

# NIH Pain Consortium

Centers of Excellence in Pain Education



## Harold: Trauma Pain

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## Introduction: Initial Trauma

Harold's car was broadsided on the driver side by a vehicle running a red light. Both front and side airbags deployed.

### Harold's Initial Stats

**HR:** 136

**BP:** 82/40

**RR:** 32

**Pulse-ox:** 88

Radial pulses were palpable but weak

Harold was slipping in and out of consciousness, but was able to tell the EMT that he had pain in his left leg and left chest and was having difficulty breathing

### Case Goals and Objectives

1. Assess the aspects of the pain experience in a trauma patient with substance use disorder by integrating the health history into the treatment decision-making process.
2. Examine multimodal approaches to treat acute trauma across transitions of care
3. Recognize the biopsychosocial impact of the treatment of acute pain in patients with substance use disorder
4. Design an appropriate treatment plan using case-based learning to address acute trauma related pain in patient with substance use disorder

## Patient Information

**Patient Name:** Harold Miller

**DOB:** 01/05/79

**Age:** 39

**Gender:** Male

## Harold's Trauma

A medical helicopter comes in for a landing on top of a hospital helipad, surrounded by skyscrapers. The scene then cuts to the trauma room, with a male patient wheeled in on a gurney, pushed by two trauma employees.

The nurse at the head of the gurney says, *"Hi everybody, the patient's here. We called a Trauma Alert."*

The male patient looks to be middle aged. You can hear him breathing heavily in distress. A white sheet covers him up to his neck. Orange straps hold him steady on an orange backboard resting on the gurney, running horizontally across his body at his knees, waist, and chest. He wears a neck brace. Two orange foam blocks help hold his head and neck steady on each side.

The nurse continues, *"This is Mr. Harold Miller. He's 39 years old."*

The nurse maneuvers the gurney under the overhead light in the trauma room, by which two trauma physicians waited, already garbed in green scrubs, blue head caps, white face masks, plastic goggles, and purple latex gloves.

The nurse says, *"He was broad sided on 52<sup>nd</sup> street. He had front and side air bags deploy,"* while she locks the wheels on the gurney for the physicians to begin their examination of Harold.

## Harold's Health History

### *Past Medical History:*

- Mild depression

### *Opioid use disorder:*

- Oxycodone

### *Hospitalizations:*

- 4-week inpatient drug rehabilitation stay for opioid use disorder

### *Allergies:*

- No known drug or food allergies

### *Family History:*

- Family history of substance use disorder

### *Social History:*

- + Tobacco: 2 packs per day for 20 years (40 pack years)

### *Past Medications:*

- Ibuprofen PRN
- Buprenorphine/naloxone (Suboxone®)

## Harold's Initial Triage

In the trauma unit, Dr. Black and John, dressed in green scrubs, blue head caps, white face masks, plastic goggles, and purple latex gloves, work on Harold. A patient monitor screen shows blood pressure, blood oxygen, and heart rate at standing height behind them.

The camera zooms into a head and shoulders profile shot of Dr. Black as he says, *"Okay, great. Now that we've got him exposed and we've got him hooked up to our monitors, let's start our primary survey, please. My name is Dr. Black, I'll be the team leader and John, our trauma fellow will be conducting the surveys."*

The shot switches to show Harold's head cradled by John's gloved hands. He says, *"Okay, airway's clear, trachea's midline."* He removes his hands while Harold's mouth works with what appears to be pain. *"What's hurting you, Harold?"* John asks.

The scene switches back to Dr. Black's profile on the left. A nurse can be seen standing to Dr. Black's right. Dr. Black says, *"Let's get him on some oxygen, please. His oxygen is at 93%."*

Harold interjects in a wheezy voice, *"Can't breathe."*

The shot shows Harold's head and shoulders while he lays on the gurney, looking distressed. John says, *"Manual blood pressure's 86 over 42."*

The midsection of a figure in green scrubs can be seen just behind Harold, gathering various rubber tubing in their gloved hands. Another pair of gloved hands reaches into the shot to place a nasal cannula across Harold's face, resting below his nostrils as Dr. Black responds, *"Thank you very much. We have vital signs currently, 129 heart-rate, our blood pressure was just said. And we have oxygen saturation of 93%. We're going to start four-liter nasal cannula and continue our primary survey."*

John replies, *"Okay,"* as the scene shows Harold, now with the white sheet no longer covering him on the gurney, lays on the backboard, bare-chested,

wearing only shorts. John works on Harold's left side, carrying out Dr. Black's orders.

## Harold's Pain Assessment

Trauma unit assistant John stands on Harold's left side, while another assistant stands to Harold's right, taking his pulse at his right wrist. A third assistant stands at Harold's head, removing the orange foam blocks to either side of Harold's head and neck while John continues the assessment.

The shot cuts to Harold's head and chest, while he lies on the backboard resting on the gurney. He still wears the neck brace. John's midsection can be seen as he stands to Harold's side and says, *"Okay. Breath sounds are decreased on the left side, but clear. Breathing's labored ... complained of pain on the left side of the chest. He's got weak radial pulses."*

The camera pans to show John's full height before it cuts once more to show John full frame behind Harold on the gurney. The other assistant on Harold's right side continues assessment Harold's pulse after pressing on several areas of Harold's hands and forearms.

John continues, *"Skin is cool. Capillary refill is delayed."*

The assistant on the right lifts Harold's hands and forearms slightly off the gurney and tells him, *"Harold, do me a favor. Squeeze my hands real tight, as tight as you can. Okay."* He instructs Harold to push his forearms and hands back down toward the gurney, *"Push. There we go. Okay."* Harold completes each test seemingly to satisfaction.

The assistant moves to Harold's feet and places his hands under each sole. *"Do me a favor, push against my hands,"* he tells Harold. *"All right, good. Lift your leg for me. Does that hurt?"* While Harold can complete the test of pushing against the assistant's hands with his feet, and raising his legs, he moans in distress when asked if his actions cause him pain.

John says, *"He's complained of pain on the left leg. Okay, he's moving everything, though."*

John comes around to Harold's right shoulder and places his left hand on Harold's forehead. *"Open your eyes for me."* Harold complies. *"Reflexes are brisk,"* John says.

In the background, Dr. Black can be heard saying, *"Okay. Let's start one liter of Bolus of LR, and let's call for x-rays. We're gonna get x-rays of the chest and the leg."*

## Interprofessional Care

The Chaplain arrives to support Harold's wife. She is understandably distraught and tells the chaplain that Harold is taking buprenorphine and naloxone (brand name Suboxone). She provides an account of Harold's substance use disorder and expresses concerns about Harold receiving any opioids for his pain.

A gentleman in a light gray suite with a white shirt underneath and a purple plaid bow tie greets Dr. Black in the trauma unit. Dr. Black turns to him and lowers his face mask as the man in the suit introduces himself, *"Dr. Black? Hey, I'm Ray, I'm the chaplain. I just was with his wife and she told me that he hurt his back and apparently he's been given chronic opioids."*

Dr. Black nods in acknowledgment.

Ray continues, *"It seems that he's become addicted to the medication and he's been taking Suboxone since he left rehab four months ago."*

Dr. Black nods once more and turns back to his team in the trauma unit. *"Okay, team, with that new information we're going to up titrate the opioid dosing."*

The pharmacist, wearing a white lab coat with a checkered shirt underneath, stands in the back of the trauma unit where Harold's being worked. After Dr. Black mentions titrating the opioid dosing, the pharmacist says, *"Remember, Suboxone's both a partial agonist and antagonist. So in order to overcome the antagonist effect, we might need to use repeated titrated doses of our opioid."*

*“If the fentanyl is not working, he's not getting good pain relief, we might need to switch to hydromorphone.”*

## Trauma Critical Care Unit

Dr. Black is concerned with Harold's breathing and wants to keep him in the Trauma Critical Care Unit overnight for observation.

The trauma team comprised of physicians, nurses and a pharmacist discuss Harold's plan of care that includes frequent assessment of his pain, administration of multimodal analgesia, and frequent monitoring to evaluate his response to treatment and observe for adverse events from analgesics. The team anticipates that he will be transferred to the general care trauma unit the next day.

## Meet Harold

Harold can be seen in a head and shoulder shot, wearing a blue plaid button up shirt. He sports a full beard and thinning hair. He faces the camera in a personal interview style with the hospital waiting room background artfully blurred out.

He begins by saying, *“My name is Harold. I am 39 years old. I work loading freight onto trucks. I've been married to Janice for 11 years.”*

*“At work, I am constantly bending and lifting heavy parts and developed pain in my lower back. It came on at such a horrible time! I had just started to feel good. I had quit smoking cigarettes, something I had done for about 20 years, and was trying to start to exercise.”*

*“The pain was really bad though. I couldn't exercise, I could barely even work. When I went to my doctor she gave me ibuprofen, and Percocet, and gave me a prescription for physical therapy.”*

*“In the beginning, it helped a little with the pain. After a while it wasn't working so I started taking more pills, which helped my pain, but also made me feel “good”. I told my doctor I needed more Oxys for my pain, but now I realize I was taking them mostly to make me feel good.”*



*“I became addicted to the feeling Oxys gave me and needed more pills to get me through each day. It’s crazy to hear me say that, because as a kid I can remember my mom doing almost the same thing when she drank. She was an alcoholic.”*

*“I would do anything to continue to have that high. Some days I would be so out of it, I’d start dozing off. I almost lost my job. I ruined relationships with my friends. I almost lost my relationship with my wife.”*

*“She gave me an ultimatum. I either go to rehab or she would leave me. So, I went to rehab.”*

*“They helped me accept that I had become an addict and were very supportive. They put me on Suboxone to try to control my cravings and I have not taken any other opioids/narcotics since I left the hospital. I learned a lot about myself, and how to cope with my pain.”*

## Meet Janice

Harold’s wife Janice wears a dark blue cardigan over a slightly lighter dark blue dress shirt. Her hair is pulled back and she wears silver hoop earrings with a silver necklace of abstract interconnected rectangles of different shapes. The shot shows her head and shoulders and blurs out the background of what appears to be a hospital waiting area. She looks worried.

She says, *“My name is Janice. I am 38 years old. I am a medical coder for an insurance company.”*

*“A couple of years ago, Harold hurt his back. We think it was probably from the physical demands of his job. The doctor gave him oxycodone. I know he was in a lot of pain and the doctor thought the oxys would help make him better, but they almost destroyed our marriage and almost took his life.”*

## Harold's Substance Abuse

Harold's wife Janice wears a dark blue cardigan over a slightly lighter dark blue dress shirt. Her hair is pulled back and she wears silver hoop earrings with a silver necklace of abstract interconnected rectangles of different shapes. The shot shows her head and shoulders and blurs out the background of what appears to be a hospital waiting area. She looks worried.

*Janice says, "Harold was taking the oxys to help with the pain from his back, but he quickly started misusing the medication and taking it more and more frequently. I really didn't notice at first, but I started to see him looking sleepy, dozing off while we were talking. He seemed very "out of it". When I asked him about it, he would get very angry."*

*"I would look for the prescription bottle to see how many pills he had left but I could never find it. Sometimes I would find baggies filled with a few pills hidden in strange spots, like taped to the back of his nightstand, or in another medicine bottle. I realized he was hiding the pills."*

*"We got in so many arguments over the pills, him hiding pills. He would get angry. He would get SO angry! I would yell back. We argued all the time. He just didn't seem like the man I had married. I didn't even know this man anymore."*

## Harold's Rehabilitation

Harold's wife Janice wears a dark blue cardigan over a slightly lighter dark blue dress shirt. Her hair is pulled back and she wears silver hoop earrings with a silver necklace of abstract interconnected rectangles of different shapes. The shot shows her head and shoulders and blurs out the background of what appears to be a hospital waiting area. She looks distressed.

*Janice says, "I don't know what happened, but one night I found him barely breathing. It was the scariest night of my life! I called 911. When Harold woke up I told him if he didn't go to rehab for his addiction I was*

*leaving. I was done! I couldn't stand the constant lying. The manipulation...his anger."*

*"Thankfully, he agreed to get help. He went to rehab and has been on Suboxone for 4 months. He seems to be much more like himself now. That's why I was so afraid when I heard about the accident."*

## Does Harold Have Mild, Moderate, or Severe Opioid Use Disorder (OUD)?

Using the table below, see how many criteria for Opioid Use Disorder Harold displays. Click either "yes" or "no" depending on whether you believe Harold exhibits the criteria referenced.

The number of criteria a patient meets determines the severity of OUD:

- Mild OUD: 2-3 criteria
- Moderate OUD: 4-5 criteria
- Severe OUD: 6-7+ criteria

*Table 1: Does Harold Have Mild, Moderate, or Severe OUD?*

Criteria for Opioid Use Disorder	Is Criteria Present?
Opioid taken in larger amounts or over a longer period than intended.	Yes. Harold told his doctor he needed more oxycodone to make him "feel good." Harold stated he needed more oxycodone to get him through the day.
Persistent desire or unsuccessful efforts to cut down or control opioid	Yes. Harold mentions he would "do anything to continue to have that

Criteria for Opioid Use Disorder	Is Criteria Present?
use.	high.”
A lot of time spent obtaining, using, or recovering from the effects of the opioid.	Yes. Harold admitted having times when he felt “out of it,” and would even doze off at work.
Craving or a strong desire to use opioids.	Yes. Harold mentions he would “do anything to continue to have that high,” which increased his craving for opioids.
Recurrent opioid use resulting in a failure to fulfill major role obligations at work, school, or home.	Yes. As a result of misusing and abusing opioids, Harold was often feeling drowsy and “out of it, “irritable and angry.” He almost lost his job and his relationship with his wife.
Continued use despite persistent or recurring social or interpersonal problems caused or exacerbated by opioid use.	Yes. Harold and his wife argued frequently about his opioid misuse and abuse, but he still continued to misuse and abuse prescription opioids.

Criteria for Opioid Use Disorder	Is Criteria Present?
Stopping or reducing important social, occupational, or recreational activities due to opioid use.	No. Harold did not mention stopping or reducing any of his life activities due to his opioid misuse and abuse. In fact, he continues to work despite overuse of opioids.
Recurrent use of opioids in physically hazardous situations.	No. Harold was not involved in any physically hazardous situations.
Continued use despite knowledge of having persistent or recurrent physical or psychological problems cause or worsened by opioid use.	Yes. Harold continued to hide and misuse opioids despite the constant arguments between him and his wife.
Tolerance as defined by either a need for markedly increased amounts to achieve intoxication or desired effect or by marked diminished effect with continued use of the same amount (does not apply when used appropriately under medical supervision).	Yes. Harold needed to take more pills each day to continue to feel euphoric, and he was exhibiting signs of tolerance.

Criteria for Opioid Use Disorder	Is Criteria Present?
Withdrawal manifesting as either characteristic syndrome or the substance is used to avoid withdrawal (does not apply when use appropriately under medical supervision.)	No. Harold does not mention experiencing symptoms of withdrawal or needing to continue to take opioids to avoid withdrawal symptoms.

Harold has 8 criteria for opioid use disorder. (Severe opioid use disorder is characterized as having 6-7+ criteria.)

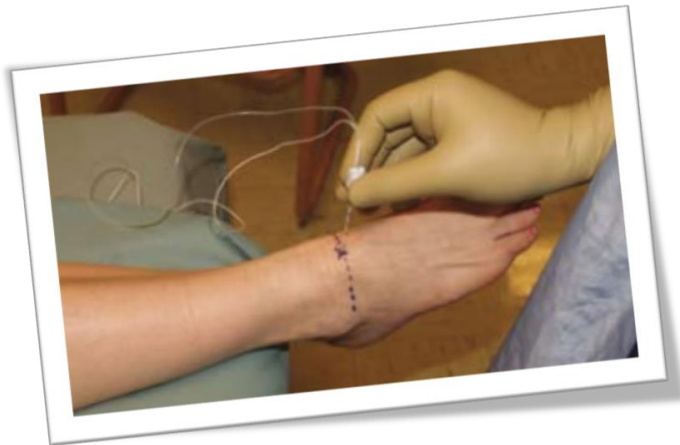
# Harold's Emergency Pain Management

## *Pharmacotherapy*

**Opioids:** Harold's emergent and critical care plan could include intravenous opioids, including fentanyl, morphine, or hydromorphone.<sup>1</sup>

**Acetaminophen:** Harold should receive acetaminophen. Acetaminophen is a nonopioid analgesic that can be used as part of multimodal analgesia and is not known to cause physical dependence.

**Regional anesthesia:** Harold could receive an ankle block for early mobilization with assisted devices to prevent further injury. A block using bupivacaine could last approximately 18 hours.



*Figure 1: Ankle Block Needle Insertion*

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<sup>1</sup> Opioid adverse effects:

- May produce a euphoric effect, while some patients may feel dysphoria
- Opioid use over time may induce physical dependence
- If stopped abruptly, the patient will experience withdrawal symptoms such as flu-like symptoms and pain



*Figure 2: Ankle Block Needle Insertion Medial Malleolus*

Images courtesy of Defense and Veterans Center for Integrative Pain Management (DVCIPM): Ankle Block. [dvcipm.org](https://www.dvcipm.org/site/assets/files/1083/chapt22.pdf). <https://www.dvcipm.org/site/assets/files/1083/chapt22.pdf>. Published 2018. Accessed July 26, 2018.



## Multimodal Analgesia

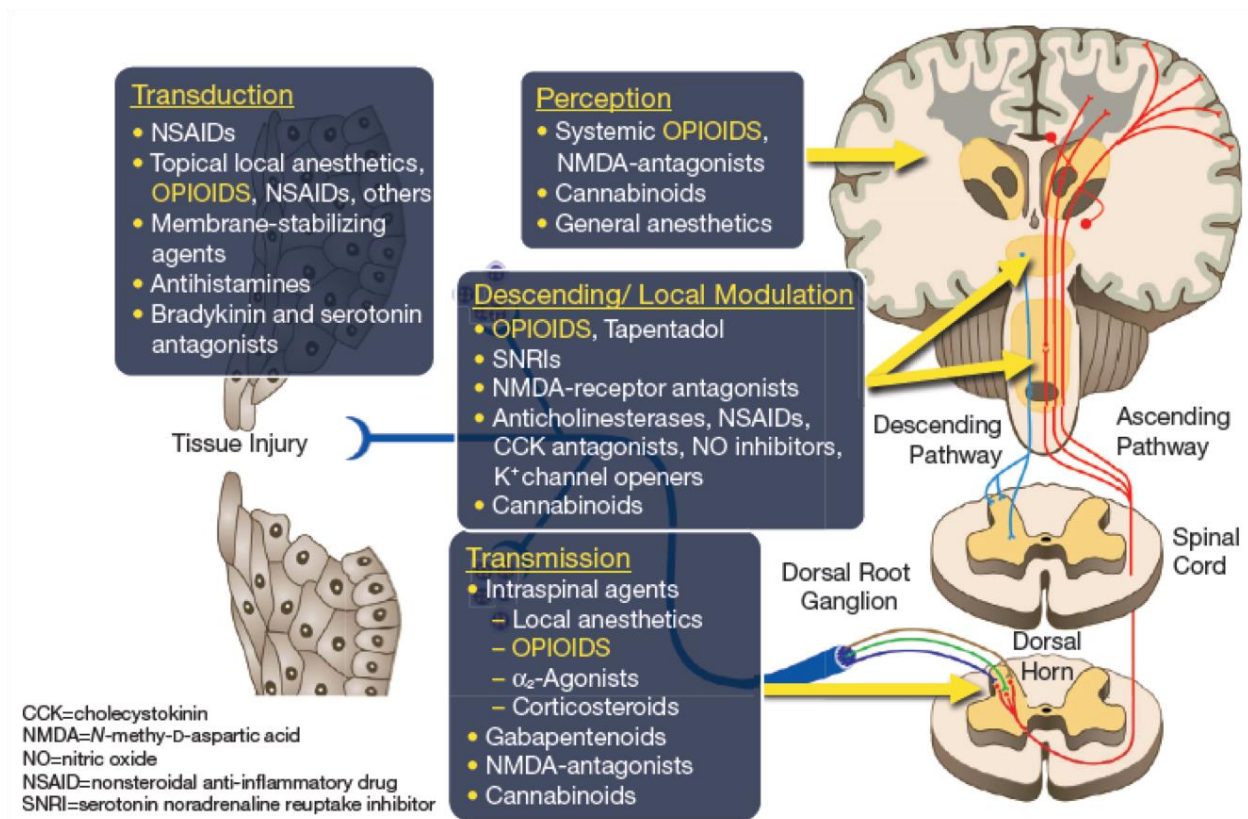


Figure 3: Multimodal Analgesia and the Actions of Classes of Analgesics<sup>2</sup>

The schematic shows representation of multimodal analgesia and the actions of classes of analgesics on peripheral and central pain pathways.

The following drug classes and modalities make up Harold's multimodal analgesic plan of care:

### *Transduction*

- NSAIDs
- Topical local anesthetics, opioids, NSAIDs, others

<sup>2</sup> Adapted from "Opioid Therapies and Cytochrome P450 Interactions," by Jeffrey Gudín, 2018, Journal of Pain and Symptom Management, figure 1. Adapted with permission.

### *Transmission*

- Intraspinal agents (local anesthetics, opioids)
- Gabapentinoids

### *Descending/Local Modulation*

- Opioids, tramadol

### *Perception*

- Systemic opioids
- General anesthesia

## Event 2: Acute Pain Treatment

- Pain accounts for 70% of Emergency Department visits
- Road traffic crashes are responsible for approximately 50 million injuries, per year, worldwide
- In 2015, 3,378 Emergency Department visits were from fractures
- Pain is one of trauma patients' most prevalent complaints
- Trauma pain management recommendations:
  - Assess the patient's pain frequently
  - Utilize multimodal analgesia therapy

### Harold's Rib Fracture and Treatment

#### *Rib fractures:*

- Most commonly caused by direct impact
- Occur in 10% of trauma patients
- Include a complication rate of 13%, with half of these including pulmonary complications
- Can predict other injuries. Greater than 90% of patients with multiple rib fractures have other injuries
- Number of rib fractures correlates with risk of complications and/or mortality

### *Impact of Rib Fracture Pain:*

- Rib fractures can cause severe pain
- Treatment of the pain is appropriate to improve respiratory function
- Rib fractures limit the patient's ability to cough and take deep breaths
- Can result in atelectasis and pneumonia
- Respiratory monitoring is required as a standard of care (end tidal CO<sub>2</sub> monitoring)

Opioids are recommended with rib fractures like Harold's because reducing pain may prevent the need for intubation and can prevent pneumonia.

### *Analgesic modalities include:*

- Epidural analgesia
- Intravenous opioids (patient-controlled)
- Intercostal blocks (paravertebral or interpleural blocks)

### *Patients are at risk for multiple thoracic complications including:*

- Pneumonia
- Respiratory distress
- Pulmonary effusion
- Pulmonary emboli
- Aspiration
- Atelectasis or lobar collapse

## *Harold Describes His Rib Pain*

Harold can be seen in a head and shoulder shot, wearing a plaid button up shirt. He sports a full beard and thinning hair. He faces the camera in a personal interview style with the hospital waiting room background blurred out.

Harold says, *“The hardest thing was not being able to breathe! That terrified me! The pain meds helped me to breathe. I didn’t notice my pain was getting better until they had me take a couple of deep breaths. My ribs still feel tender, especially when I coughed, but it was much more tolerable.”*

## Harold’s Distal Tibia Fracture

There are three types of ankle fractures.

**Tibia:** shinbone

**Fibula:** smaller bone of lower leg

**Talus:** small bone that sits between heel bone and tibia and fibula

## *Distal Tibia Fracture Treatment*

**Nonsurgical:** Surgery is not required if the broken bone is not out of place.

**Surgery:** If the fracture is out of place and the ankle is unstable.

**Ligament Damage:** There may be ligaments damaged. The ligaments of the ankle hold the ankle bones and joint in position. This can lead to chronic ankle problems.

**Recovery:** It takes at least six weeks for the broken bones to heal and may take longer for the involved ligaments and tendons to heal.

**Rehabilitation:** Physical therapy and home exercises are important to strengthen the muscles around the ankle.

## *Harold Describes His Ankle Pain*

Harold can be seen in a head and shoulder shot, wearing a plaid button up shirt. He sports a full beard and thinning hair. He faces the camera in a personal interview style with the hospital waiting room background blurred out.

*Harold says, “My leg throbbed and hurt, really badly, especially when anyone touched it. It was so swollen and bruised. Getting meds helped me to feel comfortable and to get out of bed. Acetaminophen and anti-inflammatory medications helped manage the pain.”*

*“I started doing some physical therapy to help the recovery. In the beginning, I needed an opioid pain med before doing physical therapy because the pain was so bad. But the other pain meds really did help.”*

## Harold's Neck Pain

- Neck pain resulting from motor vehicle crashes are often classified as whiplash-associated disorders (WAD)
- Whiplash-associated disorders are injuries to the neck that occur with sudden acceleration or deceleration of the head and neck relative to other parts of the body
- More than 85% of patients experience neck pain after a motor vehicle crash
- Pain with neck pain and associated disorders (NAD) and whiplash-associated disorders (WAD) are often experienced as:
  - Neck pain and upper limb pain
  - Headaches
  - Stiffness
  - Fatigue
  - Cognitive deficits
  - Shoulder and back pain
  - Numbness
  - Dizziness
  - Sleeping difficulties

## *Neck Pain Treatment*

Treatment approaches for neck pain and whiplash associated disorder (WAD) consist of a multimodal approach:

- Rest; Heat or cold
- Over the counter pain medications
- Prescription medications; Exercise
- Physical therapy; Foam neck collar
- Muscle relaxants
- Injections

Exercise consists of:

- Rotating neck in both directions
- Tilting head side to side
- Bending neck toward chest
- Rolling shoulders

## *Harold Describes His Neck Pain*

Harold can be seen in a head and shoulder shot, wearing a plaid button up shirt. He sports a full beard and thinning hair. He faces the camera in a personal interview style with the hospital waiting room background blurred out.

Harold says, *“My neck was in so much pain. They put a cuff on me, which kind of made it hurt more. They gave me acetaminophen and anti-inflammatory medications for the pain. Putting an ice pack on my neck really helped a lot.”*

## *Opioids Can be an Effective Treatment Option*

- Patients with substance abuse are commonly undertreated for their pain
- Addiction is a serious public health concern, but so is the under treatment of pain
- Evidence shows that stress from poorly treated pain may trigger relapse or intensify an existing addiction
- Chronic opioid therapy can be effective for carefully selected and monitored patients with chronic non-cancer pain (CNCP)
- Prescribers can structure opioid therapy to accommodate identified risk based on patient evaluation
- Recommendations for safe and effective opioid use include:
  - Balancing benefits and risks of chronic opioid therapy for CNCP
  - Appropriate initiation and titration of chronic opioid therapy
  - Regular and comprehensive monitoring while on chronic opioid therapy
  - Anticipation and management of opioid-related adverse effects



## Harold's Risk Factors for Opioid Use and Misuse

The following describe risk factors for opioid use and misuse:

- Demographic factors (e.g., younger age, male sex): may be due to differences in awareness of risks and willingness to engage in risk-taking behavior.
  - Because Harold is male, he's at greater risk of opioid use disorder.
- Self-reported cravings: indicates desire to use the drug and leads to continued opioid use.
  - Harold has self-reported cravings and desire to use opioids to continue the "good feeling."
- Family history of substance use disorders: genetic factors can influence addiction.
  - Harold reports his mother has a history of substance use disorder.
- History of substance or tobacco use. Shown to be strongly predictive.
  - Harold reports he smoked 2 packs of cigarettes a day for 20 years (40 pack years).
- History of preadolescent sexual abuse: leads to post-traumatic stress disorder, which is associated with substance use.
  - Harold did not report a history of preadolescent sexual abuse or post-traumatic stress disorder (PTSD).
- Psychiatric history (e.g., depression): opioids may be misused for their mood-altering properties.
  - Harold's health history displays a previous diagnosis of depression.

## Harold's Assessment:

**Name:** Harold Miller

**Address:** 123 Maple St

**Birth Date:** 01/05/1979

**Occupation:** Freight worker

### *Notes on Harold*

- Transferred to general care one day post trauma
- Pain well controlled
- Stable dose of Buprenorphine/naloxone (Suboxone®)
- Tapered off opioids

## Harold's Pain Management in General Care Unit

### *Pharmacotherapy*

- **Buprenorphine:** With Harold's history of opioid use disorder (OUD), buprenorphine/naloxone would be most appropriate because it is used for opioid detoxification or maintenance treatment of OUD and can be used to treat pain.
- **Codeine:** codeine is not the best choice for acute pain. It has variable metabolism, which creates unpredictable efficacy and is a weak synthetic opioid with little to no benefit for patients like Harold.
- **Oxycodone:** Harold should not receive oxycodone because this was his drug of choice for his opioid use disorder. In Harold's case, we want to minimize his exposure to complete agonist opioids such as oxycodone. Oxycodone will not be effective in the presence of buprenorphine/naloxone (Suboxone®), which Harold is taking, because full agonists are antagonized by the use of partial agonists/antagonists.

- **Acetaminophen:** Harold should receive acetaminophen. Acetaminophen is a non-opioid analgesic that can be used as part of multimodal analgesia and is not known to cause physical dependence.
- **NSAIDs:** Harold should receive NSAIDs. Because of his history of OUD, NSAIDs can be used as part of multimodal analgesia to reduce requirements for opioids.
- **Adjuvant Drugs:** Harold should receive adjuvant analgesics such as anticonvulsant medications as part of multimodal analgesia or antidepressants. Gabapentin is a commonly used anticonvulsant medication to treat pain. Alternatives include pregabalin, duloxetine, tricyclic antidepressants (e.g. amitriptyline).
- **Tramadol:** Harold should not receive Tramadol. Tramadol is a weak mu agonist for management of mild to moderate acute and chronic pain and should be avoided because of variable metabolism and it also has other serotonergic pathways. Because Tramadol can lead to dependence, it should be avoided in patients with a history of substance use disorder.

## Harold's Plan

- Harold is due to go home with the following:
- Naproxen: 440 mg every 12 hours
- Acetaminophen: 650 mg every 4 to 6 hours as needed
- Buprenorphine/Naloxone (Suboxone®): 8 mg/2mg twice daily
- Physical Therapy (PT)

## Event 3: Follow-Up Visit

### Harold's Pain

Harold's physician reviews his Brief Pain Inventory to assess the severity of his pain.

#### *Harold's Brief Pain Inventory (Short Form)*<sup>3</sup>

Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). Have you had pain other than these everyday kinds of pain today?

- Yes

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<sup>3</sup> Copyright 1991 Charles S. Cleeland, PhD, Pain Research Group, All rights reserved.

On the diagram, shade in the areas where you feel pain. Put an “X” on the area that hurts the most.

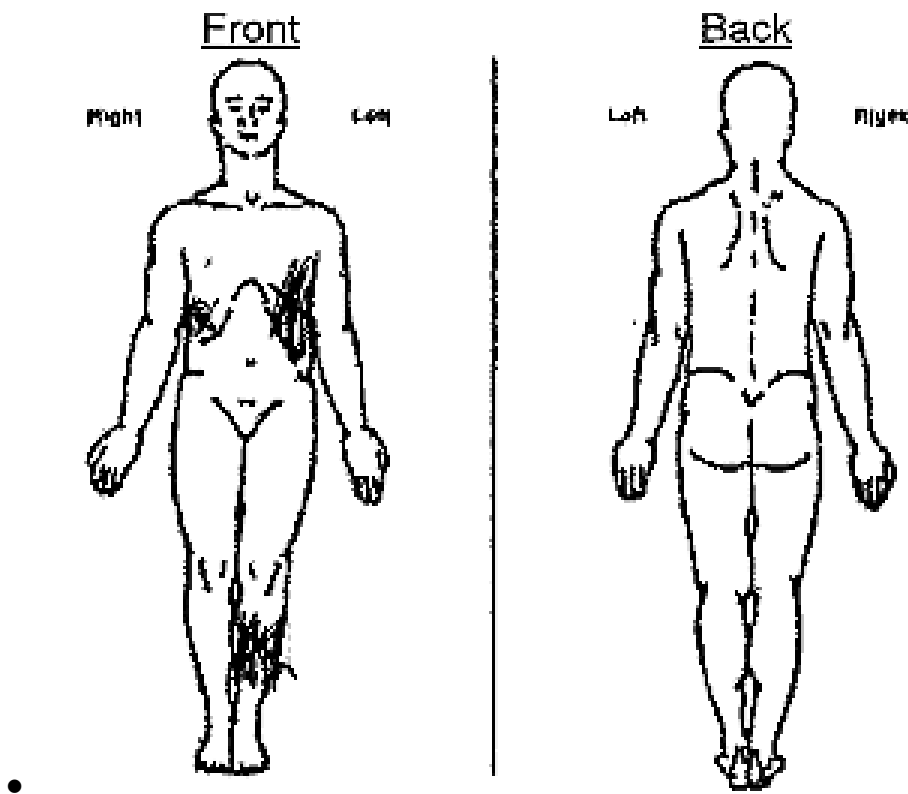


Figure 4: Harold's Brief Pain Inventory Body Diagram

Please rate your pain between zero and ten, with zero being no pain, and ten being the most pain you can imagine) with the number that best describes your pain at its worst in the last 24 hours.

- 7

Please rate your pain between zero and ten, with zero being no pain, and ten being the most pain you can imagine) with the number that best describes your pain at its least in the last 24 hours.

- 4

Please rate your pain between zero and ten, with zero being no pain, and ten being the most pain you can imagine) with the number that best describes your pain on the average.

- 4

Please rate your pain between zero and ten, with zero being no pain, and ten being the most pain you can imagine) with the number that best describes your pain right now.

- 4

What treatment or medications are you receiving for your pain?

- Naproxen
- Acetaminophen
- Gabapentin
- Suboxone®

In the last 24 hours, how much relief have pain treatment or medications provided? Please rate relief between 0% (no relief) to 100% (complete relief).

- 70%

Record a number between zero and ten, with zero being no pain, and ten being the most pain you can imagine) that describes how, during the past 24 hours, pain has interfered with your:

- General Activity
  - 4
- Mood
  - 4
- Walking Ability
  - 3
- Normal Work (includes both work outside the home and housework)
  - 4
- Relations with other people
  - 2
- Sleep
  - 4
- Enjoyment of life
  - 4

## Harold's Follow-Up Pain

Harold sits on an exam table, waiting for the physician. He wears a medium blue button up shirt. The viewer sees his right-side profile of head and shoulders, with a hand sanitizer dispenser on the wall to his left, next to a privacy curtain, currently pulled back and secured.

The physician opens the door on the opposite of the stowed privacy curtain and greets Harold, "*Hi, Harold.*" He wears a white lab coat with his name embroidered in red, a blue button up shirt underneath, with a green patterned tie and black-framed glasses.

Harold shakes the doctor's hand and says, "*Hey, how are you?*"

"*Nice to see you,*" says the doctor.

"*Yeah,*" Harold replies.

The doctor shuts the exam room door behind him and asks, "*How are you doing?*"

The shot cuts to show Harold's head and shoulders as the doctor stands facing him. With the new camera angle, a pair of crutches can be seen leaning against the wall next to Harold. He says, "*I'm okay. I made it through the first week out of the hospital. So, (yeah).*"

The camera angle shows the doctor's head and shoulders from over Harold's shoulder. The doctor asks, "*And how's the pain been doing and on average, on a scale of zero to 10, how much pain do you have?*"

"*Probably a four,*" Harold replies as the camera switches to focus on his head and shoulders from over the doctor's left shoulder.

The doctor nods and asks, "*Okay and at its worst?*"

Harold says, "*At it's worst, I guess a seven. It hurts when I cough or take a deep breath where my ribs are broken, so (yeah).*"



The doctor approaches Harold to put his hands on either side of Harold's chest. "*Yeah, actually let me have a quick look at that,*" he says.

Harold says, "*Okay.*"

The doctor lightly presses on Harold's ribs. Harold winces. "*So, it's hurting over here,*" he asks when he palpates Harold's left ribs.

Harold says, "*Yeah.*" As the doctor moves his hand towards Harold's left side and palpates the ribs once more, Harold grimaces and says breathlessly, "*Oh, yeah.*"

The doctor says, "*Okay. Yeah, that's going to continue to hurt for a little while.*"

Harold says, "*Yeah, I can't put any pressure on it and I can't sleep on my left-hand side. My right side's okay. But,*" Harold shakes his head to affirm his inability to sleep on his left-hand side.

The doctor takes a step back look at Harold's leg and asks Harold, "*How's the leg doing?*"

Harold says, "*It's okay. It only really hurts when I go up on my crutches.*"

The doctor nods and says, "*Okay, can you straighten your knee out for me?*" He moves to Harold's left side to look more closely as Harold straightens his left leg.

Harold replies, "*Yeah.*" He grimaces with pain as he slowly straightens his leg.

The doctor places his left hand on the top of Harold's left foot. "*Okay, good,*" he says. "*All right put it back down.*" Harold lowers his leg gratefully. The doctor says, "*That's great.*"

## Harold's Follow-Up Opioid Use Disorder

Harold sits on an exam table, across from the doctor standing in front of him. Harold wears a medium blue button up shirt. The viewer sees his right-side profile of head and shoulders, with a hand sanitizer dispenser on the wall to his left, next to a privacy curtain, currently pulled back and secured.

The physician wears a white lab coat with his name embroidered in red, a blue button up shirt underneath, with a green patterned tie and black-framed glasses. He holds a clipboard with the top sheet of paper furled up to expose the sheet underneath.

The doctor begins by asking Harold, *“And overall, do you still find yourself feeling a little bit of a craving?”*

Harold says, *“Sometimes, but my support group definitely helps with that.”*

The doctor makes a note on the sheet on his clipboard and says, *“Yeah, support groups are really important for this and uh you’re going to need to continue to do that for quite a long time. So, how often are you going?”*

*“Twice a week,”* Harold replies.

The doctor smiles and says, *“Great! Great, okay, well Harold, what we're going to need to do is to see you back regularly and see how things go in terms of the pain.”*

*“Okay,”* replies Harold.

The doctor continues, *“What I'd like you to do is to make an appointment to see our nurse practitioner in a couple of weeks. You can call her on the phone and talk with her about how things are going, and she can decide whether she wants to make a change in your medications, and then I'll see you back in four weeks, and we'll go from there.”*

*“Sure,”* says Harold.

*“All right?”* the doctor asks.

“Okay,” says Harold.

The doctor smiles and says, “Nice to see you.” He shakes Harold’s hand.

“Yeah, you too,” Harold says. “Thanks.”

“All right,” says the doctor. “Take care,” as he exits the exam room.

## Urine Drug Monitoring

### *Baseline*

- Definitive testing at baseline for patients prescribed opioids for chronic pain unless presumptive testing is required by institution or payer policy
- A rational approach to choosing the most relevant substances to analyze is recommended

### *Risk Assessment*

- Obtain relevant patient history
- Use validated tools to assess risk for aberrant medication-taking behavior, opioid misuse, opioid use disorder, and potential respiratory depression/overdose
- Check PDMP (Prescription Drug Monitoring Program) and previous UDM (Urine Drug Monitoring) results

Evaluate behaviors indicative of risk

### *Risk Level*

- **Low Risk:** UDM at least annually
- **Moderate Risk:** UDM greater or equal to 2 times per year
- **High Risk:** UDM greater than or equal to 4 times per year

## Pharmacotherapy

- **Buprenorphine:** With Harold's history of opioid use disorder (OUD), buprenorphine/naloxone would be most appropriate because it is used for opioid detoxification or maintenance treatment of OUD and can be used to treat pain.
- **Codeine:** codeine is not the best choice for acute pain. It has variable metabolism, which creates unpredictable efficacy and is a weak synthetic opioid with little to no benefit for patients like Harold.
- **Oxycodone:** Harold should not receive oxycodone because this was his drug of choice for his opioid use disorder. In Harold's case, we want to minimize his exposure to complete agonist opioids such as oxycodone. Oxycodone will not be effective in the presence of buprenorphine/naloxone (Suboxone®), which Harold is taking, because full agonists are antagonized by the use of partial agonists/antagonists.
- **Acetaminophen:** Harold should receive acetaminophen. Acetaminophen is a non-opioid analgesic that can be used as part of multimodal analgesia and is not known to cause physical dependence.
- **NSAIDs:** Harold should receive NSAIDs. Because of his history of OUD, NSAIDs can be used as part of multimodal analgesia to reduce requirements for opioids.
- **Adjuvant Drugs:** Harold should receive adjuvant analgesics such as anticonvulsant medications as part of multimodal analgesia or antidepressants. Gabapentin is a commonly used anticonvulsant medication to treat pain. Alternatives include pregabalin, duloxetine, tricyclic antidepressants (e.g. amitriptyline).
- **Tramadol:** Harold should not receive Tramadol. Tramadol is a weak mu agonist for management of mild to moderate acute and chronic pain and should be avoided because of variable metabolism and it also has other serotonergic pathways. Because Tramadol can lead to dependence, it should be avoided in patients with a history of substance use disorder.

## Harold's New Pharmacotherapy Plan

Harold's new pharmacotherapy plan developed at his follow-up visit includes:

- Naproxen: 440 mg every 12 hours
- Acetaminophen: 650 mg every 4 to 6 hours as needed
- Buprenorphine/Naloxone (Suboxone®): 8 mg/2mg twice daily
- Gabapentin 600mg 3 times daily
- Continue physical therapy (PT)

## Behavioral Therapy

The following behavioral therapies are considered for Harold:

1. **Initiate psychological treatment:** Yes, it is important to provide consistent outpatient psychological treatment to assist Harold in accepting and coping with his opioid use disorder as well as tolerating pain and its physical and emotional effects without using opioids.
2. **Include Harold's wife in counseling sessions:** Yes, opioid use disorder can disrupt a person's social and domestic environment. Harold and his wife experienced marital discord from Harold's OUD. It would be beneficial for Harold's wife, Janice, to join Harold's individual counseling sessions to show her support for his recovery.
3. **Focus on cognitive behavioral therapy (CBT):** Yes, CBT combines operant learning, cognitive and motivational strategies, and builds skills to deal with pain and its impact on biopsychosocial well-being. CBT will help Harold control his chronic pain and opioid use disorder by changing his thoughts.
4. **Incorporate Motivational Interviewing MI:** Yes, motivational interviewing (MI) could be beneficial for Harold as MI is based on

principles of motivational psychology meant to enhance motivation for change.

Harold was willing to seek treatment when given an ultimatum by his wife. MI can motivate Harold to make behavioral changes for himself, rather than for others.

MI is most effective when combined with other evidence-based therapies.

5. **Provide educational materials and instructions on relaxation therapies:** Yes, relaxation therapies such as progressive relaxation, guided imagery, biofeedback, self-hypnosis, and deep breathing exercises can be effective self-management techniques to reduce pain.
6. **Emphasize counseling over medication use:** No, a combination of medication treatment and counseling, an evidenced-based practice, is called medication-assisted treatment (MAT). MAT is treatment with buprenorphine or methadone in combination with behavioral therapies.

## Risk Reduction

The appropriate risk reduction plan for Harold includes:

1. **Provide routine urine drug screening a minimum of three times per year:** Yes, because of Harold's opioid use disorder, he should receive routine urine drug monitoring (UDM) as part of comprehensive risk monitoring. Harold is considered high risk, therefore, it is recommended he receive UDM at least three times per year when stable and up to monthly if needed to discourage relapse.
2. **Admit Harold for inpatient treatment of opioid use disorder:** No, although Harold previously met the DSM V criteria

for severe opioid use disorder, he was already treated inpatient several months ago following an opioid overdose. Harold was placed on buprenorphine/naloxone (Suboxone®) before being discharged from the hospital for his motor vehicle crash, and he does not require the need for abrupt inpatient detoxification. He should continue to follow-up with his doctor as requested and report any cravings he experiences.

**3. Request regular office visits (*at least once per six months*):**

Yes, Harold should plan to see his physician on a regular basis as he heals from his motor vehicle crash and recovers from the pain.

Patients who are at a higher risk of opioid misuse are encouraged to seek regular office visits for the physician to examine the patient's treatment, propose alternative treatments if current treatment is insufficient, detect any side effects, and assess for opioid misuse.

**4. Restrict opioid refills (*one or fewer opioid refills more than one week early*):**

No, Harold was reintroduced to buprenorphine/naloxone (Suboxone®) to treat his opioid use disorder and provide pain relief prior to his discharge from the hospital and should not receive any other opioids because of his history of opioid use disorder.

## Event 4: Ongoing Pain Care

### Family Support

Ongoing pain care in patients with substance use disorder like Harold includes family support.

#### *Harold and Janice Talk about Family Support*

Harold's wife Janice sits next to him. She wears a dark blue cardigan over a slightly lighter dark blue dress shirt. Her hair is pulled back and she wears silver hoop earrings with a silver necklace of abstract interconnected rectangles of different shapes.

Harold wears a blue plaid button up shirt. He sports a full beard and thinning hair. He and his wife Janice face the camera in a personal interview style.

The shot shows their head and shoulders and blurs out the background of what appears to be a hospital waiting area.

Janice begins as Harold looks at her. *“As his wife, I didn't want him to have pain.”* She glances back at Harold and continues, *“but I also didn't want him to go back on pain medications. He worked so hard to recover from that addiction.”*

Harold and Janice hold hands now. Janice says, *“There were other pain medications besides opioids that would help. They made sure he was off opioids and back on his Suboxone before going home. I've been giving him the Suboxone two times a day.”*

Janice pauses briefly to collect her composure. She seems on the verge of tears. *“He still complains of some pain every once and awhile. He knows there's no way he is going to get anything more for the pain.”*

Harold sighs in response to his wife's mention of not getting anything for the pain.



Janice says, *“So, we do deep-breathing exercises to help him relax, and I even bought him some audiotapes that he can listen to keep his mind off the pain. Listening to music helps too.”*

Harold nods in agreement.

## Harold Takes Control

Ongoing pain care in patients with substance use disorder like Harold includes Harold taking control.

### *Harold Talks about Taking Control*

Harold’s wife Janice sits next to him. She wears a dark blue cardigan over a slightly lighter dark blue dress shirt. Her hair is pulled back and she wears silver hoop earrings with a silver necklace of abstract interconnected rectangles of different shapes.

Harold wears a blue plaid button up shirt. He sports a full beard and thinning hair. He and his wife Janice face the camera in a personal interview style.

The shot shows their head and shoulders and blurs out the background of what appears to be a hospital waiting area.

Harold says, *“I still struggle with the addiction, even before the car accident. I think that is something that I will always struggle with. Having gotten some opioid pain meds when I was in the ICU, it reminded me of that feeling. I really don’t want to get back to that place again.”*

Harold locks eyes with his wife and says to her, *“I won’t fall back into that addiction.”* He turns to face the camera again. *“It’s scary how tempting it can be. In rehab, they taught me relaxation therapy, which I still use when I have a craving. And it works.”*

## Future Treatment

Ongoing pain care in patients with substance use disorder like Harold includes future treatment.

### *Harold and Janice Talk about Future Treatment*

Harold's wife Janice sits next to him. She wears a dark blue cardigan over a slightly lighter dark blue dress shirt. Her hair is pulled back and she wears silver hoop earrings with a silver necklace of abstract interconnected rectangles of different shapes.

Harold wears a blue plaid button up shirt. He sports a full beard and thinning hair. He and his wife Janice face the camera in a personal interview style.

The shot shows their head and shoulders and blurs out the background of what appears to be a hospital waiting area.

Janice starts, *"I think it would be a really good idea for him to enter a day program, especially after everything that just happened. I just want to make sure he can stay on track and not give in to those temptations."*

Harold says, *"She's done so much for me. Put up with so much. If that's what she wants, that's what I will do. Plus, I know it's what's best for me anyway."*

## Help for Substance Use Disorders

If you or someone you know is suffering with a substance use disorder:

- Call 1-800-662-HELP for drug/alcohol rehab/treatment referral service
- Call 1-888-497-6879 for free and confidential guidance for alcohol addiction.

## Appendix 1: Pain and Assessment

### Pain

#### *Classification of Pain*

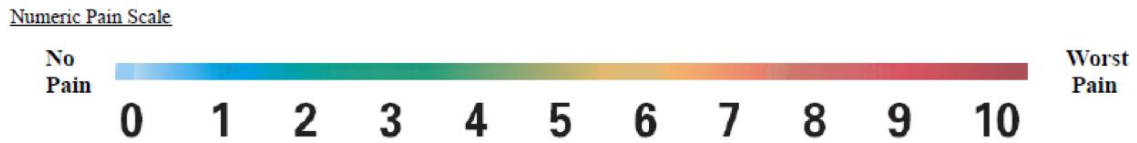
The following categories of pain all require the use of pain assessment tools to better identify their severity:

- **Acute Pain:** Caused by tissue injury.
- **Nociceptive Pain:** Caused by activation of pain fiber receptors (nociceptors) and is associated with acute tissue injury.
- **Chronic Pain:** Pain that persists for greater than 3 months or longer than expected for tissue injury.
- **Neuropathic Pain:** Arises from nerve injury and quality of pain may vary, such as burning and tingling. May persist even after tissue damage has resolved. (Neuropathic pain typically responds poorly to opioids.)

There are several different scales that can be used to assess for pain severity.

## 11-Point Numerical Rating Scale (NRS)

The most common is the 11-point Numerical Rating Scale (NRS), which uses the range 0-10. The benefits of the NRS are its simplicity and validity. Possible drawbacks include response variability and moderate correlation with functional status.



*Figure 5: 11-Point Numerical Rating Scale*

## Functional Pain Scale<sup>4</sup>

### *Instructions:*

Ask the patient if pain is present. If the patient has pain, ask him or her to rate the pain subjectively as either "tolerable" or "intolerable."

Finally, find out if the pain interferes with function. If the patient rates the pain as "tolerable," establish whether the pain interferes with any activity. If the pain is "intolerable," determine whether the pain is so intense as to prevent passive activities. See the chart below for guidelines.

- 0: No pain
- 1: Tolerable (and does not prevent any activities)
- 2: Tolerable (but does prevent some activities)
- 3: Intolerable (but can use telephone, watch TV, or read)
- 4: Intolerable (but cannot use telephone, watch TV, or read)
- 5: Intolerable (and unable to verbally communicate because of pain)

### *Scoring:*

The patient's subjective rating of pain and the objective determination of the pain's interference with activities will produce a corresponding score on a scale of 0-5.

A lower score equates to less severe pain and less interference with functional abilities, if any. Ideally, all patients should reach a 0 to 2 level, preferably 0 to 1.

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<sup>4</sup> Gloth FM III, Scheve AA, Stober CV, Chow S, Prosser J. The Functional Pain Scale: reliability, validity, and responsiveness in an elderly population. *J AM Med Dir Assoc.* 2001;2(3):110-114.

It should be made clear to the respondent that limitations in function only apply if limitations are due to the pain being evaluated.

## OPQRST<sup>5</sup>

When assessing pain, it is important to ask certain questions in order to get a full understanding of the patient's pain history. There are different methods you can use to remember the important questions to ask. One option is the mnemonic "OPQRST."

O – Onset: When did the pain start? What was happening at that time?

P – Palliative and Provocative factors: What makes the pain better? Worse? (Include specific activities, positions or treatments.)

Q – Quality: Describe the pain. Is it burning, sharp, shooting, aching, throbbing, etc.?

R – Region and Radiation: Where is the pain? Does it spread to other areas?

S – Severity: How bad is the pain? (There are several scales to use, which will be discussed in the following slide)

T – Timing: When does the pain occur? Has it changed since onset? If so, how?

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<sup>5</sup> Powell RA, Downing J, Ddungu H, Mwangi-Powell FN. Pain Management and Assessment. In: Andrea Kopf NGP, editor. Guide to Pain Management in Low-Resource Settings. Seattle: IASP: International Associations for the Study of Pain; 2010. P. 67-79 [http://www.iasp-pain.org/AM/Template.cfm?Section=Home&TEMPLATE=/CM/HTMLDisplay.cfm\\$CONTENTID=11669](http://www.iasp-pain.org/AM/Template.cfm?Section=Home&TEMPLATE=/CM/HTMLDisplay.cfm$CONTENTID=11669)

## Screening

Ask, "Are you experiencing any discomfort right now?"

If No: document "zero" pain and reassess periodically

If Yes: ask about its nature (verbal description) pattern (over time) and location

Try to quantify the intensity of the pain, show the patient the rating tools we use and determine which one is easiest and most meaningful for them.

Try to quantify the intensity of the pain, show the patient the rating tools we use and determine which one is easiest and most meaningful for them.

Starting with the **Numeric Risk Tool** (remember, this is an eleven-point scale of 0-10, not 1-10), ask the patient if they would recognize:

- if the discomfort were completely gone ("a rating of 0")
- or the worst they or anybody else could possibly experience ("10")

Have the patient rate the intensity of their pain/discomfort "right now" verbally with a number of by pointing to the number that represents their pain intensity.

Once the patient understands this scale, follow-up questions may be tried without the visual aid:

- "On a scale of 0 to 10, how much pain (or discomfort) are you experiencing now?"

If the Numeric Risk Tool is not easy and meaningful, use the Verbal Descriptor Scale:

- Determine if discomfort is "none" (chart 0) or the worst possible (chart 10).
- Ask if the discomfort or pain is mild, moderate, severe, or extreme.
  - Record 2 (for mild), 4 (for moderate), 6 (for severe), or 8 (for extreme) accordingly.
  - If the patient reports it's between two words, select the odd number between them (e.g. the score of a report of pain between mild and moderate = 3)

If that isn't easy and meaningful, use the **Functional Pain Scale**.

Determine if it is tolerable ("less than or equal to 5") or intolerable ("greater than or equal to 5").

- Tolerable pain that does not interfere with activities = 2
- Tolerable pain that interferes with physically demanding activities = 4
- Intolerable pain that interferes with physically demanding activities = 5
- Intolerable pain that interferes with active but not passive activities = 6
- Intolerable pain that interferes with passive activities (e.g. reading) = 8
- Pain so severe the patient can't do any active or passive activities (e.g. can't even talk about pain without writhing/screaming) = 10



Reassess using the 4-A's determining safety and efficacy of therapy:

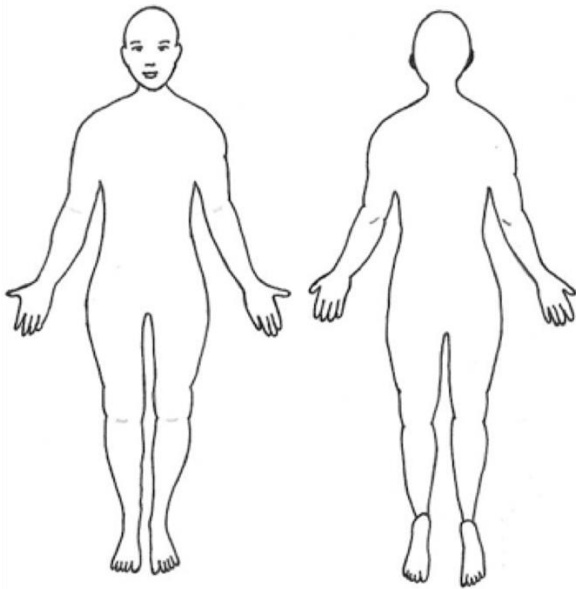
- **Analgesia:** To what extent did the treatment reduce the pain and make it more tolerable? This can be evaluated using one of the pain intensity scales above, the percent that pain intensity is reduced by (e.g., 30%, 50%, etc.) or adjectives (good, excellent effect) the patient uses.
- **Activity:** To what extent did the patient's activity and rest patterns improve as a result of the treatment? Does pain interfere less with usual and prescribed therapeutic (e.g. physical therapy) activity? Does pain interfere less with sleep? Does the treatment affect safety?
- **Adverse effects:** What side effects, toxicity, technology-related complications are experienced?
- **Aberrant behaviors:** Has the medication affected medication-focused behaviors or personality?

The **Faces Pain Scale** can also be used for any patient but is especially useful with children or non-verbal patients. This is a well-studied and validated scale.



Figure 6: Faces Pain Scale

A body diagram can allow patients to pinpoint their pain site(s) to help guide your examination.



*Figure 7: Body Diagram*

Additionally, observing patients when they move or during the exam is a useful addition to these scales, and is essential with young children and non-verbal adults.

Physical manifestations associated with acute pain, opioid withdrawal and opioid overmedication should be distinguished.

The table below matches the signs and symptoms to their corresponding condition(s) so you can see the similarities and differences for each condition.

Signs/Symptoms	Acute Pain	Opioid Withdrawal	Opioid Overmedication
Tachycardia (fast heart rate)	Yes	Yes	No
Hypertension	Yes	Yes	No
Disphoresis (sweating)	Yes	Yes	No
Vasoconstriction (cold hands/feet)	Yes	Yes	No
Mydriasis (dilated pupils)	Yes	Yes	No
Tremors (shaking)	No	Yes	No
Dysphria/anxiety (emotional state characterized by depression, anxiety, unease)	No	Yes	No
Flu-like symptoms (runny nose, congestion, malaise, etc.)	No	Yes	No

Signs/Symptoms	Acute Pain	Opioid Withdrawal	Opioid Overmedication
Depression (low mood)	No	Yes	No
Diarrhea/vomiting	No	Yes	No
Respiratory Depression (low respiratory rate)	No	No	Yes
Bradycardia (low heart rate)	No	No	Yes
Miosis (constricted pupils)	No	No	Yes
Vasodilation (warm extremities)	No	No	Yes
Myoclonic jerks (sudden muscle contractions/twitches)	No	No	Yes

*Figure 8: Signs and Symptoms of Acute Pain vs Opioid Withdrawal and Opioid Overmedication*

## Opioid Risk and Dosing

When assessing Mr. Gateway's pain, you should also address any opioid risk factors he has. It's helpful to also distinguish between the following terms:

- **Tolerance** - A state of adaptation in which exposure to a drug induces changes that result in a diminution of one or more opioid effects over time.
- **Physical dependence** - A state of adaptation manifested by a drug class-specific withdrawal syndrome that can be produced by: abrupt cessation, rapid dose reduction, decreasing blood level of the drug, and/or administration of an antagonist.
- **Addiction** - A primary, chronic, neurobiologic disease with genetic, psychosocial, and environmental factors. It's characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and/or craving.
- **Pseudoaddiction** - This is a "concept" and not a true diagnosis and is based off of case reports and small case studies. It can be understood as an iatrogenic syndrome resulting from misinterpretation of relief-seeking behaviors as though they are drug-seeking behaviors that are commonly seen with addiction. The relief-seeking behaviors resolve upon institution of effective analgesic therapy.
- **Aberrant behavior** - Any medication behaviors departing from prescribed plan of care, ranging from mildly problematic, such as

hoarding medications to use for times of severe pain, to selling medications.

- Medication misuse - Use of a medication (with therapeutic intent) other than as directed or as indicated, whether willful or unintentional, and whether harm results or not.

Distinguishing between "addiction" and "pseudoaddiction" can be challenging and often cannot be reconciled.

### Equianalgesic Example

From this table, you can compare potencies or "strengths" between the different opioids.

For instance, oral hydromorphone is more potent than oral oxycodone, which is more potent than oral morphine. Thus, lower doses of hydromorphone are needed for a similar effect of a higher dose of oxycodone.

Oral/Rectal Dose (mg)	Opioid Analgesic	Intravenous Dose (mg)
30	Morphine	10
0.4	Buprenorphine	0.3
200	Codeine	100
N/A	Fentanyl	0.1
30	Hydrocodone	N/A
7.5	Hydromorphone	1.5

Oral/Rectal Dose (mg)	Opioid Analgesic	Intravenous Dose (mg)
20	Oxycodone	N/A
100	Tramadol	N/A

Figure 9: Potencies and Strengths Between Different Opioids

### *Analgesic Fentanyl*

Calculations for transdermal fentanyl should be made based on the manufacturer's recommendations using the table below.

Oral 24-Hour Morphine Equivalent (mg/day)	Transdermal Fentanyl Dose (mcg/hour)
60-134	25
135-224	50
225-314	75
315-404	100
405-494	125
495-584	150

Oral 24-Hour Morphine Equivalent (mg/day)	Transdermal Fentanyl Dose (mcg/hour)
585-674	175
675-764	200
765-854	225
855-944	250
945-1034	275
1035-1124	300

*Figure 10: Calculations for transdermal fentanyl*



### *Equianalgesic Methadone*

There are numerous calculation methods for conversion to methadone. One method commonly used in practice is listed below.

Oral 24-Hour Morphine Equivalent (mg/day)	Oral Dose Ratio (Morphine:Methadone)
Greater than 100	3:1
101-300	5:1
301-600	10:1
601-800	12:1
801-1000	15:1
Greater than or equal to 1001	20:1

*Figure 11: Equianalgesic Methadone*

## Resources and References

### Pain Information

- International Association for the Study of Pain: <http://www.iasp-pain.org/>
- American Pain Society: <http://americanpainsociety.org/>
- Academy of Integrative Pain Management: <http://www.aapainmanage.org/>
- American Academy of Pain Medicine: <http://www.painmed.org/>
- American Chronic Pain Association: <https://theacpa.org/>
- National Fibromyalgia and Chronic Pain Association: <http://www.fmcpaware.org/>

### Institute of Medicine Report

[In 2011, the Institute of Medicine \(IOM\) released a report](#) regarding pain as a public health problem in the United States. The IOM recommended relieving pain become a national priority [9].

### National Pain Strategy

In 2016, The U.S. Department of Health and Human Services outlined the nation's first coordinated plan for reducing chronic pain in [The National Pain Strategy \(NPS\)](#). It was developed by a diverse team of experts from around the nation. The National Pain Strategy is a roadmap toward achieving a system of care in which all people receive appropriate, high quality and evidence-based care for pain [10].

## CDC Guideline for Prescribing Opioids for Chronic Pain

In 2016, the Center for Disease Control released [the guideline for prescribing opioids for chronic pain](#).

### Opioid Risk and Dosing

#### *Opioid Crisis*

#### Too Many Prescriptions

In 2015, the amount of opioids prescribed was enough for every American to be medicated around the clock for 3 weeks. (640 MME per person, which equals 5 mg of hydrocodone every 4 hours.)

#### Too Many Days

Even at low doses, taking an opioid for more than 3 months increases the risk of addiction by 15 times. (average days supply per prescription increased from 2006 to 2015.)

Even 1 day of an opioid prescription increases the risk of still being on an opioid 1 year and 3 years later. There is a direct linear relationship between the number of days' supply for the first prescription and probability of continued use at 1 and 3 years.

#### *Opioid Use and Misuse Definitions:*

- **Tolerance** - A state of adaptation in which exposure to a drug induces changes that result in a diminution of one or more opioid effects over time.
- **Physical dependence** - A state of adaptation manifested by a drug class-specific withdrawal syndrome that can be produced by: abrupt cessation, rapid dose reduction, decreasing blood level of the drug, and/or administration of an antagonist.

- **Addiction** - A primary, chronic, neurobiologic disease with genetic, psychosocial, and environmental factors. It's characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and/or craving.
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Distinguishing between "addiction" and "pseudoaddiction" can be challenging and often cannot be reconciled.

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## Appendix 2: Opioid Risk Tool<sup>6</sup>

### Instructions

The Opioid Risk Tool includes five categories:

1. Family history of substance abuse
2. Personal history of substance abuse
3. Age
4. History of preadolescent sexual abuse
5. Psychological disease

The overall score from all five categories score indicates the patient's opioid risk.

### Family History of Substance Abuse

- Alcohol
  - Item score if female: 1
  - Item score if male: 3
- Illegal Drugs
  - Item score if female: 2
  - Item score if male: 3
- Prescription Drugs
  - Item score if female: 4
  - Item score if male: 4

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<sup>6</sup> Reference: Webster LR. Predicting aberrant behaviors in opioid-treated patients: Preliminary validation of the opioid risk tool. *Pain Medicine*. 2005;6(6):432-442. Used with permission.

## Personal History of Substance Abuse

- Alcohol
  - Item score if female: 3
  - Item score if male: 3
- Illegal Drugs
  - Item score if female: 4
  - Item score if male: 4
- Prescription Drugs
  - Item score if female: 5
  - Item score if male: 5

## Age

- Age 16-45
  - Item score if female: 1
  - Item score if male: 1

## History of Preadolescent Sexual Abuse

- Abuse experienced
  - Item score if female: 3
  - Item score if male: 0

## Psychological Disease

- Attention Deficit Disorder, Obsessive Compulsive Disorder, Bipolar, Schizophrenia
  - Item score if female: 2

- Item score if male: 2
- Depression
  - Item score if female: 1
  - Item score if male: 1

### Total Score Risk Category

- Low Risk: 0 – 3
- Moderate Risk: 4 – 7
- High Risk:  $\geq 8$

## Appendix 3: Numeric Pain Rating Scale (NPRS)

### Purpose

The Numeric Pain Rating Scale (NPRS) measures the subjective intensity of pain.

### Description

- The NPRS is an eleven-point scale from 0 to 10.
  - “0” = no pain
  - “10” = the most intense pain imaginable
- Patients verbally select a value that’s most in line with the intensity of pain that they’ve experienced in the last twenty-four hours.
- A written form is also frequently used with the numeric values of 0 to 10, written out.
- The NPRS has good sensitivity while producing data that can be statistically analyzed (Williamson & Hoggar, 2005)

## Area of Assessment

Pain

## Body Part

Not applicable

## Domain

Sensory

## Assessment Type

Patient reported outcome

## Length of Test

Five minutes or less

## Time to Administer

Less than three minutes

## Number of Items

One

## Equipment Necessary

None necessary

## Training Required

None necessary

## Type of Training Required

No training

## Cost

Free

## Actual Cost

None

## Age Range

Adult: 18-64 years; Elderly adult: 65+

## Administration Mode

Paper/pencil

## Diagnosis

Pain

## Populations Tested

- Chronic pain
- Acute pain
- Older adults (Geriatric)

- Postsurgical pain (e.g., superficial incisions to complex intra-abdominal and musculoskeletal operations)
- Oncology
- Pain of the neck, back, upper extremity or lower extremity
- Complex regional pain syndrome (CPRS)
- Rheumatoid arthritis

### Standard Error of Measurement (SEM)

**Lower Back Pain:** (Childs et al, 2005;  $n = 131$ ; mean age = 33.9 (11) years; patients receiving physical therapy; 87% with symptoms for under six weeks)

- SEM = 1.02

### Minimal Detectable Change (MDC)

**Neck/Upper Extremity/Lower Extremity:** (Stratford & Spadoni, 2001;  $n = 124$ , subgroups by pain location; neck ( $n = 25$ ), back ( $n = 27$ ), upper extremity ( $n = 42$ ), lower extremity ( $n = 29$ ); patients assessed on two occasions within seven days)

- Raw changes of three points or 27% (percent of raw in total = 3 points/11 points) is required for meaningful change

**Lower Back Pain:** (Childs et al, 2005)

- 2 points based on a 95% confidence interval

## Minimally Clinically Important Difference (MCID)

**Chronic Musculoskeletal Pain:** (Salaffi et al, 2004; n = 825 patients with chronic musculoskeletal pain)

1 point or 15.0% change

**Lower Back Pain:** (Childs et al., 2005)

- At 1 week of physical therapy treatment = 1.5 points
- At 4 weeks of physical therapy treatment = 2.2 points

**Post-operative Patients:** (Sloman et al, 2006; n = 150; mean age = 47.2 years, 56% post-abdominal surgery, 28.6% post-orthopedic surgery, 15.4% other types of surgery)

- Percent change in NPRS rather than raw scored change may provide more meaningful information regarding a patient's response to pain treatment. For example, a change from 3/10 to 0/10 pain may be more meaningful than a change from 8/10 to 5/10 pain.
- Therefore, MCIDs were determined in percent change:
  - 35% reduction on the NPRS had a rating of “minimal relief”
  - 67% reduction had a rating of “moderate relief”
  - 70% reductions had a rating of “much relief”
  - 94% reduction had a rating of “complete relief”

**Shoulder Pain:** (Michener et al, 2001; n = 136; surgical and non-surgical conditions; mean age 51.7(16.4) years; 76.5% no surgery, 23.5% status post-surgery; assessment of average NPRS scores for at rest, normal activity, and strenuous activity)



- 2.17 points for surgical and non-surgical subjects after three to four weeks of rehabilitation

**Chronic Pain:** (Farrar et al, 2001;  $n = 2,724$  subjects with varying diagnoses including fibromyalgia, diabetic neuropathy, post-herpetic neuralgia, chronic low back pain and osteoarthritis)

- 1.7 points or a reduction of 27.9% (raw change/baseline x 100)

**Hospital/Emergency Room Population:** (Bijur et al, 2003;  $n = 108$ ; mean age = 44 years; participants presented with acute pain in the emergency room department)

- 1.3 points

**Chronic SCI:** (Hanley et al, 2006a;  $n = 82$ ; mean age = 41.44(10.14) years; 54% cervical SCI, 38% thoracic SCI, 7% lumbar/sacral SCI; average pre-treatment pain intensity = 5.27 (1.79) on NPRS)

- 1.80 points or 36%

## Cut-Off Scores

**Traumatic Spinal Cord Injury (SCI):** (Forchhemier MB et al, 2011;  $n = 6096$ ; mean age = 32.5 (14) years; mean time since injury = 9.8 (9.3) years; all subjects had SCI and pain; injury level: 24.3% AIS D, 5.8% paraplegia AIS C, 5.0% paraplegia B, 29.8% paraplegia A, 7.0% tetraplegia AIS C, 8.0% tetraplegia AIS B, 20.1% tetraplegia AIS A)

- Pain severity can be categorized into 3 distinct groups as relates to pain interference: 1-3, 4-6, and 7-10

**Chronic SCI:** (Hanley et al, 2006b; for questions about general pain:  $n = 307$ , mean age = 43.1 (13.0) years; for questions about worst pain:  $n = 174$ , mean age = 41.6 (13.6) years; inclusion criteria of SCI >6 months)

- For rating overall pain: mild = 1-3, moderate = 4-7, severe = 8-10
- For rating worst pain problem: mild = 1-3, moderate = 4-6, severe = 7-10
- For cut-off determination, pain severity on NPRS was compared to pain interference

## Normative Data

Not established.

## Test-retest Reliability

**Chronic Pain:** (Jensen & McFarland, 1993;  $n = 200$ ; mean age = 43.83 (13.2) years; mean time since pain onset = 6.13 (8.24) years)

- Adequate test-retest reliability for a single pair of assessments (one assessment during week 1, one assessment during week 2) ( $r = 0.63$ )
- Excellent test-retest reliability for ratings on 2 or more days during week 1 compared to 2 or more days during week 2 ( $r = 0.79 - 0.92$ )
- Test-retest reliability increases with increasing numbers of ratings with the highest reliability for 4 ratings/day taken on 7 days ( $r=0.95$ )

## Interrater/Intrarater Reliability

**Healthy Populations:** (Herr et al, 2004;  $n = 175$  total, 86 subjects aged 25-55 years (mean age = 39.1 (8.8) years), 89 subjects aged 65-94 years (mean age = 76.0 (7.4) years))

- **Excellent** interrater reliability with 100% agreement between two raters scoring the 0-10 point NPRS

## Internal Consistency

**Chronic Pain:** (Jensen & McFarland, 1993)

- Excellent internal consistency for a single pair of ratings (one during week 1 and one during week2) (Coefficient alpha = 0.84)
- Excellent internal consistency for ratings on 2 or more days during week 1 compared to 2 or more days during week 2 (Coefficient alpha = 0.89 –0.98)

**Healthy Populations:** (Herr et al, 2004)

- Excellent internal consistency for NPRS in participants aged 65-94 (Cronbach's alpha = 0.87)
- Excellent internal consistency for NPRS in participants aged 25-55 (Cronbach's alpha = 0.88)

## Criterion Validity (Predictive/Concurrent)

### *Concurrent Validity:*

**Healthy Populations:** (Herr et al, 2004)

- **Excellent** correlation between NPRS and Visual Analogue Scale ( $r = 0.86$ )
- **Excellent** correlation between NPRS and Verbal Descriptor Scale ( $r = 0.88$ )
- **Excellent** correlation between NPRS and 21-point Numeric Rating Scale ( $r = 0.87$ )
- **Excellent** correlation between NRPS (on 0-20 scale) and Faces Pain Scale ( $r = 0.80$ )

## Construct Validity (Convergent/Discriminant)

### *Convergent Validity:*

#### **Hospital/Emergency Room Population:** (Bijur et al, 2003)

- **Excellent** correlation between NRPS and VAS ( $r = 0.94$ , 95% CI = 0.93-0.95)

**Traumatic SCI:** (Dijkers, 2010;  $n = 168$ ; mean 38(18) years; level of injury: 10% paraplegia incomplete, 26% paraplegia complete, 45% tetraplegia incomplete, 19% tetraplegia complete)

- **Adequate** correlation between NPRS and Verbal Rating Scale (Spearman's  $r = 0.38$ )

## Content Validity

**SCI:** (Bryce et al, 2007;  $n = 50$  health care providers attending the 2006 combined American Spinal Injury Association (ASIA)/International Spinal Cord Society (ISCoS) scientific meeting)

- In a vote on the validity and usefulness of the NPRS in people with pain related to a SCI, attendees voted as follows:
  - 64% NPRS is a valid measure and should be part of a minimum dataset for clinical trials
  - 14% NPRS is a valid measure but should be part of an expanded dataset only
  - 20% NPRS needs further study to establish reliability and validity before being recommended
  - 2% NPRS is not valid or relevant for use
  - 79% NPRS as first choice for a minimum data set over a VRS (16%) and VAS (5%) (n= 57)

## Face Validity

### **Healthy Population:** (Herr et al, 2004)

- Subjects were shown 5 scales rating pain intensity and asked which scale best described the severity of pain experienced during the study.
  - 35.3% preferred the 21-point Numeric Rating Scale (written format)
  - 25.3% preferred the Verbal Descriptor Scale
  - 15.9% preferred the NPRS (11-point verbal scale)
  - 12.9% preferred the Faces Pain Scale ○ 10.6% preferred the Visual Analogue Scale

## Floor/Ceiling Effects

Not established

## Responsiveness

### **Lower Back Pain:** (Childs et al, 2005)

- Large effect size at 1 week and 4 weeks (ES = 0.95-1.2) in patients receiving physical therapy for low back pain

### **Healthy Population:** (Herr et al, 2004)

- NPRS detected significant differences across temperatures of thermal stimuli tested ( $F_{6,1037} = 67.09, p < 0.0001$ ) indicating sensitivity to changes in pain stimulus

### **Shoulder Pain:** (Michener et al., 2011)

- Large effect size for surgical (ES = 1.51) and non-surgical subjects (ES = 1.94)

## Professional Association Recommendations

Recommendations for use of the instrument from the Neurology Section of the American Physical Therapy Association's Multiple Sclerosis Taskforce (MSEdge), Parkinson's Taskforce (PD EDGE), Spinal Cord Injury Taskforce (PD EDGE), Stroke Taskforce (StrokEDGE), Traumatic Brain Injury Taskforce (TBI EDGE), and Vestibular Taskforce (VEDGE) are listed below. These recommendations were developed by a panel of research and clinical experts using a modified Delphi process.

For detailed information about how recommendations were made, please visit: <http://www.neuropt.org/go/healthcare-professionals/neurology-section-outcome-measures-recommendations>

## **Abbreviations**

- HR: Highly Recommend
- R: Recommend
- LS / UR: Reasonable to use, but limited study in target group / Unable to Recommend
- NR: Not Recommended

## Recommendations for use based on acuity level of the patient

### **Acute (CVA < 2 months post) (SCI < 1 month post) (Vestibular < 6 weeks post)**

- SCI EDGE: R

### **Subacute (CVA 2 to 6 months) (SCI 3 to 6 months)**

- SCI EDGE: R

### **Chronic (> 6 months)**

- SCI EDGE: HR

## Recommendations based on SCI AIS Classification

### **AIS A/B**

- SCI EDGE: R

### **AIS C/D**

- SCI EDGE: R

Recommendations for entry-level physical therapy education and use in research:

**Students should learn to administer this tool? (Yes/No)**

- SCI EDGE: Yes

**Students should be exposed to tool? (Yes/No)**

- SCI EDGE: Yes

**Appropriate for use in intervention research studies? (Yes/No)**

- SCI EDGE: Yes

**Is additional research warranted for this tool (Yes/No)**

- SCI EDGE: Not reported

## Considerations

**Older Adults:** (Herr et al, 2004)

Herr et al recommend use of a Verbal Descriptor Scale over the NPRS based on evidence related to failures, internal consistency reliability, construct validity, scale sensitivity, and patient preference. Do you see an error or have a suggestion for this instrument summary? Please [e-mail us!](#)

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## Year Published

1995

## Instrument in PDF Format

Yes

## Approval Status

Approved

## Appendix 4: The QuickDASH Outcome Measure<sup>7</sup>

A faster way to measure upper-extremity disability and symptoms

### About the QuickDASH

The DASH Outcome Measure has been increasing in popularity since its release in 1996. Today the tool is being used around the world in both clinical and research settings and has proven to be a useful self-report outcome measure for people with musculoskeletal upper-limb disorders.

The QuickDASH is a shortened version of the DASH Outcome Measure. Instead of 30 items, the QuickDASH uses 11 items to measure physical function and symptoms in persons with any or multiple musculoskeletal disorders of the upper limb. Like the DASH, the QuickDASH also has two four-item optional modules that are scored separately.

This shortened version of the tool provides clinicians with an option that enables faster measurement of disability and symptoms; however, there are some advantages to using the full DASH outcome measure. (See Psychometric Properties)

The QuickDASH Outcome Measure is available free of charge (for noncommercial purposes) and may be downloaded from the DASH web site at [www.dash.iwh.on.ca](http://www.dash.iwh.on.ca). Information on scoring is also available on-line.

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<sup>7</sup> Institute for Work and Health 2006. All rights reserved.

## Development of the QuickDASH

Statistical analysis of the 30-item DASH indicated that it could be reduced to 11 items while still maintaining an acceptable rating of internal consistency for individual patient evaluation (i.e. Cronbach's alpha  $\sim 0.90$ ). Shortening the DASH was felt to be an attractive and sensible option provided that psychometric properties could be maintained.

Three techniques were used for item reduction using field-testing data for the full DASH. Three different scales (i.e. QuickDASH versions) were produced.

### *Conceptual Method*

The first scale was created by selecting items that represented each of the key domains identified in the theoretical framework of the full DASH. The 16 original domains were reduced to 11 based on similarity across domains. Items in the full DASH were sorted according to the domain they represented and were then ranked according to two criteria: first, the importance and difficulty according to patients, and second, correlation with total DASH score. The highest ranking items in each of the 11 specified domains were chosen to comprise the concept-based version of the QuickDASH.

### *Equidiscriminative Item-Total Correlation (EITC)*

The second scale was created by selecting items that had the highest correlation with overall scores across subgroups (those with high, moderate and low levels of disability). The four items with the highest correlation in each grouping were selected to compose the EITC-based version of the QuickDASH (the item with the smallest correlation of the twelve was eliminated).

### *Item Response Theory (Rasch Analysis)*

The third scale was created using Rasch analysis. DASH items were calibrated based on their relative difficulty; misfitting items were

eliminated, and an 11-item scale was produced with items theoretically equally spaced and calibrated along the scale length.

### *Evaluation and Comparison*

Three distinct QuickDASH versions were produced using the item-reduction techniques described. These scales were evaluated and compared using data from the original 30 item DASH prospective cohort (i.e., 200 individuals with various upper-limb disorders). The final decision of the accepted version of the QuickDASH was made based on the following criteria:

1. number of items with > 40% in one response category
2. Cronbach's alpha > 0.90
3. highest correlation with the 30- item DASH and with other markers of physical function and severity of problem.

The three versions were similar, though differing in content. The concept version ranked slightly better than the others and was chosen and unanimously supported by the Upper Extremity Collaborative Group (the DASH development group) and named the QuickDASH Outcome Measure.

### *Psychometric Properties*

Establishing the psychometric properties of any instrument is an ongoing process and is context specific. In other words, with each new population, clinical setting or treatment type, pilot testing of performance in that particular context is recommended.

Initial testing has shown the QuickDASH to work well in groups of patients (research studies, program evaluation); however, clinicians should be aware that there are advantages to using the full DASH in individual patient monitoring. The precision of measurement is slightly better with the DASH, resulting in greater confidence of the accuracy of scores. Until further data is available on the QuickDASH, clinicians should consider this advantage when choosing which measure to use.

## QuickDASH versus DASH<sup>8</sup>

- Reliability
  - Internal Consistency
    - QuickDASH: Cronbach's alpha = 0.94
    - DASH: Cronbach's alpha = 0.97
  - Test-Retest
    - QuickDASH: ICC = 0.94
    - DASH = 0.96

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<sup>8</sup> ICC – intra-class correlation coefficient (2,1)

M – average score; r – Pearson product moment correlation

SRM - standardized response mean; VAS - visual analogue scale

All Pearson product moment correlations and known-group differences statistically significant at  $p < 0.05$ .

- Validity
  - Convergent Construct
    - VAS of overall problem
      - QuickDASH:  $r = 0.70$
      - DASH:  $r = 0.70$
    - VAS of overall pain
      - QuickDASH:  $r = 0.73$
      - DASH:  $r = 0.72$
    - VAS of ability to function
      - QuickDASH:  $r = 0.80$
      - DASH:  $r = 0.79$
    - VAS of ability to work
      - QuickDASH:  $r = 0.76$
      - DASH:  $r = 0.77$
  - Known-Groups
    - Able to do all need to versus limited
      - QuickDASH:  $M = 25.4$  vs.  $48.6$
      - DASH:  $M = 23.6$  vs  $47.1$
    - Able to work versus unable to work due to upper-limb problem
      - QuickDASH:  $M = 27.5$  vs  $52.6$
      - DASH:  $M = 26.8$  vs  $47.1$

- Responsiveness
  - Change in group of patients undergoing treatment: expected to improve
    - QuickDASH: SRM = 0.79
    - DASH: SRM = 0.78
  - Change in those rating their problem as better
    - QuickDASH: SRM = 1.03
    - DASH: SRM = 1.05

## Scoring the QuickDASH

The QuickDASH is scored in two components: the disability/symptom section (11 items, scored 1-5) and the optional high-performance sport/music or work modules (4 items, scored 1-5).

### Disability/Symptom Score

At least 10 of the 11 items must be completed for a score to be calculated. The assigned values for all completed responses are simply summed and averaged, producing a score out of five. This value is then transformed to a score out of 100 by subtracting one and multiplying by 25. This transformation is done to make the score easier to compare to other measures scaled on a 0-100 scale. A higher score indicates greater disability.

$$([\text{sum of } n \text{ responses}/n] - 1) \times 25^9$$

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<sup>9</sup> Where n is equal to the number of completed responses



## Optional Modules (Sport/Music or Work)

There are two optional modules, each consisting of four items. The optional modules are intended for athletes, performing artists and other groups of workers whose jobs require high levels of physical performance. These individuals may be having difficulties only at these high-performance levels, which are beyond the scope of the 11- item QuickDASH. The same procedure described for the disability/symptom score is followed to calculate the optional four item module score. All four questions must be answered in order to calculate the score. For each module, simply add up the assigned values for each response and divide by four (number of items); subtract one and multiply by 25 to obtain a score out of 100.

### Missing Items

If more than 10 percent of the items (that is, more than one item) are left blank by the respondent, you will not be able to calculate a QuickDASH disability/symptom score. By this same rule (that is no more than 10 percent of the items can be left blank), no missing values can be tolerated in the optional modules because each module consists of only four items.

## The Quick DASH Outcome Measure

### *Instructions*

This questionnaire asks about your symptoms as well as your ability to perform certain activities. Please answer every question, based on your condition in the last week, by choosing the appropriate number. If you did not have the opportunity to perform an activity in the past week, please make your best estimate of which response would be the most accurate. It doesn't matter which hand or arm you use to perform the activity; please answer based on your ability regardless of how you perform the task.

## *QuickDASH*

Please rate your ability to do the following activities in the last week either 1, for no difficulty, 2 for mild difficulty, 3 for moderate difficulty, 4 for severe difficulty, or 5 for unable.

- Open a tight or new jar
- Do heavy household chores (e.g., wash walls, floors)
- Carry a shopping bag or briefcase
- Wash your back
- Use a knife to cut food
- Recreational activities in which you take some force or impact through your arm, shoulder, or hand (e.g., golf, hammering, tennis, etc.).

Choose the appropriate number to reflect the following, with 1 for not at all, 2 for slightly, 3 for moderately, 4 for quite a bit, or 5 for extremely.

- During the past week, to what extent has your arm, shoulder, or hand problem interfered with your normal social activities with family, friends, neighbors or groups?

Choose the appropriate number to reflect the following, with 1 for not at all, 2 for slightly, 3 for moderately, 4 for quite a bit, or 5 for unable.

- During the past week, were you limited in your work or other regular activities as a result of your arm, shoulder or hand problem?

Please rate the severity of the following symptoms in the last week by choosing the appropriate number. Choose 1 for none, 2 for mild, 3 for moderate, 4 for severe, and 5 for extreme.

- Arm, shoulder, or hand pain.
- Tingling (pins and needles) in your arm, shoulder, or hand.

Choose the appropriate number to reflect your experience for the following, with 1 for no difficulty, 2 for mild difficulty, 3 for moderate difficulty, 4 for severe difficulty, or 5 for so much difficulty that I can't sleep.

- During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder, or hand?

QuickDASH Disability/Symptom Score =  $([\text{sum of } n \text{ responses}/n] - 1) \times 25$ , where n is equal to the number of completed responses.

**A QuickDASH score may not be calculated if there is greater than one missing item.**

### *QuickDASH Work Module (Optional)*

The following questions ask about the impact of your arm, shoulder, or hand problems on your ability to work (including homemaking if that is your main work role).

Please note what your job/work is. If you do not work, you may skip this section.

Please note the number that best describes your physical ability in the past week. 1 denotes no difficulty, 2 mild difficulty, 3 moderate difficulty, 4 severe difficulty, and 5 unable.

Did you have any difficulty:

1. Using your usual technique for your work?
2. Doing your usual work because of arm, shoulder, or hand pain?
3. Doing your work as well as you would like?
4. Spending your usual amount of time doing your work?

### *QuickDASH Sports/Performing Arts Module (Optional)*

The following questions relate to the impact of your arm, shoulder, or hand problem on playing your musical instrument or sport or both. If you play more than one sport or instrument (or play both), please answer with respect to that activity which is most important to you.

Please note the sport or instrument which is most important to you. If you do not play a sport or instrument, you may skip this section.

Please note the number that best describes your physical ability in the past week. 1 denotes no difficulty, 2 mild difficulty, 3 moderate difficulty, 4 severe difficulty, and 5 unable.

Did you have any difficulty:

1. Using your usual technique for playing your instrument or sport?
2. Playing your musical instrument or sport because of arm, shoulder, or hand pain?
3. Playing your musical instrument or sport as well as you would like?
4. Spending your usual amount of time practicing your instrument or sport?

Scoring the Optional Modules: Add up assigned values for each response; divide by 4 (number of items); subtract 1; multiply by 25.

An optional module may not be calculated if there are any missing items.