

Maintenance Care in clinical practice using the MAINTAIN tool

From guesswork to an evidence-informed
patient-centered clinical strategy

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The Nordic Maintenance Care Program

Important topic

Politically charged

An ambitious idea

A research program



The Swedish trial

Randomized controlled trial

12-month follow-up period

Two treatment arms

- Maintenance Care (Intervention)
- Symptom guided treatment (control)



Psychological sub-groups

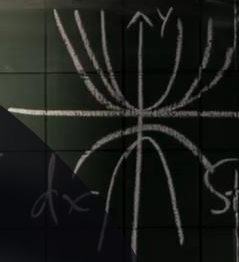
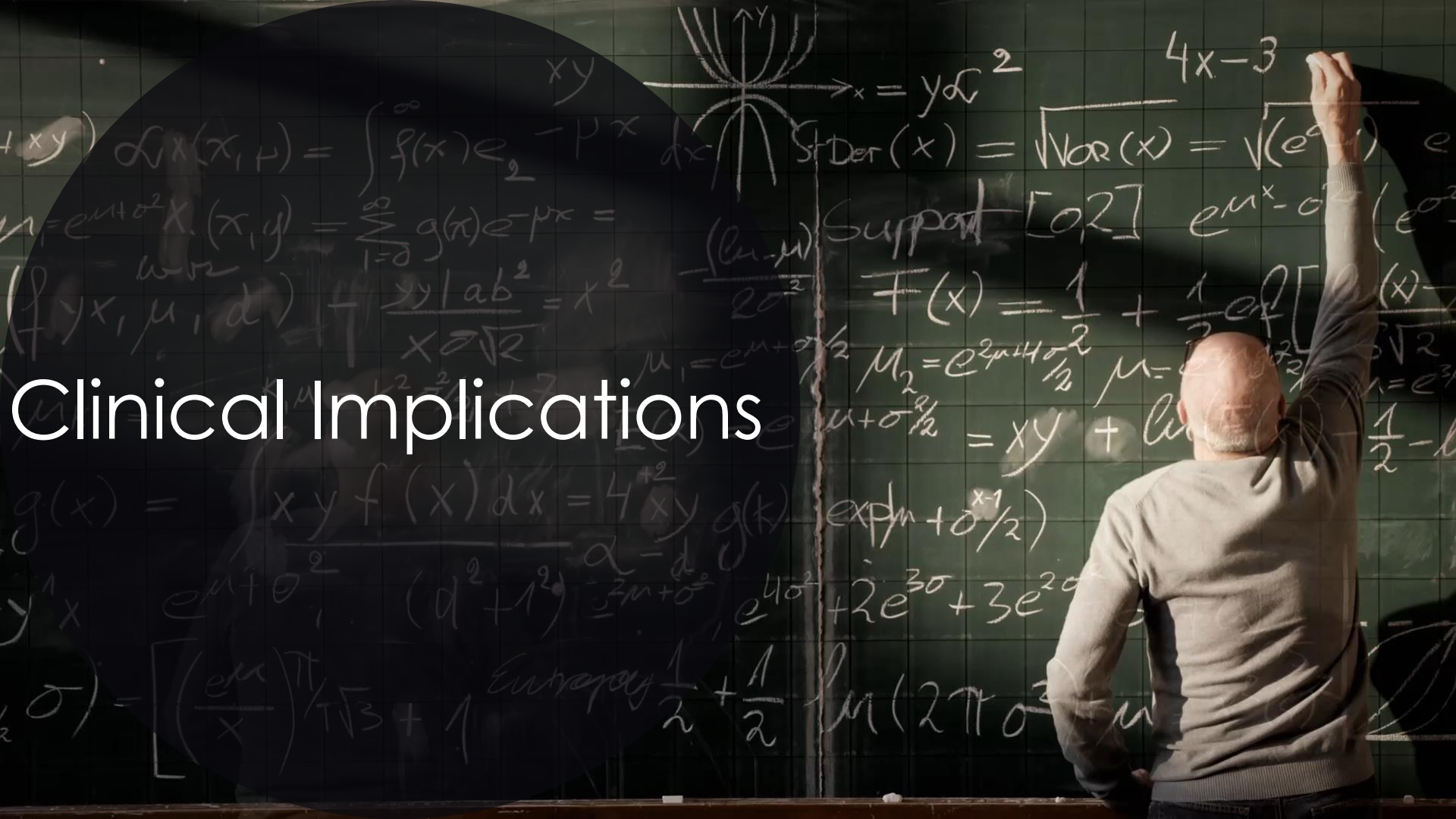
MPI-S (West Haven–Yale Multi Dimensional Pain Inventory)

- **Adaptive Copers (AC)**
- **Interpersonally Distressed (ID)**
- **Dysfunctional (DYS)**

**Cognitive behavioural
conceptualization of pain.**



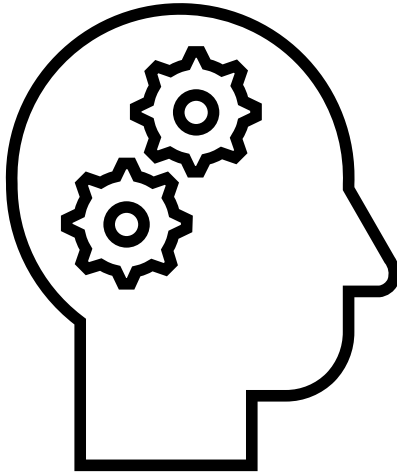
Clinical Implications



$$f(x) = \int_0^{\infty} f(x) e^{-px} dx$$
$$f(x) = \sum_{k=0}^{\infty} g(k) e^{-pk} =$$
$$f(x, \mu, \sigma) = \frac{1}{\sigma \sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$
$$g(x) = \frac{xy f(x) dx = 4^{x^2}}{(d^2 + 1)^{2m + \frac{1}{2}}}$$
$$\sigma = \left[\left(\frac{e^{\mu}}{x} \right)^{\frac{1}{3}} + 1 \right]$$

$$x = y^2$$
$$f(x) = \sqrt{\text{Var}(x)} = \sqrt{(e^{\mu})}$$
$$\text{Support } [0, 2]$$
$$F(x) = \frac{1}{2} + \frac{1}{2} e^{-x}$$
$$M_2 = e^{2\mu + \frac{\sigma^2}{2}}$$
$$\mu = \frac{1}{2} \ln(2\pi \sigma^2)$$
$$= xy + \ln(2\pi \sigma^2)$$
$$e^{2\mu + \frac{\sigma^2}{2}} = 2e^{3\mu} + 3e^{2\mu}$$
$$\ln(2\pi \sigma^2)$$

Clear patient profile where MC is appropriate



Recurrent and persistent LBP

- >30 days the previous 12 months.

Good initial effect from treatment

- 4th visit.

Focus on dysfunctional patients

- **MAINTAIN score** of 18 or more.
 - High severity
 - High interference with everyday life
 - High affective distress
 - Low perception of life control
 - Low activity levels

If taken into account, what can we expect?

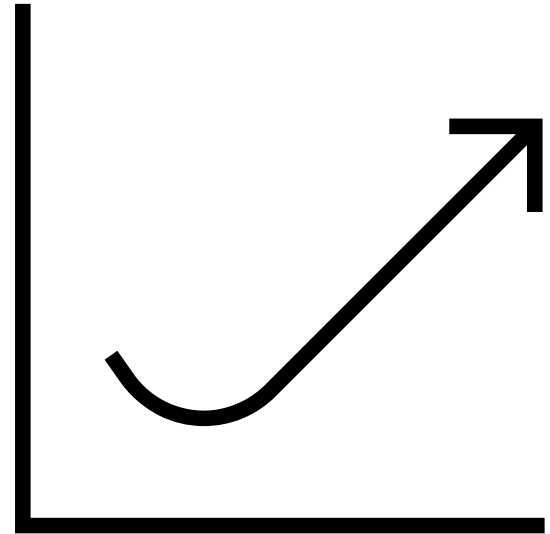
Fewer days with activity limiting pain (30 days).

More pain free weeks (10 weeks).

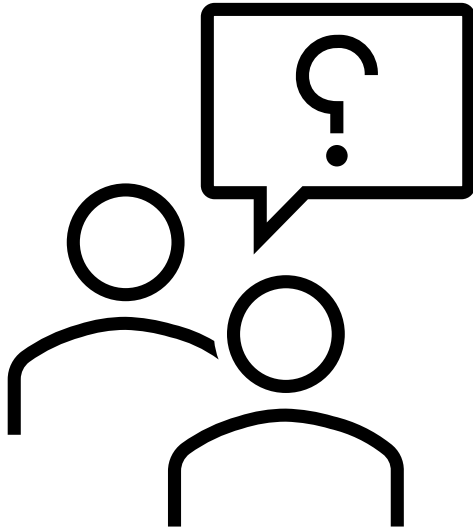
Less acute flare-ups.

Cost neutral from a patient perspective.

Cost saving from a societal perspective.



How do we identify DYS patients in clinic?



The original MPI instrument?

Other instruments?

Open interview/taking a case history?

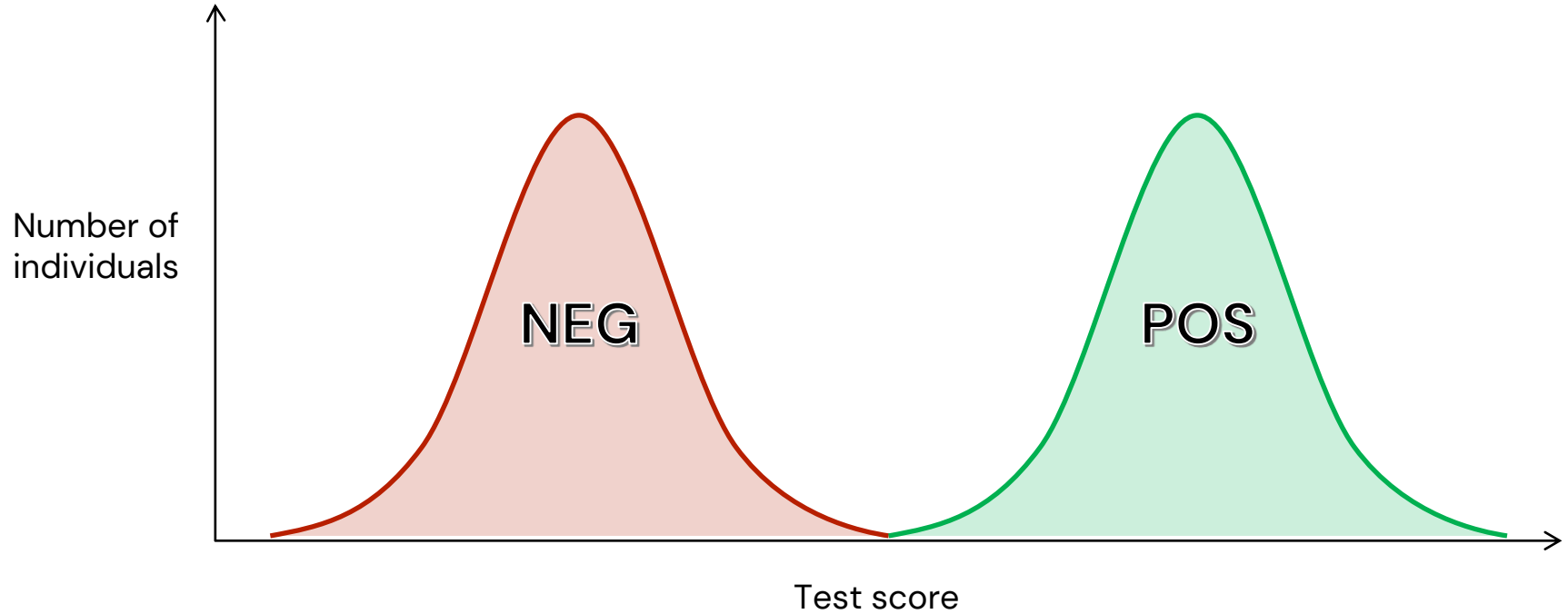
Structured case history?

It seems we need a new instrument!

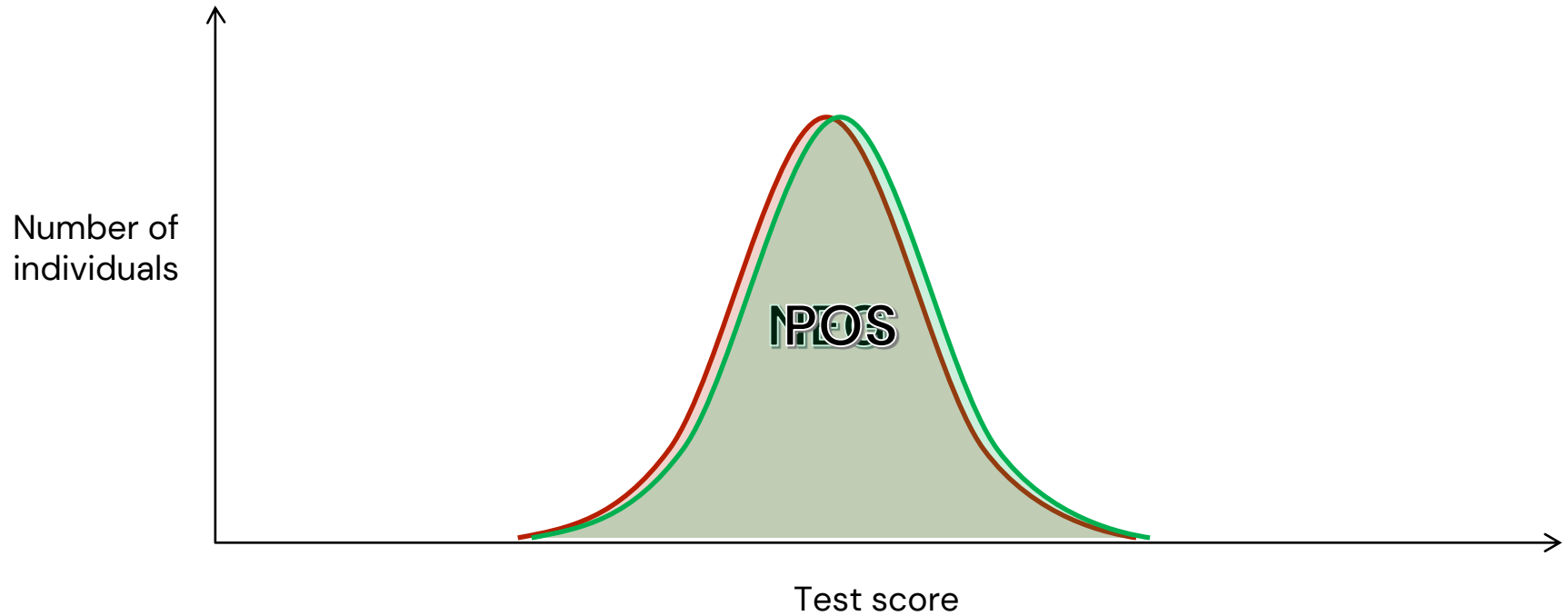


Clinical Instrument

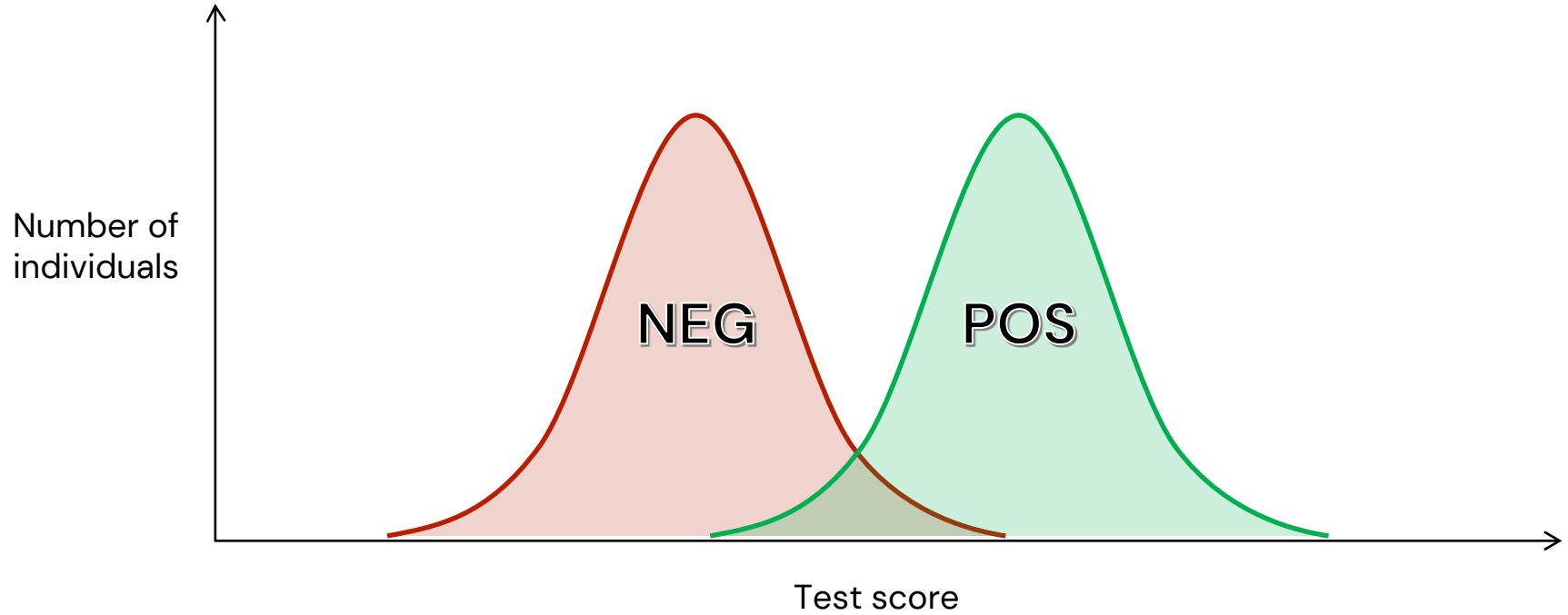
Perfect test



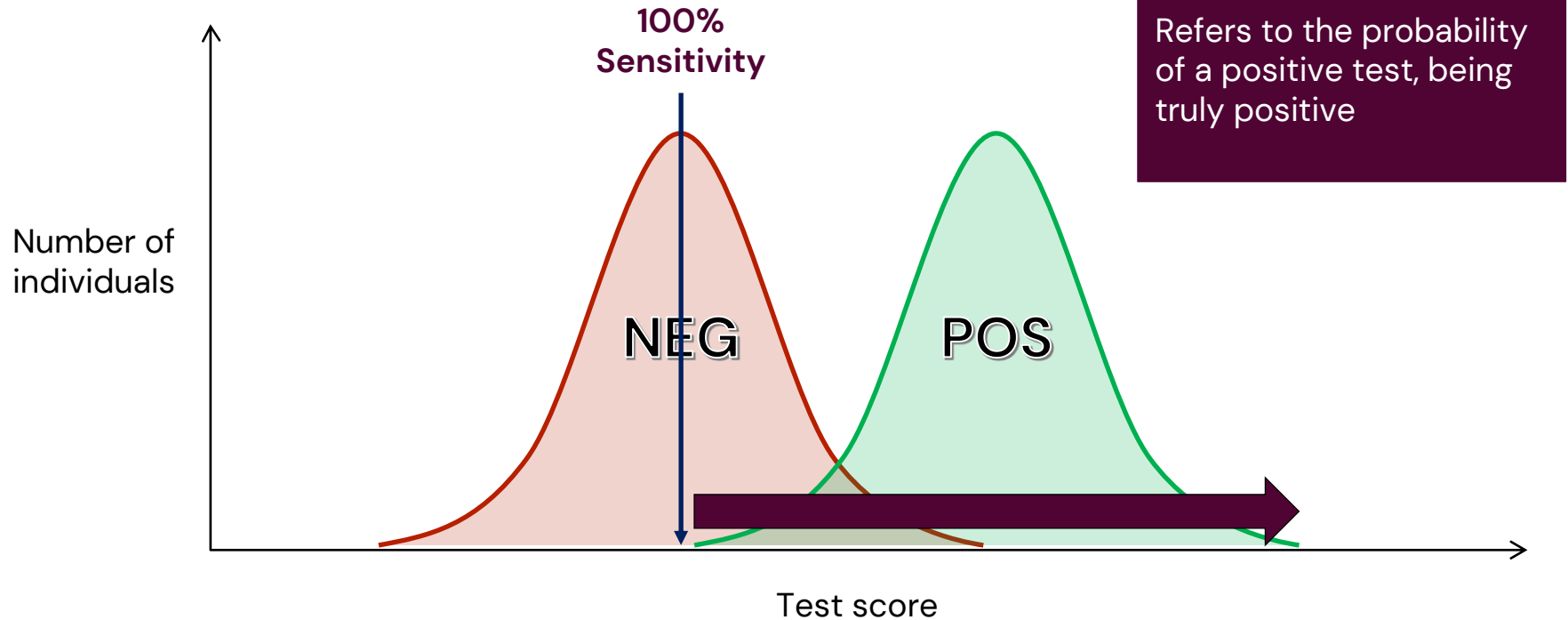
Useless test



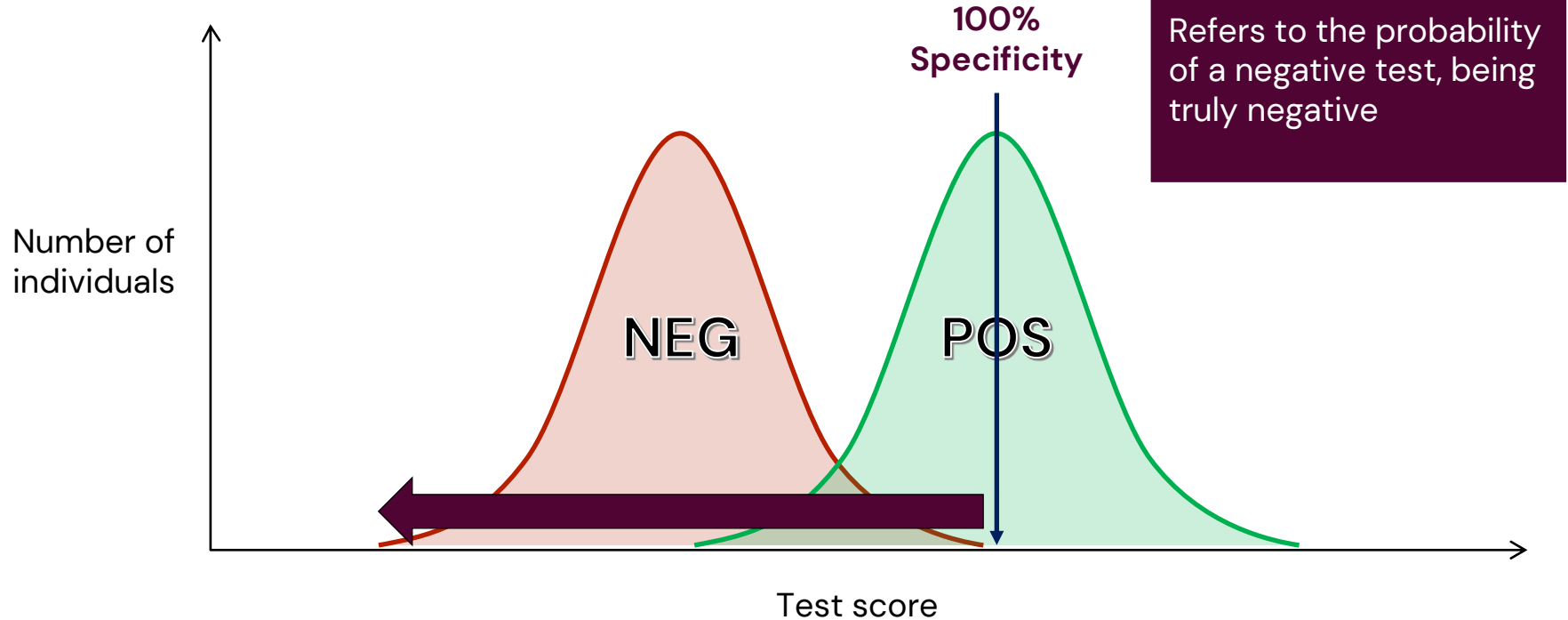
Reality



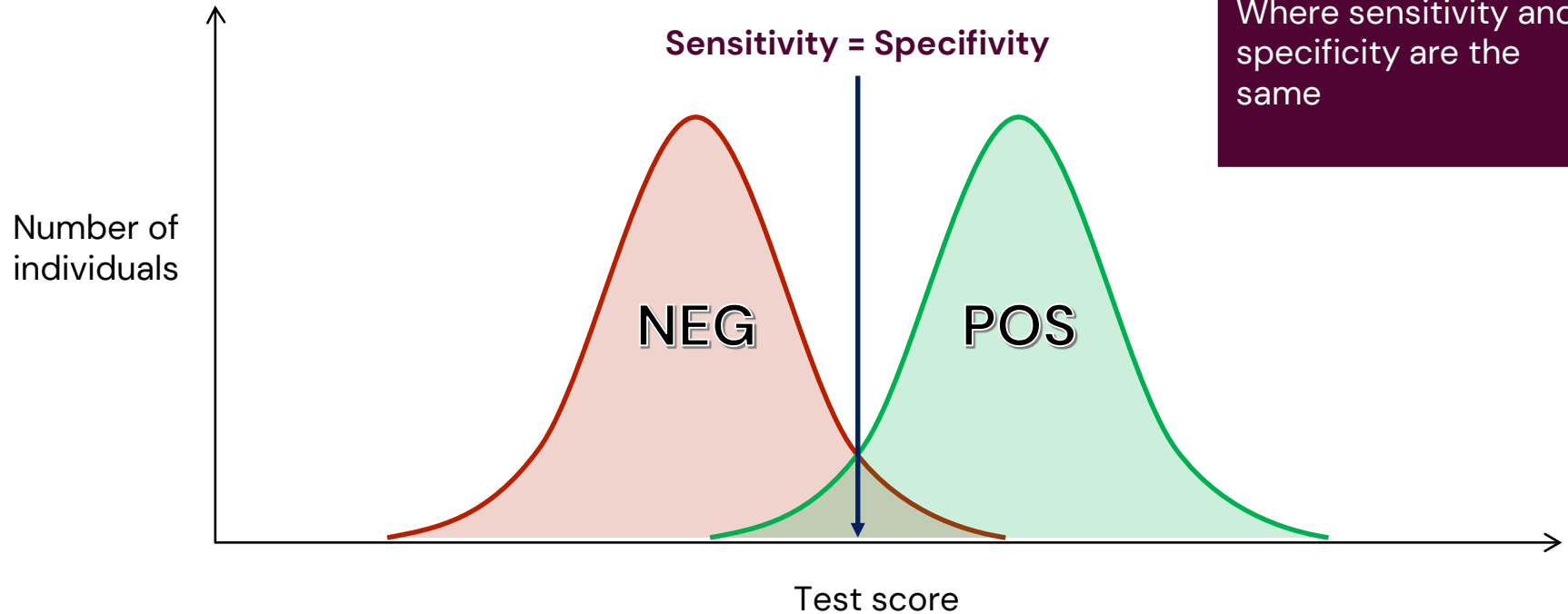
Sensitivity



Specificity

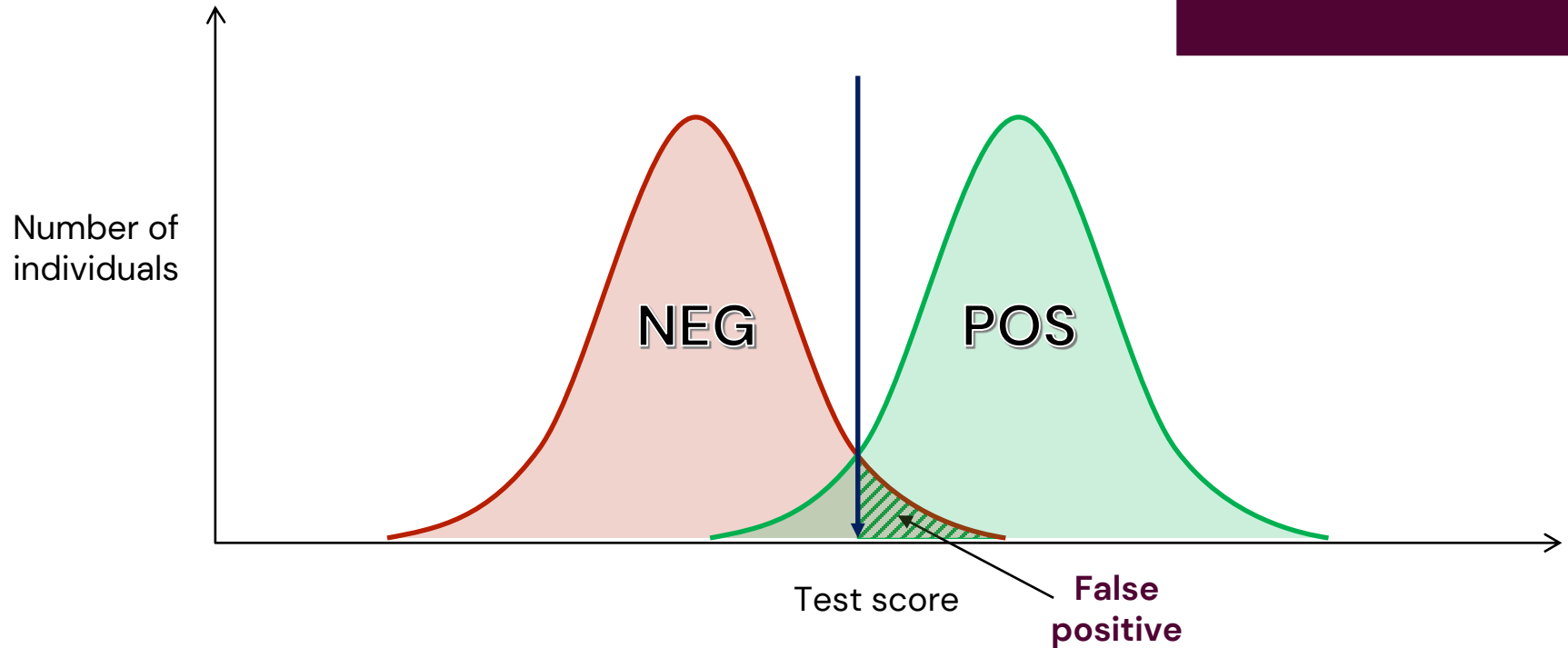


Equal weight



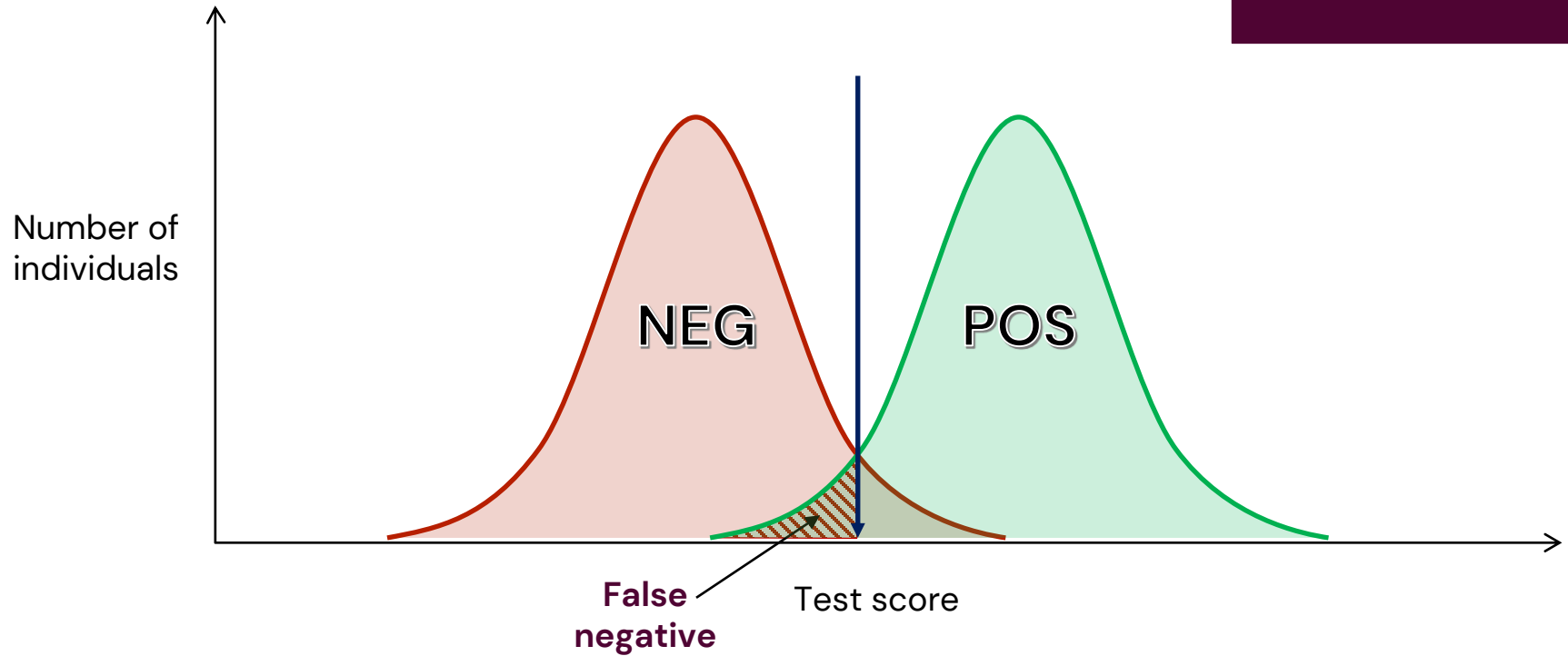
False positive test

Healthy people incorrectly identified as sick



False negative test

Sick people incorrectly identified as healthy



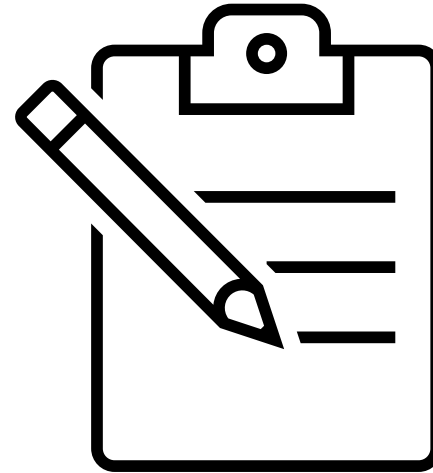
The MAINTAIN instrument

10 questions (0-6)

5 dimensions

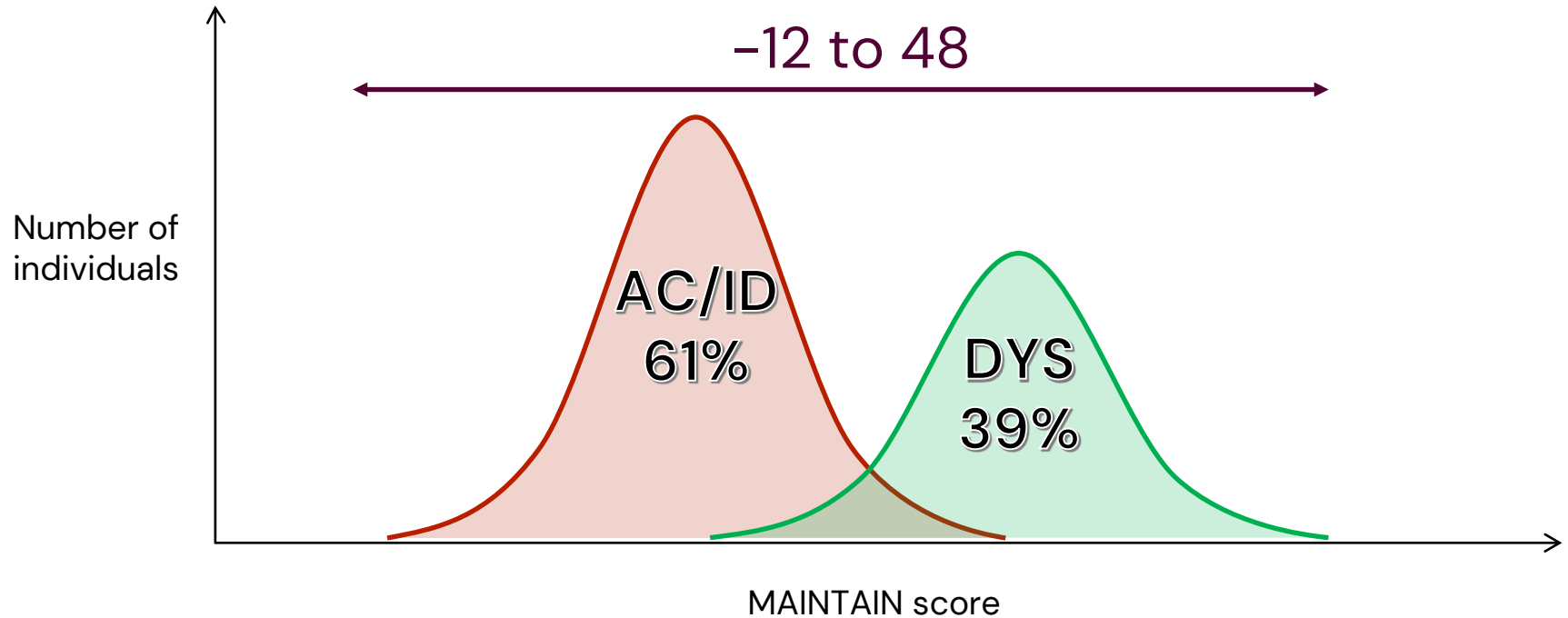
- Pain severity +
- Interference +
- Life control -
- Support +
- Affective distress +

Summary measure

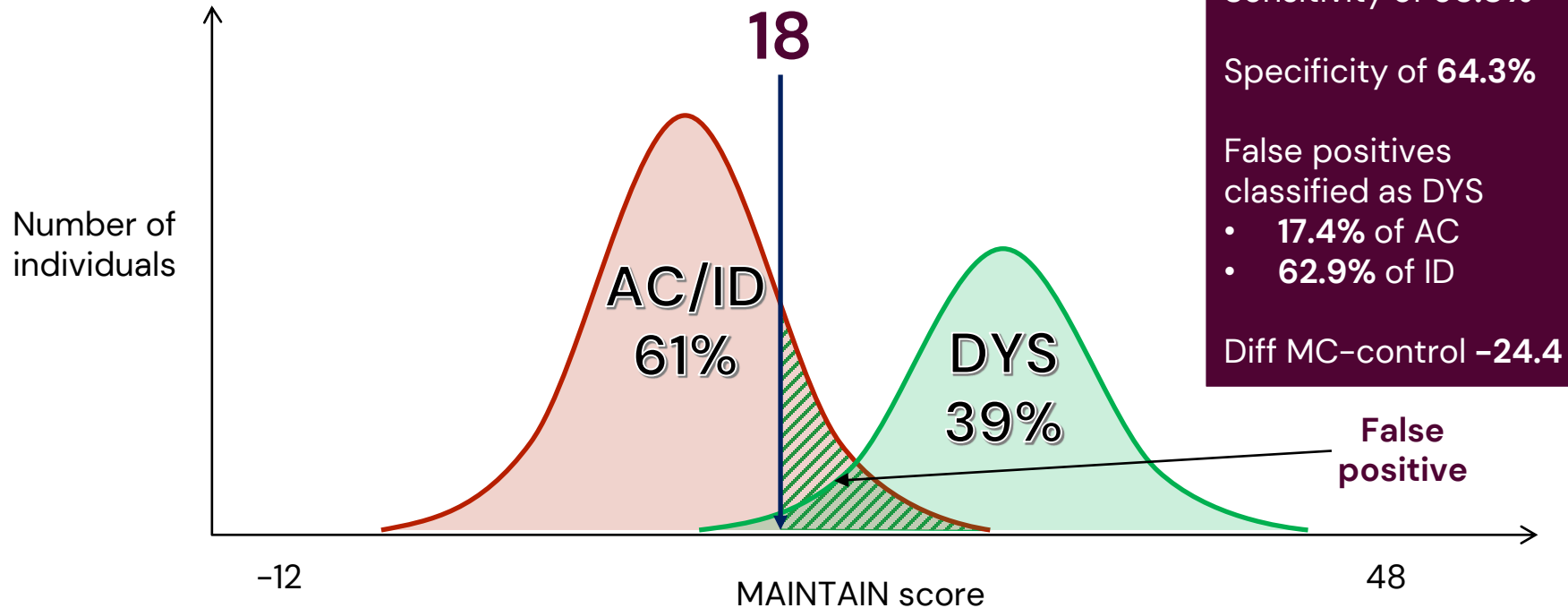


Eklund et. al. 2022. Chiropractic & Manual Therapies

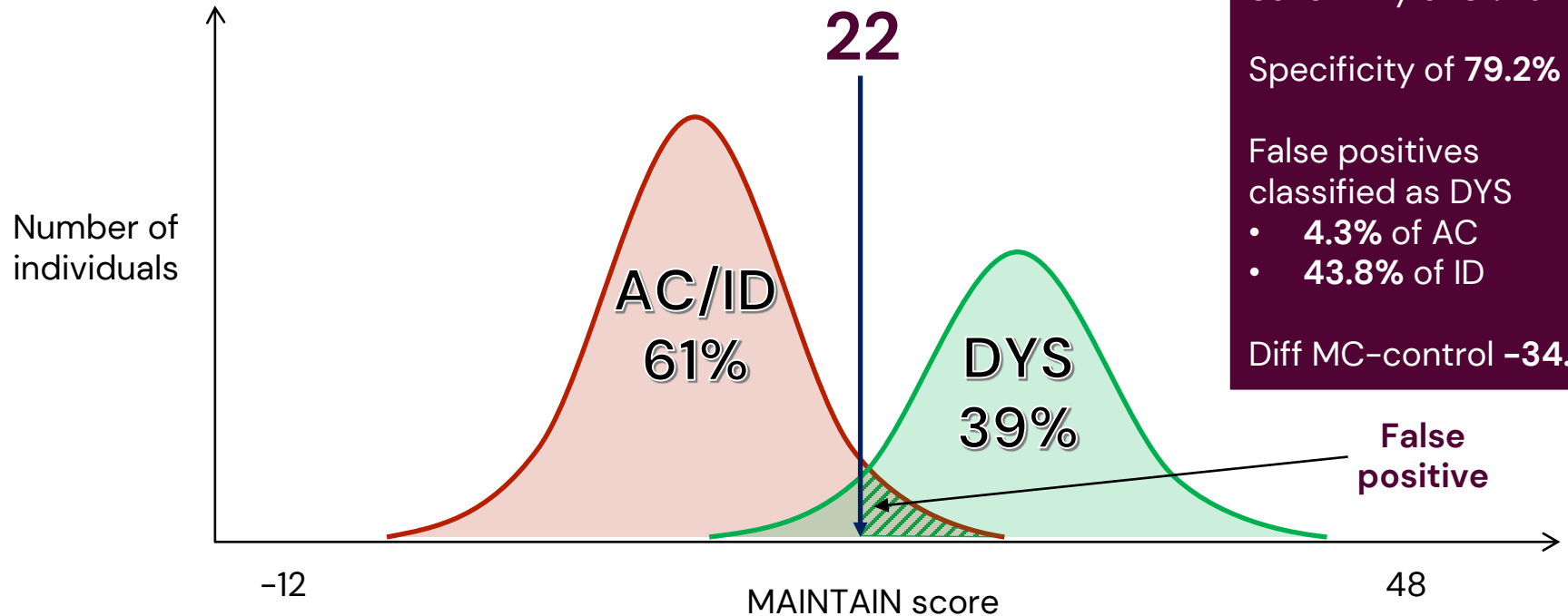
The MAINTAIN instrument



The lower threshold



The upper threshold



44% of sample
classified as DYS

Sensitivity of **81.1%**

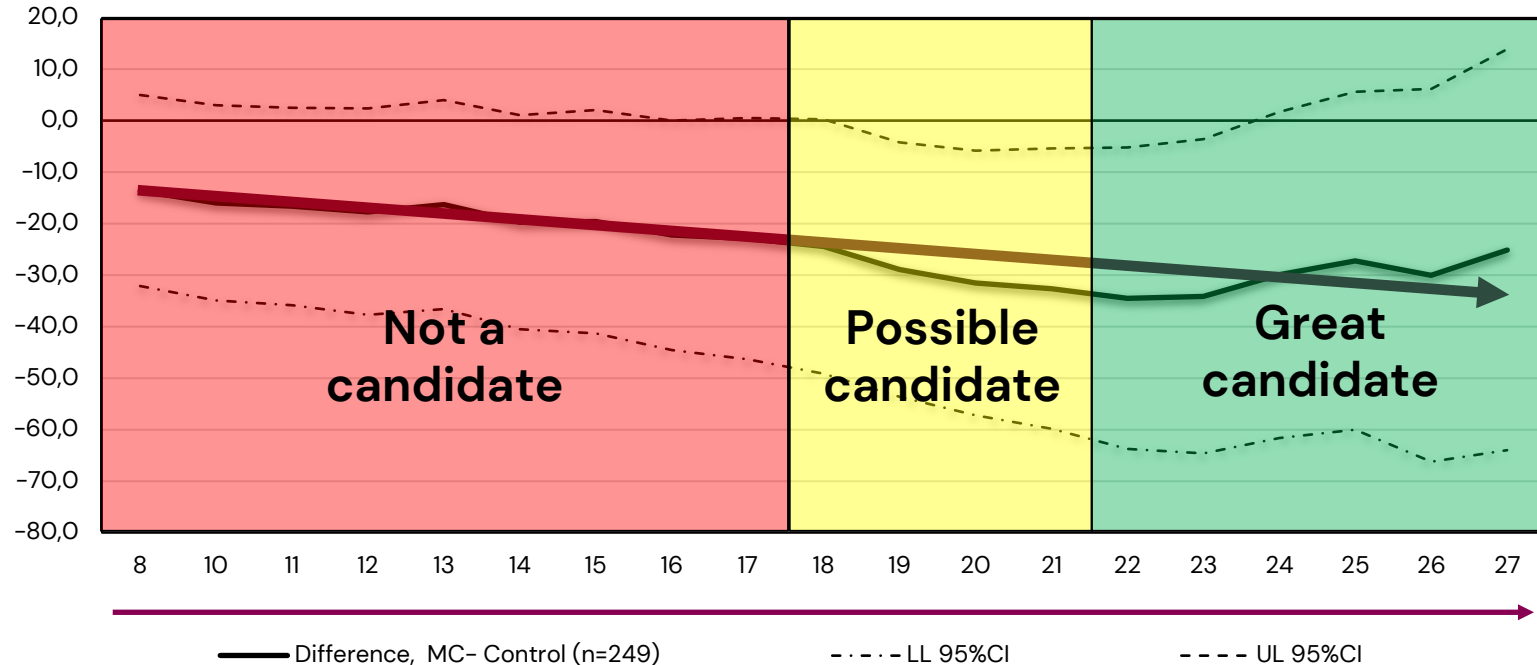
Specificity of **79.2%**

False positives
classified as DYS

- **4.3%** of AC
- **43.8%** of ID

Diff MC-control **-34.5**

Difference in total number of days with activity limiting LBP by MS



Using the MAINTAIN tool

Requires:

- **2 minutes** for patient to fill in.
- **1 minute** for clinician to score.


How to use:

- Administer before visit or during visit.
- MAINTAIN Score to classify patient
- Defining challenging areas.
- Adapt treatment plan accordingly.



The MAINTAIN instrument


In the following 13 questions, you will be asked to describe your pain and how it affects your life. Under each question it is asked to record pain answer. Read each question carefully and then check a number on the score under that question to indicate how that specific question applies to you.



1. How the level of your pain at the present moment?	Not at all 0 1 2 3 4 5 Extremely severe	0 1 2 3 4 5
2. How much has your pain changed the amount of satisfaction or enjoyment you get from participating in social and recreational activities?	No change 0 1 2 3 4 5 Extremely change	0 1 2 3 4 5
3. During the past week, how often or anxious have you been?	Not at all 0 1 2 3 4 5 Extremely often or anxious	0 1 2 3 4 5
4. How much has your pain changed your ability to participate in recreational and other social activities?	No change 0 1 2 3 4 5 Extremely change	0 1 2 3 4 5
5. During the past week, how much do you feel that you've been able to deal with your problems?	Not at all 0 1 2 3 4 5 Extremely well	0 1 2 3 4 5
6. On the average, how severe has your pain been during the last week?	Not at all 0 1 2 3 4 5 Extremely severe	0 1 2 3 4 5
7. How supportive or helpful is your spouse (significant other) to you in relation to your pain?	Not at all 0 1 2 3 4 5 Extremely supportive	0 1 2 3 4 5
8. During the past week, how successful were you in coping with stressful situations in your life?	Not at all 0 1 2 3 4 5 Extremely successful	0 1 2 3 4 5
9. During the past week, how irritable have you been?	Not at all 0 1 2 3 4 5 Extremely irritable	0 1 2 3 4 5
10. How attentive is your spouse (significant other) to your pain problems?	Not at all 0 1 2 3 4 5 Extremely attentive	0 1 2 3 4 5

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Procedure




Consider the following questions when planning care for the long-term management of recurrent or persistent pain.

Question	Yes	No
1. Has the patient experienced the pain before (a. if recurrent)?	<input type="checkbox"/>	<input type="checkbox"/>
2. Has the patient experienced more than 30 days of pain the previous 12 months?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Does the patient have a Modified Score of 18 or more (yellow or green candidate) at the initial consultation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Do the patient request want to manual care (a clear improvement within the first 4 visits)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

- If the answers to the following 4 questions are YES consider maintenance care as part of a long term management of the patients spinal pain.
- Initially explore the feasibility of physical activity/exercise as the main intervention for the long term management.
- If a physical activity/exercise is not effective, not feasible or not preferred by the patient discuss maintenance care as a secondary (in addition to) or primary (instead of) management strategy depending on the patient's clinical status, life circumstances and preferences.
- If the patient scores 18-24, MC may be cost effective and should only be recommended if there is strong preference on behalf of the patient.
- If the patient scores 24-48, MC is likely effective and probably cost effective and can be recommended.
- Focus on reassuring and empowering messages with the aim of improving self-management strategies and life control while reducing knowledge, anxiety and catastrophic thought patterns.

Developing a treatment plan



In addition to generating a maintain score the scores on the individual questions can be used to identify specifically challenging areas to build the treatment plan around. Identify in which of the domains has the highest score i.e. where the condition has the largest negative impact on the patient's quality of life. Use further probing questions to deepen the understanding to identify how, why, and when they experience this as a problem.

• Pain Severity (questions 1 and 6) <ul style="list-style-type: none">o When do they experience the pain/what does the impetuous look like?o When is it worse/best?o What activities are affected?
• Interference (questions 2 and 4) How and when the pain affects their: <ul style="list-style-type: none">o Ability to work?o Ability to perform hobbies, activities, and level of activity?o Ability to household work, social activities, relationships (family, friends, co-workers)?o Ability to plan activities?o Ability to experience ambivalence?o Fear of movement (fearless the problem will get worse with lack of activity/rest)?
• Life Control (questions 7 and 8) How and when the pain affects their ability to: <ul style="list-style-type: none">o Control the help they?o Handle everyday problems and stressful situations?o Manage (control) your work and personal, domestic, behaviors or medications?
• Effects (questions 9 and 10) How and when the patient experience: <ul style="list-style-type: none">o Alcohol/medication use is effective?o Get increased and relaxed?o Get worried or scared?
• Support (questions 7 and 10) when and how significant others: <ul style="list-style-type: none">o Support the patient when there is a specific need?o Consider the needs of the patient?

Together with the patient discuss how to solve these issues. Use the solutions as an integral part of the treatment plan. Use these items along with other outcomes as a means to explore effectiveness of the care plan.

In the following 10 questions, you will be asked to describe your pain and how it affects your life. Under each question is a scale to record your answer. Read each question carefully and then check a number on the scale under that question to indicate how that specific question applies to you.



1. Rate the level of your pain at the present moment. No pain <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Very intense pain 0 1 2 3 4 5 6	+
2. How much has your pain changed the amount of satisfaction or enjoyment you get from participating in social and recreational activities? No change <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extreme change 0 1 2 3 4 5 6	+ I
3. During the past week, how tense or anxious have you been? Not at all tense or anxious <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extremely tense or anxious 0 1 2 3 4 5 6	+ AD
4. How much has your pain changed your ability to participate in recreational and other social activities? No change <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extreme change 0 1 2 3 4 5 6	+ I
5. During the past week, how much do you feel that you've been able to deal with your problems? Not at all <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extremely well 0 1 2 3 4 5 6	- LC
6. On the average, how severe has your pain been during the last week? Not at all severe <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extremely severe 0 1 2 3 4 5 6	+ PS
7. How supportive or helpful is your spouse (significant other) to you in relation to your pain? Not at all supportive <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extremely supportive 0 1 2 3 4 5 6	+ S
8. During the past week, how successful were you in coping with stressful situations in your life? Not at all successful <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extremely successful 0 1 2 3 4 5 6	- LC
9. During the past week, how irritable have you been? Not at all irritable <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extremely irritable 0 1 2 3 4 5 6	+ AD
10. How attentive is your spouse (significant other) to your pain problem? Not at all attentive <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Extremely attentive 0 1 2 3 4 5 6	+ S
-12 - 17 = Red, 18 - 21 = Yellow, 22 - 48 = Green Total:	



Procedure

Consider the following questions when planning care for the long-term management of recurrent or persistent spinal pain.

Question	Yes	No
1. Has the patient experienced the pain before (is it recurrent)?	✓	
2. Has the patient experienced more than 30 days of pain the previous 12 months?	✓	
3. Does the patient have a Maintain Score of 18 or more (yellow or green candidate) at the initial consultation?	✓	
4. Do the patient respond well to manual care (a clear improvement within the first 4 visits)?	✓	

- If the answers to the following 4 questions are YES consider maintenance care as part of a long-term management of the patients spinal pain.
- Initially explore the feasibility of physical activity/exercise as the main intervention for the long-term management.
- If a physical activity/exercise is not effective, not feasible or not preferred by the patient discuss maintenance care as a secondary (in addition to) or primary (instead of) management strategy depending on the patient's clinical status, life circumstances and preferences.
- If the patient scores 18-21, MC may be cost effective and should only be recommended if there is strong preference on behalf of the patient.
- If the patient scores 22-48, MC is likely effective and probably cost-effective and can be recommended.
- Focus on reassuring and empowering messages with the aim of improving self-management strategies and life control while reducing kinesofobia, anxiety and catastrophic thought patterns.

Developing a treatment plan

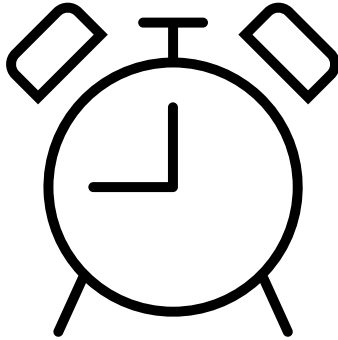


In addition to generating a maintain score the scores on the individual questions can be used to identify specifically challenging areas to build the treatment plan around. Identify in which of the 5 domains has the highest scores i.e. where the condition has the largest negative impact on the patient's quality of life. Use further probing questions to deepen the understanding by identify how, why, and when they experience this as a problem.

- **Pain Severity (questions 1 and 6)**
 - *When do they experience the pain/what does the trajectory look like?*
 - *When is it worst/best?*
 - *What alleviates/provokes?*
- **Interference (questions 2 and 4);** how and when the pain affects the:
 - *Ability to work?*
 - *Ability to perform hobbies, activities, and level of activity?*
 - *Ability to household work, social activities, relationships (family, friends, co-workers)?*
 - *Ability to plan activities?*
 - *Ability to experience satisfaction/joy?*
 - *Fear of movement (believes the problem will get worse with load/activities/work)?*
- **Life Control (questions 5 and 8);** how and when the pain affects the ability to:
 - *Control the daily life?*
 - *Handle everyday problems and stressful situations?*
 - *Control/manage pain with exercises, movement, behaviors, or medication?*
- **Affective Distress (questions 3 and 9),** how and when the patients/patient:
 - *Mood/emotional state is affected?*
 - *Gets irritated and tensed?*
 - *Gets worried or scared?*
- **Support (questions 7 and 10),** when and how significant others:
 - *Support the patient when there is a specific need?*
 - *Considers the needs of the patient?*

Together with the patient discuss how to solve these issues. Use the solutions as an integral part of the treatment plan. Use these items along with other outcomes as a means to explore effectiveness of the care plan.

When and how?



Exercise and self-management first!

If active strategies are **not effective** or **not feasible**, consider MC.

Focus on:

- Reduction of fear
- Empowerment
- Improving coping strategies
- Increased activity

Transition from DYS to AC perhaps the core objective?

Provide **high-value care!**

- Care that improves quality of life!
- Care that is structured, accessible & appreciated!
- Care that is patient centered!

Scoring exercise

Work in pairs.

If you have low back pain relate to that when you score.

If you don't, make up a fictive case.

- Think about why you are scoring each dimension at that specific level.

When finished give the sheet to your partner to score.

- Summary score
- Dimensions

Interview your partner

- Ask about the specific challenges relating to each dimension.

Patient specific functional scale

Focus on the affected dimensions you have identified.

Define challenging activities related to the dimensions.

Access the degree of the challenge using the NRS-10 scale.

Repeat until enough activities have been identified to capture all the affected dimensions.

Use as outcomes and record the degree of challenge at revisits/follow-ups

Case 1



A 42-year-old male carpenter presents with a four-year history of severe back pain that began by pushing a tool cart at work.

He characterizes his back pain as constant and severe. He also experiences sharp, stabbing pains radiating down both legs below the knee and complains of burning and numbness. He also notes that occasionally his legs will “give out”.

His initial MRI showed a L4–L5 central disc protrusion which led to a decompression surgery two years ago. The surgery did not change his symptoms; MRI studies have shown only degenerative disc changes and postoperative scarring at L4–L5. EMG and neurological exam are normal.

Since his initial injury, the patient has not worked. He ambulates with a single-point cane. Other than surgery, other treatments have included epidural and facet injections, medication trials, physical therapy, manipulation, and an outpatient pain program without relief.

MAINTAIN score, Case 1

Overall score:	38
Pain severity:	10
Interference:	11
Support:	9
Affective distress:	10
Life control:	2

1. How would you **interpret** the MAINTAIN score?
2. What could be the **treatment goals** for this patient?
3. What is the recommendation if the patient **responds well** to the initial treatment plan?
4. What is the recommendation if the patient **does not respond well** to the initial treatment plan?

1. How would you interpret the MAINTAIN score?

Overall score:	38
Pain severity:	10
Interference:	11
Support:	9
Affective distress:	10
Life control:	2


→ The overall score is over 22, red category.

Scores on all dimensions are high ≥ 6 (PS, I, S, AD) and < 6 (LC)

→ An extended case history is warranted to understand the consequences of pain in all dimensions.

2. What could be the treatment goals for this patient?

Overall score:	38
Pain severity:	10
Interference:	11
Support:	9
Affective distress:	10
Life control:	2



Challenging case with a high degree of psychological distress.

All dimensions have high scores.


Previous treatments were unsuccessful, including SMT.

Identify modifiable risk factors associated with each dimension.

Set functional treatment goals.

Active strategies are important.

3. What is the recommendation if the patient responds well to the initial treatment plan?

1. Recurrent pain
 2. +30 days past 12 months
 3. Red category (+22)
 4. Responds well to initial treatment plan (4th visit)
- 

If a physical activity/exercise is not effective, not feasible or not preferred by the patient discuss maintenance care as a secondary (in addition to) or primary (instead of) management strategy depending on the patient's clinical status, life circumstances and preferences.

MC is likely effective and probably cost-effective and can be recommended.

Focus on reassuring and empowering messages with the aim of improving self-management and life control while reducing kinesophobia, anxiety, and catastrophic thought patterns.

4. What is the recommendation if the patient does not respond well to the initial treatment plan?

1. Recurrent pain
2. +30 days past 12 months
3. Red category (+22)
4. Does not respond well to initial treatment plan (4th visit)

MC is likely not effective or cost-effective and should not be recommended.

Focus on physical activity/exercise.

Communicate reassuring and empowering messages with the aim of improving self-management and life control while reducing kinesiophobia, anxiety, and catastrophic thought patterns.

Co-manage with psychologist, physiotherapist and/or occupational therapist.

Case 2



A 46-year-old female software developer presents with a 5-year history of mild low back pain.

She experiences multiple flare-ups each year and has been out of work for the last month with a typical exacerbation.

She describes her pain as a constant dull pain with occasional sharp, stabbing pains in the upper axial lumbar region.

Her symptoms are improving overall. Neurological exam is normal, and imaging studies are unremarkable.

MAINTAIN score, Case 2

Overall score: **10**

Pain severity: **4**

Interference: **8**

Support: **4**

Affective distress: **4**

Life control: **10**

1. How would you **interpret** the MAINTAIN score?
2. What could be the **treatment goals** for this patient?
3. What is the recommendation if the patient **responds well** to the initial treatment plan?
4. What is the recommendation if the patient **does not respond well** to the initial treatment plan?

1. How would you interpret the MAINTAIN score?

Overall score:	10	→	The overall score is under 18, green category.
Pain severity:	4		
Interference:	8	↘	Scores on most dimensions are low (PS, S, AD) and high (LC). Interference score above 6.
Support:	4		
Affective distress:	4		Out of work du to pain?
Life control:	10		

2. What could be the treatment goals for this patient?

Overall score: **10**

Pain severity: **4**

Interference: **8**

Support: **4**

Affective distress: **4**

Life control: **10**

Ask about how and when the pain affects the:

- Ability to work?
- Ability to perform hobbies, activities, and level of activity?
- Ability to household work, social activities, relationships (family, friends, coworkers)?
- Ability to plan activities?
- Ability to experience satisfaction/joy?
- Fear of movement (believes the problem will get worse with load/activities/work)?

3. What is the recommendation if the patient responds well to the initial treatment plan?

1. Recurrent pain
2. +30 days past 12 months
3. Green category (-18)
4. Responds well to initial treatment plan (4th visit)


MC is likely not effective or cost-effective and should not be recommended. Short-term symptom-based care only.

Focus on physical activity/exercise to prevent the next recurrence.

Communicate reassuring and empowering messages.

Recommend the patient to come back for care the next episode as the treatment has been effective.

4. What is the recommendation if the patient does not respond well to the initial treatment plan?

1. Recurrent pain
 2. +30 days past 12 months
 3. Green category (-18)
 4. Does not respond well to initial treatment plan (4th visit)
- 

MC is likely not effective or cost-effective and should be recommended.

Focus on physical activity/exercise to prevent the next recurrence.

Communicate reassuring and empowering messages.

Try a different treatment strategy or recommend another healthcare provider the next episode as the treatment has been not been effective.

Case 3



A 35-year-old male postal worker supervisor complains of left sided low back pain radiating into the left calf. He reports onset after involvement in a motor vehicle accident nine months ago where he was t-boned at an intersection.

He characterizes his back and leg pain symptoms as moderate to severe, and that they have not improved over the last six months.

The patient has neurological deficits on exam. Recent lumbar MRI is unremarkable other than a central disc bulge at L5-S1.

Initially, the patient returned to work about 3 months post-accident but stopped working within three weeks after complaining of back and leg pain symptom aggravation with standing and walking at work.

MAINTAIN score, Case 3

Overall score:	20
Pain severity:	4
Interference:	5
Support:	10
Affective distress:	6
Life control:	5

1. How would you **interpret** the MAINTAIN score?
2. What could be the **treatment goals** for this patient?
3. What is the recommendation if the patient **responds well** to the initial treatment plan?
4. What is the recommendation if the patient **does not respond well** to the initial treatment plan?

1. How would you interpret the MAINTAIN score?

Overall score: **20**



The overall score is above 17 and below 22, yellow category.

Pain severity: **4**

Interference: **5**

Support: **10**

Affective distress: **6**



Scores on S, AD are high and LC low.

Life control: **5**

Support highest.

2. What could be the treatment goals for this patient?

Overall score: 20

Pain severity: 4

Interference: 5

Support: 10

Affective distress: 6

Life control: 5

Consider relationship to significant other:

- Support the patient when there is a specific need?
- Considers the needs of the patient?

Consider how and when the patients/patients:

- Mood/emotional state is affected?
- Gets irritated and tensed?
- Gets worried or scared?

Consider how and when the pain affects the ability to:

- Control daily life?
- Handle everyday problems and stressful situations?
- Control/manage pain with exercises, movement, behaviours, or medication?

3. What is the recommendation if the patient responds well to the initial treatment plan?

1. Recurrent pain
2. +30 days past 12 months
3. Yellow category (18-21)
4. Responds well to initial treatment plan (4th visit)

MC may be cost-effective and should only be recommended if there is a strong preference on behalf of the patient.

If a physical activity/exercise is not effective, not feasible or not preferred by the patient discuss maintenance care as a secondary (in addition to) or primary (instead of) management strategy depending on the patient's clinical status, life circumstances and preferences.

Communicate reassuring and empowering messages with the aim of improving self-management and life control while reducing kinesophobia, anxiety, and catastrophic thought patterns.

4. What is the recommendation if the patient does not respond well to the initial treatment plan?

1. Recurrent pain
2. +30 days past 12 months
3. Yellow category (18–21)
4. Does not respond well to initial treatment plan (4th visit)

MC is likely not effective or cost-effective and should be recommended.

Focus on physical activity/exercise.

Communicate reassuring and empowering messages with the aim of improving self-management and life control while reducing kinesiophobia, anxiety, and catastrophic thought patterns.

Try a different treatment strategy or recommend other providers the next episode as the treatment has been not been effective.

Final thoughts

The instrument needs to be administered when the patient is in pain.

The MAINTAIN instrument is a tool that assists in the clinical reasoning process.

The thresholds should not be used to diagnose but rather to guide decisions.

Consider the instrument a scale measuring how distressing/severe the pain is.

The patient should be considered as a whole in the process, not just a score.

The MAINTAIN instrument should improve patient-centeredness and deepen the relationship not the opposite.



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