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### **Case**

Amanda is a 32 year old Search and Rescue Technician with the Royal Canadian Airforce based out of Canadian Forces Base - Comox here on the island. Two days ago, she was on a mission med-evacuating a patient from a fishing vessel of the coast.

She and her fellow SAR - Tech were able to stabilize the patient for transport. However, upon bending over to lift the stretcher, Amanda felt an immediate sharp pain her in lumbar spine. Upon returning home for her days off, despite taking Tylenol, which offered little relief, she stayed mainly in bed because the pain was so intense.

She presents to sick parade on Monday at the base clinic, because the pain has not resolved and now she is having some pain radiate down her right leg.

When it comes to back pain, I find it useful to consider timelines as this can help to guide our differential and management.

### **Definitions**

- Acute back pain: 4 weeks
- Subacute back pain: 4-12 weeks
- Chronic back pain: >12 weeks

Given that the onset of Amanda's presentation occurred within the last 4 weeks, we can investigate this as acute backpain.

### **Objective 1: In a patient with undefined acute low back pain (LBP):**

- a. Rule out serious causes (eg. cauda equina syndrome, pyelonephritis, ruptured abdominal aortic aneurysm, cancer) through appropriate history and physical examination**
- b. Make a positive diagnosis of MSK pain (not a diagnosis of exclusion) through an appropriate history and physical examination**

There is no beating around the bush. The differential for back pain is a monster

and there are many ways to move through it. Following Rosen's lead, I generally like to think of back pain as either having origin in the spine or not in the spine.

For non spinal causes, I find it very important to do a review of systems.



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This includes but is not limited to assessing for symptoms like concurrent abdominal pain, urinary or bowel symptoms, cardiovascular manifestations like chest pain, syncope, shortness of breath, constitutional and infectious symptoms and alike. We will zip through the differential, but we will include these in the show notes for today's episode so don't fret!

### Etiology

- Non-Spinal
  - GI: Esophageal disease, peptic ulcer disease, pancreatitis, pancreatic cancer, biliary cholic, cholecystitis, cholangitis,
  - GU:
    - Renal: renal colic, pyelonephritis, perinephric abscess
    - Prostatitis, endometriosis, ovarian torsion or tumor, pelvic inflammatory disease
  - CVS: Aortic Dissection, AAA, bacterial endocarditis
  - Pulmonary: PE, pleural effusion, pneumonia
  - MSK: Hip disease
  - Other: Neoplasm, retroperitoneal hemorrhage, psoas abscess, shingles
- Spinal
  - Infectious
    - Osteomyelitis
    - Septic diskitis
    - Transverse myelitis
    - Paraspinous abscess
    - Epidural abscess
  - Inflammatory arthritis
    - Ankylosing spondylitis
    - Psoriatic spondylitis
    - Reactive arthritis
    - IBD
  - Trauma
    - Traumatic fracture

Having gone through all of this, the most likely presentation you will see, and the focus of today's episode is **mechanical back pain** of which there are many causes.

Starting off with:

- Lumbar strain/sprain
  - Which is generally caused by extensive mechanical stress and may present with diffuse back pain that typically worsens with movement and improves with rest

There are also a number of related entities within musculoskeletal pain that can lead to compression of the spinal nerves which can subsequently produce symptoms such as **radicular pain** that may radiate to the buttock and/or leg and that is typically

- Worse with sitting, coughing, valsalva, sneezing
- Improves with standing
- Pain not worsened with ambulation



### **neurogenic claudication**

- Which can be characterized as pain, paresthesia, or cramping of one or both legs, brought on when walking and relieved in sitting

### and even progress to **cauda equina syndrome**

- Which is caused by compression of the nerve routes in the thecal sac of the lumbar spine
- And clinically presents with symptoms of urinary retention, fecal incontinence, saddle anesthesia and lower motor neuron weakness or sensory changes

### These clinical entities include

- Degenerative disc disease
  - Disc bulge: The disk can become dried out or compressed leading to displacement of the annulus fibrosus
  - Disc herniation: which occurs when the inner nucleus pulposus ruptures out from the annulus fibrosus
- Vertebral/ Facet Joint OA
  - Over time, as with other joints, the facet joints within the spine wear down and can develop osteoarthritis. Typically felt as unilateral back pain, which can spread down the entire limb. Pain upon hyperextension. The gold standard for diagnosis is positive response to medial branch blocks.
- Spinal stenosis
  - Definition: Narrowing of the vertebral canal that compresses spinal nerves that can lead to pain and paresthesias
  - Sx: typically low back pain, may be referred to the buttock or leg.
    - This pain can be worsened with extension (walking, standing upright) and relieved with flexion (sitting, leaning over, sleeping in fetal position).
- Spondylolysis
  - Definition: A fracture in the pars interarticularis

### which may ultimately progress to

- Spondylolisthesis
  - Definition: Subluxation of one of the vertebral bodies anterior to the vertebrae below
  - Sx: Typically presents with back pain which is relieved with rest and sitting

### **History**

As we just described, the differential for acute back pain is huge. Particularly in the clinic setting, where you don't have immediate access to investigations, one of the most useful tools will be your history.

Personally, I like to start off with OPQRST

- Onset
  - When did the pain start? What were you doing?



- Provocation & Palliation
  - Does anything make it better or worse?
- Quality
  - What does it feel like?
- Region & Radiation
  - Where does it start? Where does it end?
- Severity
  - On a scale of ten
- Time course

For acute back pain, while the incidence of serious pathology is low, particularly in the first visit, it is important to assess for emergent causes of back pain that could either necessitate urgent neurosurgical consultation or imaging

To do this, we like to consider "red flag" symptoms which may alert us to emergent diagnoses.

These include symptoms suggestive of

- *Cauda Equina*
  - Urinary retention, fecal incontinence, saddle anesthesia, lower motor neuron weakness or sensory changes
  - Etiology: Space Occupying Lesion
    - Disc herniation, spinal epidural hematoma, spinal cord tumors, synovial facet cyst, spinal epidural abscess, trauma, spondylolithesis

#### *Infection*

- Fever, hx of IVUD, spinal procedure, immunosuppression

#### *Malignancy*

- Constitutional sx, hx of cancer (eg. breast, lung, prostate)

#### *Vertebral Fracture*

- Older age (>65), hx of osteoporosis, trauma, systemic steroid use

#### *Inflammatory Back Pain*

- Insidious in onset, affects younger patients (<40 years), improves with exercise but not with rest, and causes pain at night, improves on getting up.

#### **Case:**

In hearing Amanda's story, it is very reassuring for mechanical low back pain given it occurred directly after an extensive mechanical stress and she has no red flag symptoms.

While not necessarily helpful with diagnosis, our history taking should also keep in mind that certain psychosocial factors, referred to as "Yellow flags", have some predictive value in a patient developing chronic back pain and can greatly affect one's recovery and will help us guide our management.

- These include
  - A negative attitude that back pain is harmful or potentially severely disabling
  - Fear avoidance behaviour and reduced activity levels



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- An expectation that passive, rather than active, treatment will be beneficial
- A tendency to depression, low morale and social withdrawal
- Social or financial problems
- An emphasis on early medical investigations or treatment

### Physical Exam

- Particularly, in the setting of acute back pain, we want to ensure that we are not missing emergent spinal nerve compression or neurological compromise and so the first visit should consist of an msk and neuro exam.

### MSK

#### Inspection

- Signs of trauma, deformities, abnormal curvature,

#### Range of Motion

- Active ROM
  - Decreased ROM may be suggestive of Ankylosing spondylitis or mechanical back pain

#### Palpation

- Tenderness
  - Over the paraspinal muscles could be associated with lumbar strain/sprain whereas over the vertebrae could be associated with a compression fracture.

#### Special Tests

- Lumbosacral impingement:
  - Straight leg raise
    - Reproduces pain and paresthesia below the knee at 30-70 degrees hip flexion
    - Non specific but Highly sensitive. If negative, very unlikely the pathology is due to lumbar disk herniation.
  - Crossed strait leg raise
- For inflammatory arthritis such as
- Ankylosing spondylitis
  - Occiput to wall test.
  - Modified schober's test.

### Neuro Exam

- In acute back pain, it's also important to assess for signs of Cauda Equina Syndrome and Neurological compromise as this would warrant urgent MRI and neurosurgical evaluation.
- Anatomically, the cauda equina starts at the L2 vertebrae, so for simplicities sake, we will be assessing L1-S5.

Here is a very brief rundown of how to thoroughly and efficiently check myotomes which evaluate motor function for their respective. spinal nerves.

- Myotomes (motor function): Strength
  - Hip Flexion: L1-L2.
  - Knee Extension: L3
  - Ankle dorsiflexion: L4
  - Big toe extension: L5.



- Ankle plantar flexion: S1.
- Knee flexion: S2.
- Rectal tone/bulbocavernosus: S3-S5.

You should also assess for sensory perception by examining the respective dermatomes and knee and ankle reflexes. Particularly, if you have a high suspicion of Cauda equina, you can utilize pinprick in the saddle region.

### **Extraspinal pathology**

- Based on your index of suspicion, you will also want to perform other physical exam maneuvers to examine for extraspinal pathologies should you suspect it for example hip disease, GI causes and alike. For example CVA tenderness for pyelonephritis, palpable abdominal masses for AAA and so on and so forth.

### **Case:**

Back to the case, Amanda denies any red flag symptoms, has normal vitals but demonstrates some increased back pain with flexion that radiates down her right leg. She has a positive straight leg raise. However, her lower extremity motor and sensory exam is normal. We are suspecting mechanical low back pain. Likely some disc pathology but no evidence of impending neurological compromise.

### **Objective 2: In a patient with confirmed mechanical low back pain:**

- a. Do not over-investigate in the acute phase.**
- b. Advise the patient:**
  - **That symptoms can evolve, and ensure adequate follow-up care**
  - **That the prognosis is positive (ie. The overwhelming majority of cases will get better)**

### **Investigations in Acute Back Pain**

For the patient presenting with acute back pain, in the absence of red flags, no laboratory tests are recommended.

### **Imaging in Acute Back Pain**

You should perform urgent imaging if you have suspicion of

- Cauda equina (MRI)
- Epidural abscess or malignancy/osteomyelitis (CT or DEXA)
- Fracture (X-ray or CT)
  - If you have a low suspicion of cancer, fracture, may be reasonable to defer imaging.
- Patients with radiculopathy related to suspected disc herniation or neurogenic claudication related to suspected central spinal canal stenosis, do not need to be referred for immediate imaging, because the results will not change management



As important as it is to know when to do imaging, it's equally as important to know when to NOT do imaging. As per Choosing Wisely, in the absence of red flags, it's recommended not to do imaging for low back pain within the first six weeks. For a number of reasons.

For context, many patients who do not experience back pain will have radiologic anomalies so ultimately, symptoms may not necessarily correspond to image findings and vice versa. Early imaging corresponds to an increased likelihood of having surgery.

In an observational study by Jacobs et al., which reviewed over 400,000 clinical encounters of patients with lumbar back pain without red flags, early MRI before 6 weeks was associated with higher rates of surgery, higher use of prescription opioids and higher pain scores.

Previously, age older than 50 was an independent red flag to be considered for imaging. However, as described by Wang et al. 2018 that is no longer the case. So something to consider.

## **General Counselling in Acute Back Pain**

*CMAJ*

Etiology: Do I have cancer?

- Often times, patients will be concerned about what is causing their back pain.
- Previous studies have shown that the incidence of serious pathology among patients presenting with back pain to primary care is low (< 1%).
- We should reassure the patient that the likelihood the cause of their acute low back pain is serious in etiology is exceptionally low.
- From a diagnostic perspective, it's important to keep in mind that just because a person has a red flag, it does not mean they have serious pathology.
  - In an Australian cohort study, in which < 1% of patients who presented with back pain had serious pathology, 80% of all patients had at least one red flag. (need to paraphrase this sentence)

Prognosis: am I stuck with this forever?

- Additionally, patients may be concerned about whether or not this will be their new normal.
- But it can be helpful to mention that while recurrences can happen, most cases of acute back pain resolve within 6-12 weeks of onset. (CFPC Guidelines 2019)

Treatment: do I need to spend \$10,000 and get an U/S treatment in Mexico?

- Beyond that, most patients with acute or subacute low back pain improve over time regardless of treatment Acute Back Pain (Annals of Internal Medicine 2017)

**Objective 4. Advise the patient with mechanical low back pain to return if new or progressive neurological symptoms develop**

**Follow Up Instructions**



- While the likelihood of your patient presenting with a critical or emergent diagnosis is low, it is important to counsel patients that things can evolve and if cauda equina symptoms or progressive neurological symptoms develop, they should present for urgent follow up.

**Objective 3: In a patient with mechanical low back pain, whether it is acute or chronic, give appropriate analgesia and titrate it to the patient's pain**

## Treatment

For the purposes of this podcast, we will be covering the treatments and interventions specific to mechanical low back pain.

In the acute setting, for conservative management, one of the first things to do is provide a patient with

- Education and Reassurance
  - Namely, reassurance about the high likelihood of improvement and also setting realistic expectations that pain can often recur.

Before moving on to medication, there are a number of non-pharmacologic interventions you can recommend in the acute phase.

- Non Pharmacologic (annals of internal medicine/rx files)
  - Should dos:*
    - Encourage patients to stay active
    - Physiotherapy
      - Active exercise is better than passive
    - Superficial heat (annals of internal medicine)
      - Moderate quality evidence
    - Heat or cold Packs. (CFPC back pain guidelines)
      - Superficial heat (application of heating pads or heated blankets) recommended for short term relief of acute low back pain
        - As a reminder, heat should not be applied directly to the skin and not for longer than 15 to 20 minutes.
  - Should not:
    - Just lay in bed (Bed rest) as this has been demonstrated to significantly worsen outcomes.
    - Avoid activity avoidance

*They can also try (although limited evidence)*

- Massage
- Acupuncture
- CBT
- An additional consideration is that often these interventions are not covered. The patient should be counselled on this so they can decide if the benefits outweigh the cost.

Moving on to medication.





- Pharmacological Dos
  - NSAIDs
    - Eg. Ibuprofen: 400-800 mg po TID
    - Eg. Naproxen: 375-500mg po BID
    - Side effects: GI bleed, HTN, abdominal pain, heartburn
    - Practice recommendations:
      - Brief trial (2 weeks or less) in patient with good renovascular and GI risk profile
      - Consider co-prescribing a PPI
  - Non benzodiazepine muscle relaxants
    - Eg. baclofen 5-20 mg TID, cyclobenzaprine 5-10 mg TID.
    - Side effects: Risk of dizziness, drowsiness, sedation
    - Practice recommendations:
      - Unlike acute low back pain, not recommended for persistent low back pain.
      - Ideally, these would be used for less than 1 week and on a prn basis
- Pharmacologic Don'ts
  - Tylenol
    - While the CFPC Back pain guidelines suggest acetaminophen as a possible treatment, both CMAJ and Annals of internal medicine to not recommend use of Tylenol. You can consider its use if a patient is unable to take NSAIDs (RX Files)
  - Opioids
    - Most guidelines indicate that especially in the acute setting harms out weight the risk.
  - Systemic corticosteroids

When to follow up with patients for acute low back pain

- 1st visit:
  - Advise on red flags. Instructions to follow-up.
    - Advise the patient with mechanical low back pain to return if new or progressive neurologic symptoms develop

Particularly in the case of radicular back pain,

- 1-2 weeks: Reassess (CMAJ/CFPC)
- Follow up in 6 weeks if not substantially recovered (CFPC)
  - If symptoms (radiculopathy) persist, consider imaging. MRI. (CFPC back pain guidelines)

**Case:**

Back to the case. Because we are a family medicine podcast and you invariably are going to see patients whose pain does not improve right away, Amanda's back pain, over the course of 3 months,



unfortunately persists with radiculopathy and we send her for an MRI which reveals a mild disc herniation at L5.

We educate her that her prognosis is reassuring in that 90% of herniated disks improve without surgery. However, we need to consider some adjunct treatments which will lead us into... DUH DUH DUH.

#### **Objective 5.**

**In all patients with mechanical low back pain, discuss exercises and posture strategies to prevent recurrences**

#### **Chronic Back Pain Management** (annals of internal medicine/RX files)

Back pain is hard to treat and this can be frustrating for both patients and physicians. In terms of conservative non pharmacological treatment, some interventions that have good evidence include physiotherapy and exercise. We should also emphasize that active exercises are better than passive.

#### **But which exercises should we recommend to our patients?**

The Annals of Internal Medicine has a really fantastic article on this, that I will provide the link to in the show notes so you can review it at your leisure. This article reviewed the literature for different interventions for acute and chronic low back pain from everything from motor control exercises (which focus on restoring coordination, control and strength of muscles that control and support the spine), to Tai Chi, to yoga.

For simplicities sake, while some studies have shown benefit in terms of reducing pain and improving function, generally speaking, the quality of evidence for the benefit **among** different types of exercise is not great.

So instead of recommending one form of exercise specifically, I think it's important to emphasize two principles.

- 1) Find what works best for the patient and
- 2) recommend active exercise preferentially over passive treatments.

In addition to this, there are other interventions that patients will commonly ask about including massage, acupuncture and spinal manipulation. The evidence is not particularly clear cut and guidelines between the UK and US, which we base our guidelines on, are mixed.

- Massage
  - Moderate quality evidence: Small effect on improving short term pain relief and function.
- Acupuncture
  - Guidelines conflict



- moderate quality evidence.
- Spinal Manipulation
  - Low quality evidence some mild benefit. Moderate quality evidence: no difference.
  - May confer some short term benefit in function but not pain (Rubenstein et al. BMJ)
  - Some short term benefit for pain and function (Up to date)

Ultimately, the risk of harm is low but the risks of cost may be high. So if patients are able to afford them, they can give them a try with the education that these interventions may not improve things.

- Psychological Interventions such as CBT or mindfulness based stress reduction can be helpful to prevent development of chronic pain behaviour especially in the presence of yellow flags (RX files).
- What does have good evidence and what we should recommend is
  - Multidisciplinary therapy. So as a take away, get other team members involved.
- Things with no evidence that we should not recommend include
  - Bed rest
  - TENS and U/S.

Moving on to

- **Pharmacological therapy (CMAJ Article)**

CMAJ/RX Files

I think it's important to preface by saying that chronic low back pain can be incredibly difficult to treat.

In looking at formal guidelines and the differences in clinical practice I have observed in community, particularly from pain medicine specialists, the approach is not as algorithmic as one might hope.

This especially evident when it comes to pharmacologic treatment for chronic non-radicular back pain once we've trialed NSAIDS and muscle relaxants.

Perhaps, following these, what has the best evidence in the chronic back pain setting is the SNRI Duloxetine.

- What is generally not recommended, but you may encounter in practice and will change as we start to better understand the pathophysiology of backpain, include
  - Tylenol
  - Opioids
  - TCAs
  - Benzodiazepines
- **Injections and Surgical Intervention may also be considered.**



Outside of the primary care setting, patients can be referred for epidural and facet joint steroid injections and radiofrequency ablation. And if non operative treatment fails, surgery can be considered. But the specifics of that are outside of the scope of today's review.

### **Radicular Back Pain and Neurogenic Claudication (CMAJ)**

There are some additional treatment considerations for radicular pain and neurogenic claudication. Generally, it is not recommended to prescribe benzodiazepines or systemic corticosteroids for radicular back pain and neurogenic claudication.

However, other things that you will invariably see and hear about, with mixed evidence include.

- Anti convulsants eg. gabapentin, pregabalin
  - Evidence is mixed. However, it can be trialed in patients with neurologic symptoms to see if it benefits the patient and if it does, its efficacy should be periodically reassessed, and you should only prescribe the lowest effective dose.
- TCAs, eg. amitriptyline
- Opioids
  - Although US guidelines suggest they can possibly use as last resort, It is generally thought that the harms likely exceed the benefit and patients must be carefully selected particularly for risk of diversion, abuse and misuse.

Beyond that, for radicular pain, you can consider epidural steroid Injections. And again, if conservative management fails, surgery.

#### **Case:**

For Amanda, after 6 months of trialing a multidisciplinary approach including physio, NSAIDs and mindfulness, she has had a marked improvement and while she may experience mild flairs from time to time, she is able to continue her work as a SAR -TECH.

#### **Recap**

I think it cannot be emphasized more that each patient's journey with back pain is unique and their treatments will have to reflect that.

To summarize, in the patient presenting with acute back pain, make sure to assess for red and yellow flags, and investigate for pathology requiring immediate imaging or intervention including cauda equina, malignancy and infection.

Particularly from a pain management perspective, we should educate patients on the likelihood of resolution and positive prognosis, and emphasize to them that maintaining activity and active exercise is vital.

Assuming they have a good GI and renal profile, they can trial NSAIDS for pain relief which can be advanced to muscle relaxants. In the chronic setting, we should recommend continued active exercise, a



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multidisciplinary approach, and advance analgesia accordingly likely in consultation with your local pain medicine service.

**Annals of Internal Medicine Article 2017: Guidelines from the American college of physicians**

<https://www.acpjournals.org/doi/10.7326/M16-2367>

**CFPC Low Back Pain Guidelines**

[https://www.cfpc.ca/CFPC/media/Resources/Pain-Management/Low\\_Back\\_Pain\\_Guidelines\\_Oct19.pdf](https://www.cfpc.ca/CFPC/media/Resources/Pain-Management/Low_Back_Pain_Guidelines_Oct19.pdf)

**Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomised controlled trials**

<https://www.bmj.com/content/bmj/364/bmj.l689.full.pdf>

**Subacute and chronic low back pain nonpharmacologic and pharmacologic treatment**

[https://www.uptodate.com/contents/subacute-and-chronic-low-back-pain-nonpharmacologic-and-pharmacologic-treatment?search=chronic%20back%20pain%20treatment&source=search\\_result&selectedTitle=1~150&usage\\_type=default&display\\_rank=1#H1673450180](https://www.uptodate.com/contents/subacute-and-chronic-low-back-pain-nonpharmacologic-and-pharmacologic-treatment?search=chronic%20back%20pain%20treatment&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1#H1673450180)

**Rx Files: Back Pain**

<https://www.rxfiles.ca/rxfiles/uploads/documents/members/CHT-BackPain-2pg.pdf>