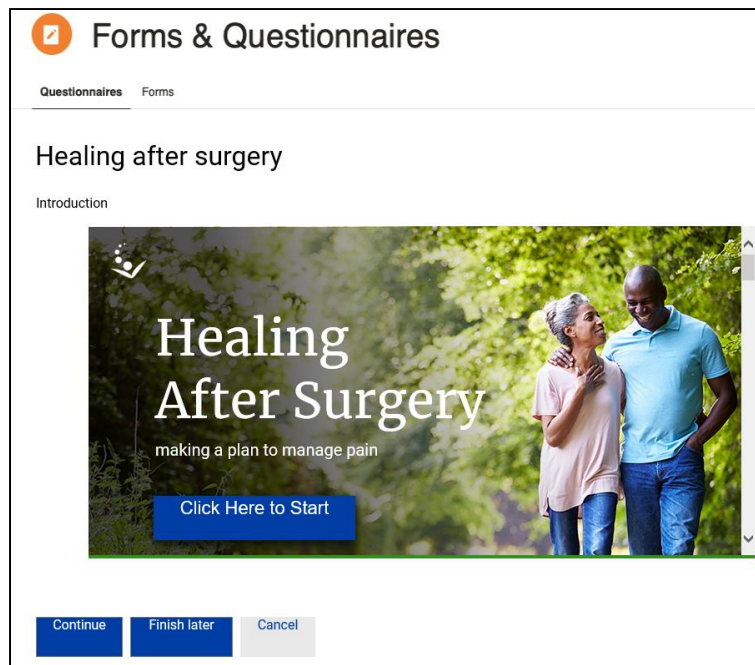
# Epic portal functionality

		Candidate Portal Functionalities		
		Inbox message	Questionnaire	Interactive Care Plan
<b>Efferent</b>	Text	✓	✓	✓
	Embedded photos	✓	✓	✓
	Embedded HTML		✓	
	Linked questionnaires	✓	✓	✓
	External links	✓	✓	✓
<b>Afferent</b>	Text in notes	✓		
	Flowsheet data		✓	
	Questionnaire data		✓	✓



# CG design

- Portal message with attached CG link
- CG is a very large questionnaire with HTML



# CG design

## Healing after surgery

Physical techniques to consider

### Physical

| Massage

Acupressure

Acupuncture

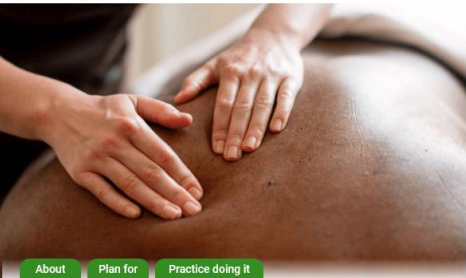
Massage

Cold or Heat

TENS

If you would like to use a technique, select it below

**Do not click continue** until you have finished your selection



About

Plan for

Practice doing it

Select the physical techniques that you'd like to use

Select all that apply

Acupressure

Acupuncture

Massage

Cold or Heat

TENS

## Healing after surgery

Movement techniques to consider

### Movement

| Walking

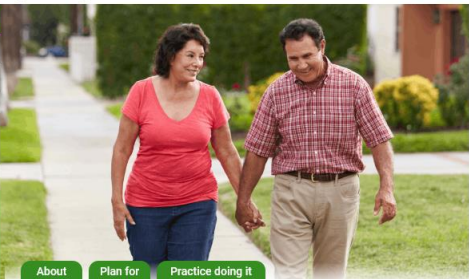
Walking

Yoga

Tai Chi

If you would like to use a technique, select it below

**Do not click continue** until you have finished your selection



About

Plan for

Practice doing it

Select the movement techniques that you'd like to use

Select all that apply

Walking

Yoga

Tai Chi

## Healing after surgery

Relaxation techniques to consider

### Relaxation

| Music listening

Breathing

Muscle relaxation

Meditation

Imagery

Music

Aromatherapy

If you would like to use a technique, select it below

**Do not click continue** until you have finished your selection



About

Plan for

Select the relaxation techniques that you'd like to use

Select all that apply

Breathing

Muscle relaxation

Meditation


Imagery

Music

Aromatherapy

# CG design

- Patient must “submit” their CG questionnaire

 Forms & Questionnaires

Questionnaires Forms

## Healing after surgery

Confirm your selected techniques to complete your pain management plan.

Please review your responses. To finish, click **Submit**. Or, click any question to modify an answer.

Question	Answer
Would you like to start at the beginning of this guide or skip to the section on pain management techniques?	Start at the beginning
Surgery and Pain	
How concerned or nervous are you about your ability to cope with an manage pain?	Very concerned
Over the last 2 weeks, how often have you not been able to stop or control worrying?	Not at all
When I'm in pain, I fell that it is terrible and will never get better.	Not at all
Medicines for Pain	
In the past 12 months, how often have you used any prescription medications just for the feeling, more than prescribed or that were not prescribed for you?	Never
Techniques for Pain	
Select the movement techniques that you would like to use after surgery.	Walking
Select the relaxation techniques that you would like to use after surgery.	Breathing Music
Select the physical techniques that you would like to use after surgery.	Cold or Heat

Back

Submit

Finish Later

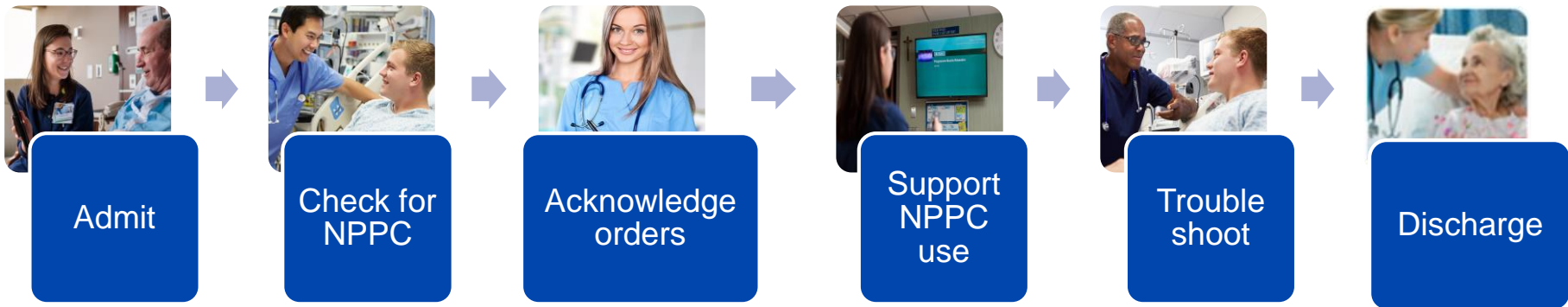
Cancel

# Assignment logic & timing

- Electronic event trigger
  - Elective surgeries → order
  - Unplanned (day of) → Post-op CPT code
- Assignment algorithm
  - Site
  - Department
  - Epic surgical ORP code
  - Provider
- Procedure/site-specific tailoring of content

# Epic CDS

- Mapped clinical workflows of key stakeholders
- Emphasis on inpatient nursing and PT/OT



# Matching Epic functionalities

# Matching Epic functionalities

- Admission Navigator

The screenshot displays the 'RN Navigators' application interface. The top navigation bar includes tabs for Admission, Transfer, Discharge, Pre-op, Stroke Care, BH Admission, Treatment Plan, ECT, and DCNavforProject. The left sidebar lists various clinical areas under 'OVERVIEW', with 'Pain Preferences' currently selected. The main content area is titled 'NOHARM Non-pharmacologic Pain Care'. It features a 'Time taken' field set to 4/24/2020 and 1146, along with a 'Responsible' field and a 'Create Note' button. Below this, there are three sections for patient selections: 'Patient Selected Movement Techniques' (with options for Tai Chi, Walking, Yoga, and None), 'Patient Selected Relaxation Techniques' (with options for Aromatherapy, Guided Imagery, Meditation, Muscle Relaxation, Music Listening, and Relaxed Breathing), and 'Patient Selected Physical Techniques' (with options for Acupressure, Acupuncture, Cold or Heat, Massage, TENS, and None). At the bottom, there are buttons for 'Create Note', 'Restore', 'Close', 'Cancel', 'Previous', and 'Next'.

# Matching Epic functionalities

- Admission Navigator
- Acknowledge Orders

RN Navigators

Admission Transfer Discharge Pre-op Stroke Care BH Admission Treatment Plan ECT DCNavforProject

OVERVIEW

Release Orders

Travel and Expo...

Pain Preferences

Vital Signs

Care Everywhere

Allergies

Review PTA Meds

Expired History

Tobacco Use As...

History

Directives - HC

Visitor List

Meds from Home

Interpreter Services

Consents

IMMUNIZATION SCREENING

Immunizations

MEDICAL DEVICES

LDA Avatar

NOHARM Non-pharmacologic Pain Care

Time taken: 4/24/2020 1146 Responsible Create Note

Show Row Info Show Last Filed Value Show All Choices

Non-Pharmacological Pain Care Selections

Patient Selected Movement Techniques

☐ Tai Chi ☐ Walking ☐ Yoga ☐ None

Patient Selected Relaxation Techniques

☐ Aromatherapy ☐ Guided Imagery ☐ Meditation ☐ Muscle Relaxation ☐ Music Listening ☐ Relaxed Breathing ☐ None

Patient Selected Physical Techniques

☐ Acupressure ☐ Acupuncture ☐ Cold or Heat ☐ Massage ☐ TENS ☐ None

Create Note

Restore Close Cancel

Previous Next

Orders to be Acknowledged

(From admission, onward)

Acknowledge All

New Orders

Ordered

04/24/20 1142 > Educate and support the patient in the practice of Tai Chi for pain management Start: 04/24/20 1143, Until discontinued, R Comments: Restrictions: Bending and t...

Acknowledge All



# Matching Epic functionalities

- Admission Navigator
- Acknowledge Orders

RN Navigators

Admission Transfer Discharge Pre-op Stroke Care BH Admission Treatment Plan ECT DCNavforProject

OVERVIEW

Release Orders

Travel and Expo...

Pain Preferences

Vital Signs

Care Everywhere

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MEDICAL DEVICES

LDA Avatar

NOHARM Non-pharmacologic Pain Care

Time taken: 4/24/2020 1146 Responsible Create Note Show Row Info Show Last Filed Value Show All Choices

Non-Pharmacological Pain Care Selections

Patient Selected Movement Techniques

☐ Tai Chi ☐ Walking ☐ Yoga ☐ None

Patient Selected Relaxation Techniques

☐ Aromatherapy ☐ Guided Imagery ☐ Meditation ☐ Muscle Relaxation ☐ Music Listening ☐ Relaxed Breathing ☐ None

Patient Selected Physical Techniques

☐ Acupressure ☐ Acupuncture ☐ Cold or Heat ☐ Massage ☐ TENS ☐ None

Create Note

Restore Close Cancel

Previous Next

Orders to be Acknowledged

(From admission, onward)

Acknowledge All

New Orders

Ordered

04/24/20 1142 > Educate and support the patient in the practice of Tai Chi for pain management Start: 04/24/20 1143, Until discontinued, R Comments: Restrictions: Bending and t...

Acknowledge All

- Best Practice Advisory

# Matching Epic functionalities

- Admission Navigator
- Acknowledge Orders

- Best Practice Advisory
- Educational Activity

# Matching Epic functionalities

- After Visit Summary

**After Visit Summary**

Documents to Print

- AVS - For the Patient

Available Documents

- AVS - Facility/Next Level...
- AVS - For the Patient (Li...
- Medication Administratio...
- Advance Directives
- Discharge Summary Note
- Insulin Pump Settings

Change Font Size

Language

Print 1 document

Print

Resolve these issues before printing

- Travel and exposure screening not complete.
- "Discharge patient" order has not been placed/signed.

**AVS - For the Patient** Selected to print

Edit AVS

**Instructions**

No changes were made to your m...

**Non-Med Pain Management Instructions**

Do not use cold packs more than 15 min...

Please continue Tai Chi and Aromatherapy pain management.

**Non-Med Pain Management Techniques**

YOUR PAIN MANAGEMENT AND HEALING SELEC...

We're glad that you've selected pain management approaches that will speed your recovery after surgery. These approaches alone or with pain medications...

If you have questions or need help with your choices, call 1-800-919-1432, toll free.

Remember that you can add or select different p...

selections.

**Aromatherapy**

**Getting started.**

Essential oils can be inhaled or applied to your skin. Do not ingest them. If you have not received essential oils in the hospital, you can purchase them at a health food or grocery store, or on-line. Lavender, mandarin, and lemon are most commonly used for stress reduction. Eucalyptus, peppermint, and rosemary essential oils can help reduce pain.

If you buy oils, they should be sold in a dark bottle with a stopper. The label should include information on the country of origin, Latin name of the parent plant, and method of extraction. Also look for the USDA certified organic label and assurance of 100% pure essential oil with no other ingredients.

An easy way to get started is to apply the oil to a cotton ball and inhale the vapor. The cotton ball can be kept in a sealable plastic bag and reused. You can also mix oils in a spray bottle with water and mist over furniture, carpet, or linens. Diffusers spread essential oil vapors throughout an entire room and can be purchased for around \$25.

# Modifiable components with EHR logic: Provider, procedure, site, etc.

Educate (TV) and support patient practice of Tai Chi for pain management

✓ Accept

✗ Cancel

Frequency: 

Until discontinued

Once

Until Discontinued

For: 

Hours

Days

Weeks

Starting: 

3/9/2020

Today

Tomorrow

 At: 

1100

Starting: **Today 1100** **Until Specified**

Scheduled Times

03/09/20 1100

Priority: 

Routine

Routine

Comments: 

Insert SmartText

Restrictions: Observe post-operative movement precautions when performing Tai Chi.  
Instruction: Patient Education is available through Mayo TV or tablet. Encourage viewing and use of modality.  
Site specific consideration: Place orders if additional support resources are available to the patient while in the hospital.  
Other educational resources: Print materials or DVD may be available

ⓘ Next Required

Link Order

✓ Accept

✗ Cancel

# Physician and APP roles in NOHARM

- Heterogeneous pre- and post-operative cadence
- Pre-hospital
  - Endorse NPPC and CG use
- Hospital
- Post-hospital




# Physician and APP roles in NOHARM

- Heterogeneous pre- and post-operative cadence
- Pre-hospital
  - Endorse NPPC and CG use
- Hospital
- Post-hospital
  - Promote NPPC if refill requested



**The patient may require an opioid refill but other options should be explored.**

 Link to NPPC preference list [Link](#)  
Link to Synopsis Pain Summary view [Link](#)

Open SmartSet	Do Not Open	Nonpharmacological Pain Management <a href="#">Preview</a>
Add Problem	Do Not Add	Anxiety <a href="#">Edit details</a> (Share with patient)
Add Problem	Do Not Add	Pain <a href="#">Edit details</a> (Share with patient)
Add Problem	Do Not Add	Opioid use disorder, mild, abuse <a href="#">Edit details</a> (Share with patient)

Acknowledge Reason

[Declines](#) [NPPC ineffective](#) [Low abuse risk](#) [Function improving](#)

[Accept](#) [Dismiss](#)



# Self-management education & support

- Modality-specific material
- Website
- DVD & print versions

## Movement Videos

### Tai Chi

#### Gentle Movements Tai Chi Qigong

This video leads you through a series of easy postures and a brief meditation performed while seated. Do not perform these movements after neck or shoulder surgery until you are cleared by your surgical team. Stop any movements that cause discomfort.



[Tai chi: Discover the many possible health benefits](#)

# Organizational Navigation

- Committees
- Clinical Practice
- Epic
- Site & Divisional
- IRB
- Collaboratory (Biostat & Design, Eth & Reg, Steering)



# Stakeholder Training & Engagement

- MyLearning training
- Practice supports
- JIT

“Keep an  
eye out...”



# The NOHARM Rack Card points patients in the right direction



## HEALING AFTER SURGERY: MANAGING PAIN

### Step 1: Register for the portal

The patient portal (Patient Online Services) allows you to be actively involved in planning how to manage your pain post-surgery. By logging on to the portal, you can learn more about different pain management strategies, try them out on your own, and indicate your preferences for your hospital stay. For assistance setting up a new patient portal account, you can call Mayo Clinic customer assistance at **1-877-858-0398** or you can visit window 17 or 18 on the ground floor of the Gonda building at Mayo Clinic's Rochester site.



### Step 2: Learn about pain management options

Soon after your surgery is scheduled, you will receive a questionnaire called "Healing After Surgery" in your patient portal inbox. This questionnaire is different from other patient questionnaires. It includes information about different pain management options and guidance on how to practice them prior to your surgery.

### Step 3: Choose pain management options

After learning about the different types of pain management options available to you, select the strategies that you are interested in trying during your hospital stay and after you return home. Your selections will then be shared with your care team, so that they can be used to assist with managing your pain during your recovery.



### Step 4: Use pain management option at home



Once you are home and recovering from your surgery, you will be able to access videos and other resources that will help you in using your preferred pain management approaches. Just go to [healingaftersurgery.com](https://healingaftersurgery.com). Your care team may also follow up with you to ask how things are going and if you need any additional support.

MAYO CLINIC | 200 First Street SW | Rochester, MN 55905 | [mayoclinic.org](https://mayoclinic.org)

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MC7823rev0420



# Pilot\*

- Prospective Pilot (RST & MCHS)
  - Neurosurgery spine procedures
    - Integrated w/in hospital and post-op workflows
  - Turned CG&CDS on for spine procedures
  - Assessed experience
    - CG access and usability
    - CDS function
    - Outcome completion rates
    - Debrief with teams

\* COVID-modified UG3

# COVID-modified UG3

- Restrictions
  - Mayo Clinic banned air travel
    - Precluded on-the-ground support at FL and AZ
  - Elective surgeries cancelled from March 15<sup>th</sup> to May 12<sup>th</sup>
- Modifications
  - Narrowed the site inclusion to Rochester, MN; Eau Claire, WI; and Mankato, MN
  - Manual vs. algorithmic CG assignment
  - Compressed outcome collection interval

# Pilot\*

- Participants, N=24
  - 17 from Rochester, 7 from MCHS
  - 42% female
- NPPC selection
  - 92% via portal prior to hospitalization
  - Modalities selected, mean 3.8, range 1-5
- CDS – BPA misfires, otherwise OK
- Outcomes – 92% complete

\* COVID-modified UG3

# Pilot Take Homes

- Sequence of huddles with each cluster prior to “go live”
  - Pre- and post- hospitalization encounter sequence & roles
  - CDS specification
- Importance of JIT
- Need on-site support for TENS & exercise
- Work around for EHR portal non-users
- Accommodate patients discharged to PAC

## Next Steps

- Refine role specifications for on-site support
- Expand self-management education
- Trouble shoot CDS, esp. BPAs
- Develop print workaround for portal non-users
  - Can be automated
- Initiate pre- “go live” Tranche 1 cluster engagement



# Gratitude

- Mayo Clinic Team & Leadership
- Collaboratory
- NIA/NICHHD partners



# Thank You

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