

Measures for Patients with Chronic Musculoskeletal Pain: A Rapid Evidence Review

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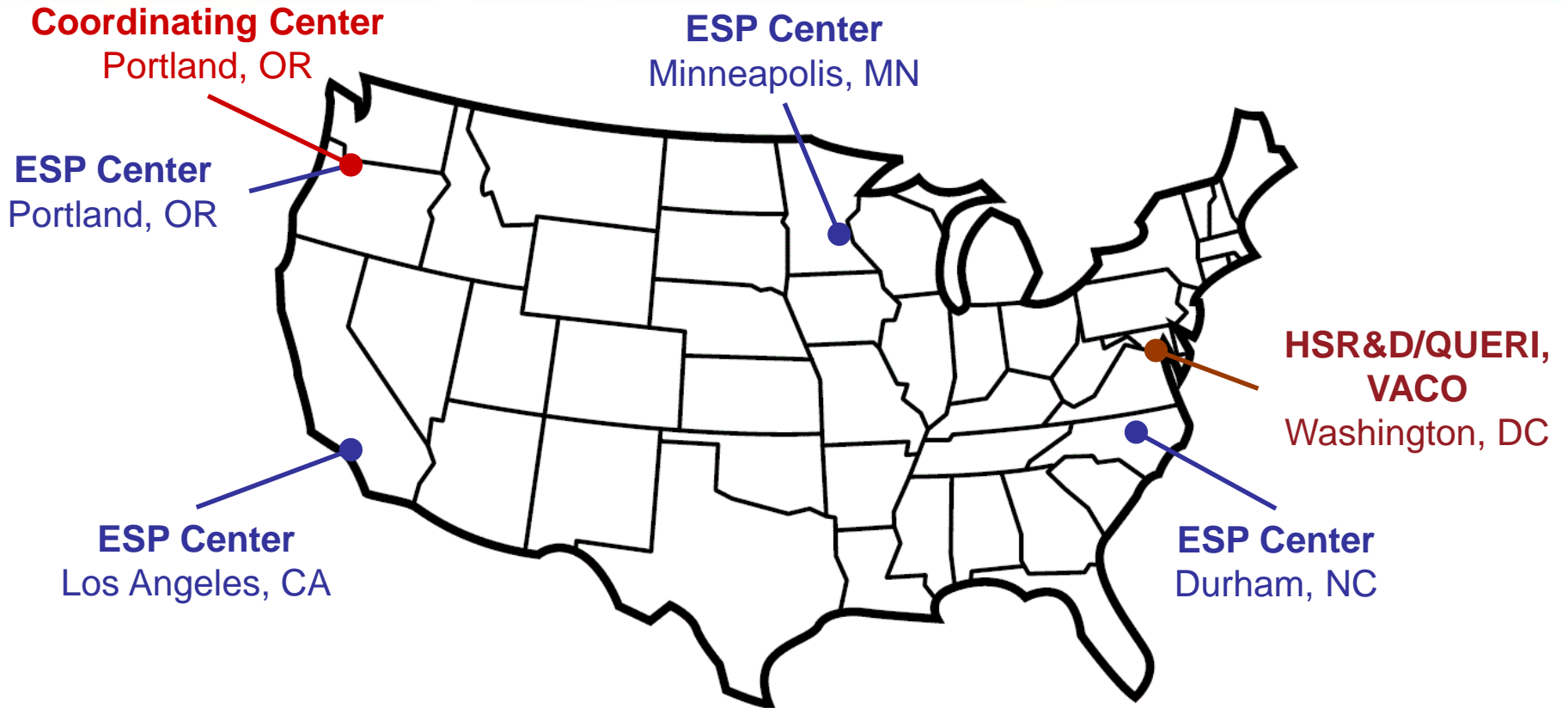
Disclosure

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VA Evidence-based Synthesis Program (ESP) Overview

- Sponsored by VA Office of Research and Development and the Quality Enhancement Research Initiative (QUERI)
- Goal: provide timely and accurate syntheses/reviews of healthcare topics identified by VA clinicians, managers, and policy-makers, to improve health of Veterans.
- Builds on staff and expertise in place at the Evidence-based Practice Centers (EPC) designated by AHRQ. Four of these EPCs are also ESP Centers.

ESP Center Locations



VA Evidence-based Synthesis Program (ESP) Overview

- Provides evidence syntheses on important clinical practice topics relevant to Veterans. These reports help:
 - develop clinical policies informed by evidence;
 - the implementation of effective services to improve patient outcomes and to support VA clinical practice guidelines and performance measures; and
 - guide the direction of future research to address gaps in clinical knowledge.
- Broad topic nomination process – *eg*, VACO, VISNs, field staff – facilitated by the ESP Coordinating Center (Portland):
<http://www.hsrd.research.va.gov/publications/esp/TopicNominationForm.pdf>

Current report

RAPID EVIDENCE REVIEW: MEASURES FOR PATIENTS WITH CHRONIC MUSCULOSKELETAL PAIN

(August 2017)

Full-length report available on ESP website:

<http://vaww.hsrd.research.va.gov/publications/esp/chronicpain-measures.cfm>

Poll question

What is your professional role in relation to chronic pain?
(*Select all that apply.*)

- Primary care clinician (RN, NP, MD/DO, PA, PT, pharm....)
- Mental health provider
- Specialty care clinician (PM&R, neurology...)
- Researcher
- Other (student, etc.)

Outline

- Background and motivation
- Methods and measures
 - with a *very brief* intro to psychometric properties
- Results (a few examples)
- Conclusions and take-homes

Background

The investigator who would study pain is at the mercy of the patient, upon whose ability and willingness to communicate he is dependent.

Lasagna, 1960 (by way of Cleeland 2004)

Lasagna L. *Ann NY Acad Sci* 1960; 86:28-37.

Cleeland C, Mendoza T. Presentation to IMMFACT Working Group, 2004.

Background

- Self-report is essential to measuring chronic pain
 - Patient-reported outcome (PRO)
- Pain intensity / severity
 - Commonly assessed in clinic
- Pain-related functional impairment
 - Important to patients
- Use of multiple measures recommended

Von Korff M. 2011. New York: Guilford Publications.

Dworkin RH et al. 2005. *Pain* 113(1-2): 9-19.

Taylor AM et al. 2016. *Pain* 157(9): 1836-1850.

Kemppi C et al. 2012. *J Rehabil Med* 44: 158–162.

Motivation



STATE OF THE ART CONFERENCE

**Non-pharmacological Approaches
to Chronic Musculoskeletal
Pain Management**

VA HSR&D

- Consistent core outcome measures would be useful in chronic musculoskeletal pain research in VA
- Psychometric data – data on measure properties like reliability and validity – are essential to measures' candidacy for wide implementation

Key question

- Which of **17 suggested measures** of pain intensity or pain-related functional impairment
- have sufficient evidence **with respect to psychometric properties**
 - Validity, test-retest reliability, responsiveness, minimal important difference (MID)
- to recommend their use as core outcome measures in research on nonpharmacological approaches to care
- for persons with chronic (≥ 3 months) musculoskeletal pain?

Patient-reported outcome measures

- Brief Pain Inventory ([BPI](#))
- Defense & Veterans Pain Rating Scale ([DVPRS](#))
- Graded Chronic Pain Scale ([GCPS](#))
- Hip Osteoarthritis Outcomes Scale ([HOOS](#))
- Knee Osteoarthritis Outcomes Scale ([KOOS](#))
- McGill Pain Questionnaire ([MPQ](#))
- West-Haven-Yale Multidimensional Pain Inventory ([WHYMPI/MPI](#))
- Numeric Rating Scale ([NRS](#))
- Oswestry Disability Index ([ODI](#))
- Patient Global Impression of Change ([PGIC](#))
- [PEG](#): A three-item scale assessing [P] pain intensity, [E] enjoyment of life, and [G] general activity
- Patient-Reported Outcomes Measurement Information System - Pain Interference ([PROMIS-PI](#))
- Roland-Morris Disability Questionnaire ([RMDQ](#))
- SF-36 Bodily Pain Scale ([SF-36 BPS](#))
- Visual Analogue Scale ([VAS](#))
- Western Ontario and McMaster Universities Arthritis Index ([WOMAC](#))
- [Wong-Baker Faces® Pain Rating Scale](#)

Brief Pain Inventory (BPI)

Severity

0 1 2 3 4 5 6 7 8 9 10
No pain Pain as bad as you can imagine

What number best describes...

1. your pain at its **worst** in the last week?
2. your pain at its **least** in the last week?
3. your pain on **average** in the last week?
4. how much pain you have **right now**?

Interference

0 1 2 3 4 5 6 7 8 9 10
Does not interfere Completely interferes

What number best describes how, in the last week, pain has interfered with your...

5. **general activity?**
6. **mood?**
7. **walking ability?**
8. **normal work** (includes both work outside the home as well as housework)?
9. **relations with other people?**
10. **sleep?**
11. **enjoyment of life?**

BPI and PEG

Severity

0 1 2 3 4 5 6 7 8 9 10
No Pain as bad
pain as you can
imagine

What number best describes...

1. your pain at its worst in the last week?
2. your pain at its least in the last week?
3. **your pain on average in the last week?**
4. how much pain you have right now?

Interference

0 1 2 3 4 5 6 7 8 9 10
Does not Completely
interfere interferes

What number best describes how, in the last week, pain has interfered with your...

5. **general activity?**
6. mood?
7. walking ability?
8. normal work (includes both work outside the home as well as housework)?
9. relations with other people?
10. sleep?
11. **enjoyment of life?**

BPI, PEG and NRS

Severity

0 1 2 3 4 5 6 7 8 9 10

No
pain

Pain as bad
as you can
imagine

What number best describes...

1. your pain at its worst in the last week?
2. your pain at its least in the last week?
3. **your pain on average in the last week?**
4. how much pain you have right now?

Interference

0 1 2 3 4 5 6 7 8 9 10

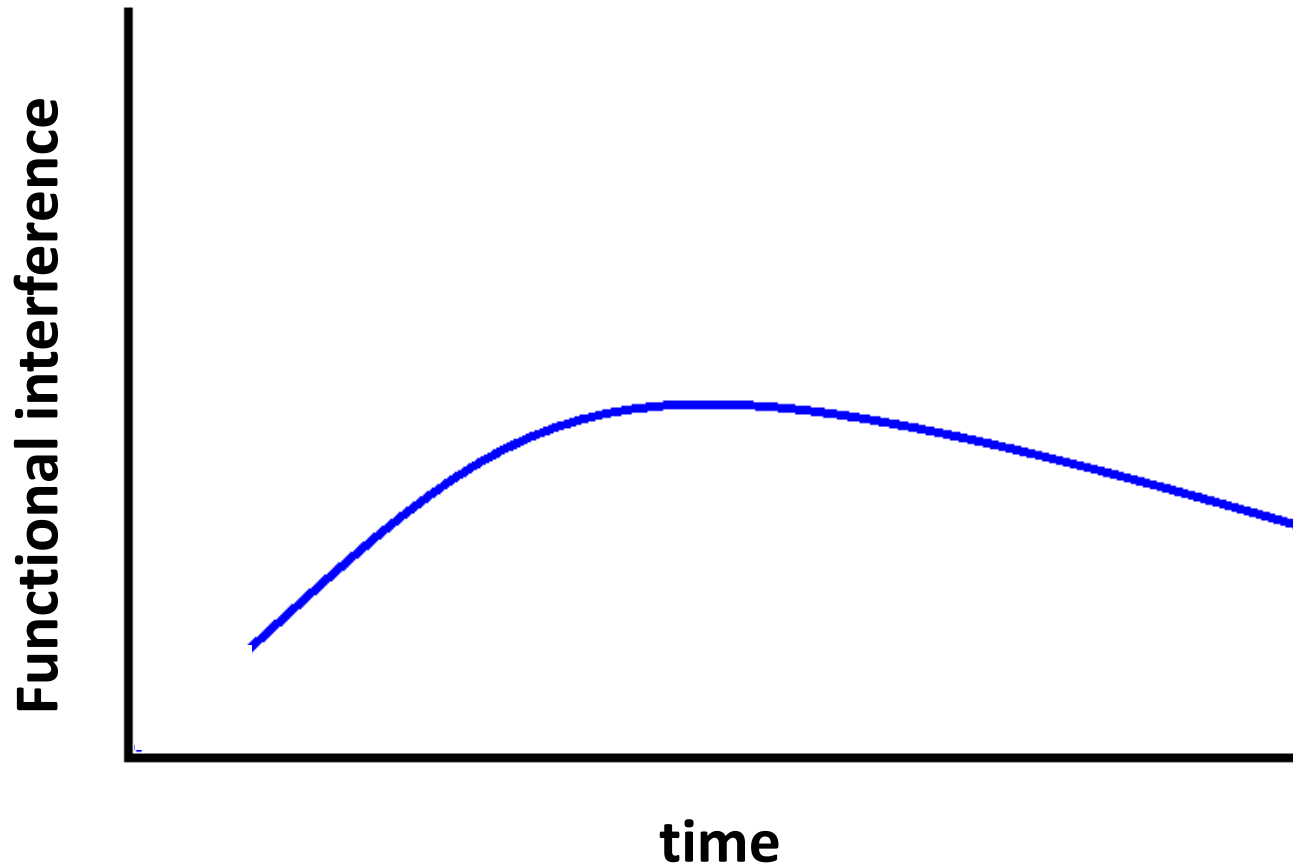
Does not
interfere

Completely
interferes

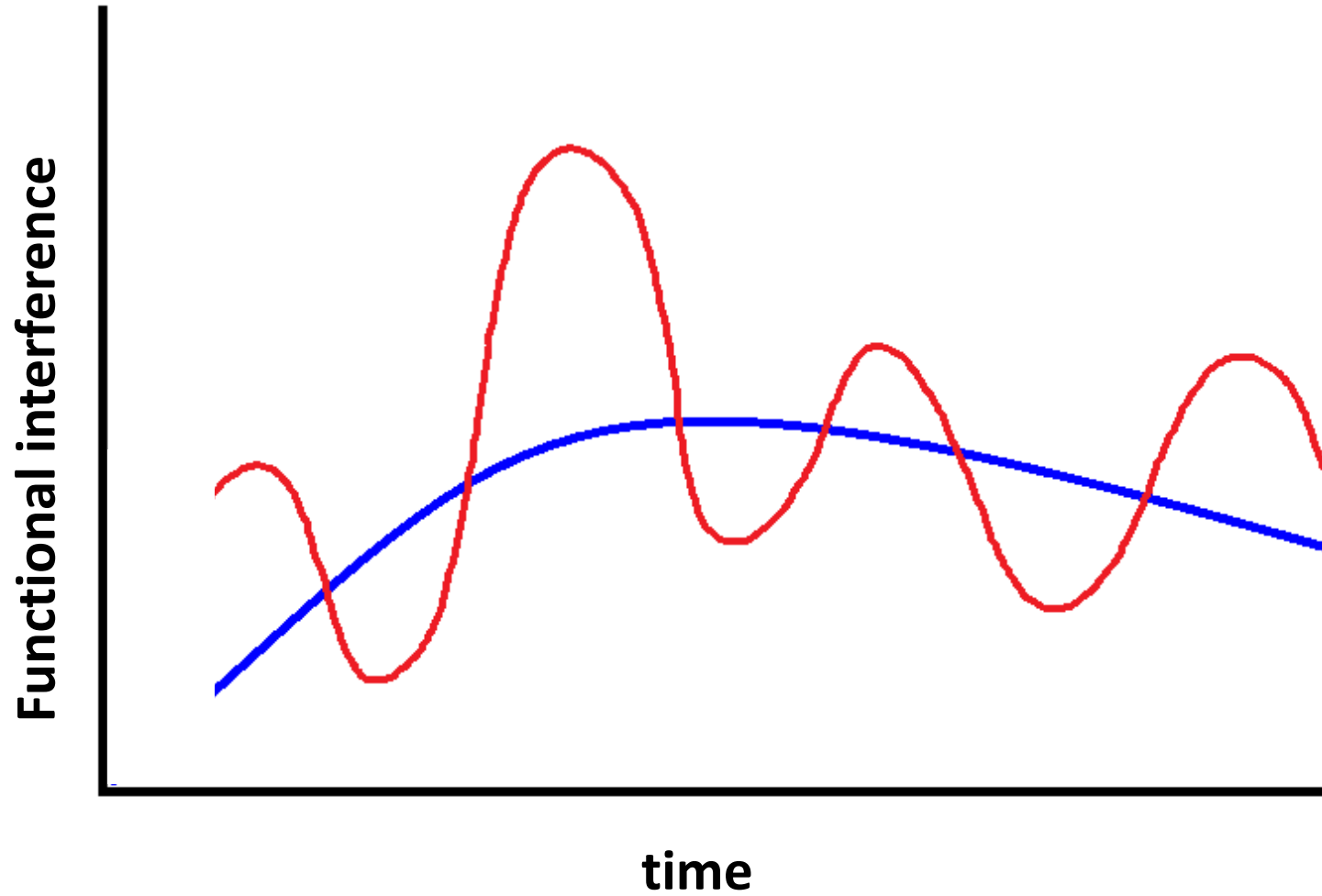
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9. relations with other people?
10. sleep?
11. enjoyment of life?

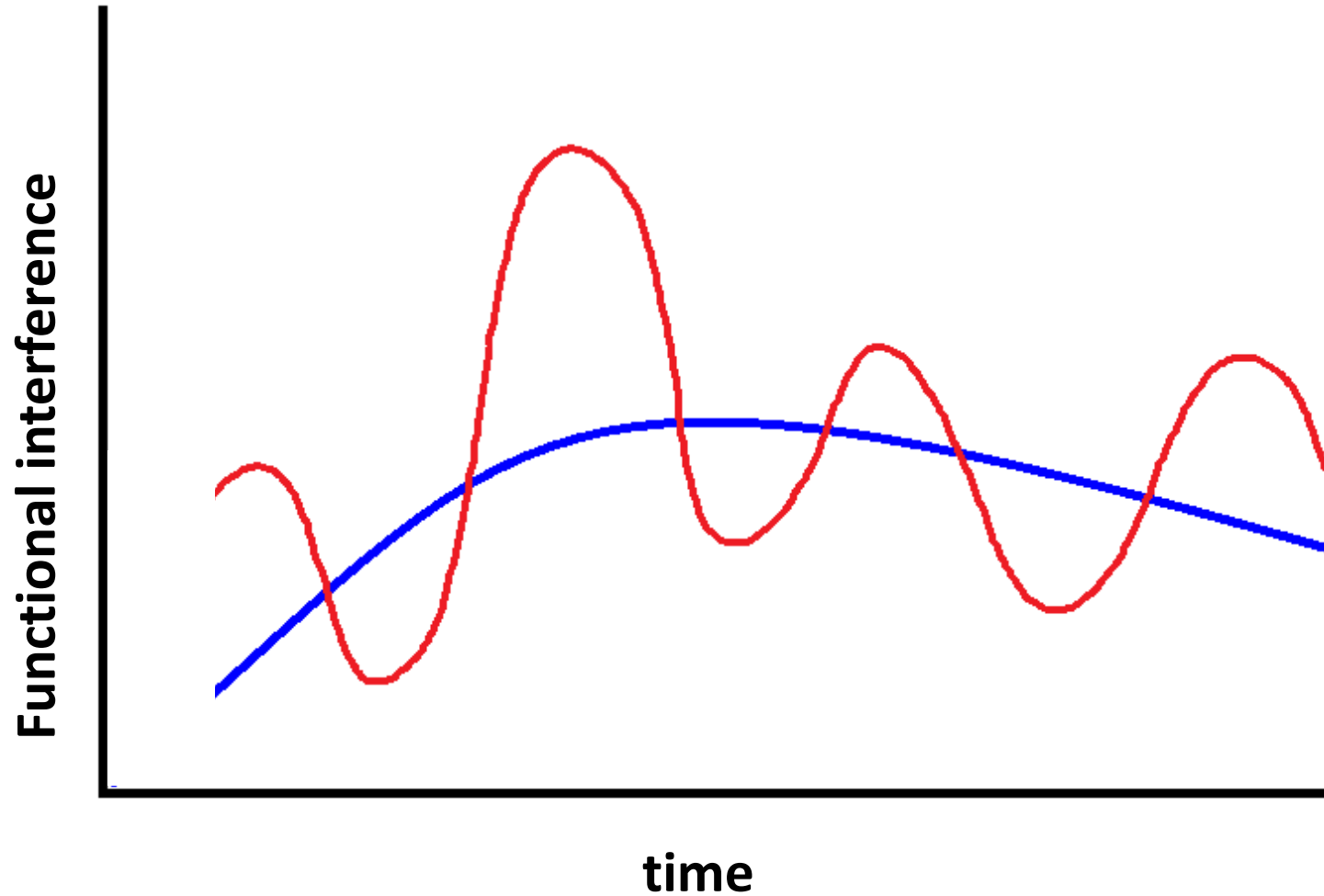
Pain and psychometric properties



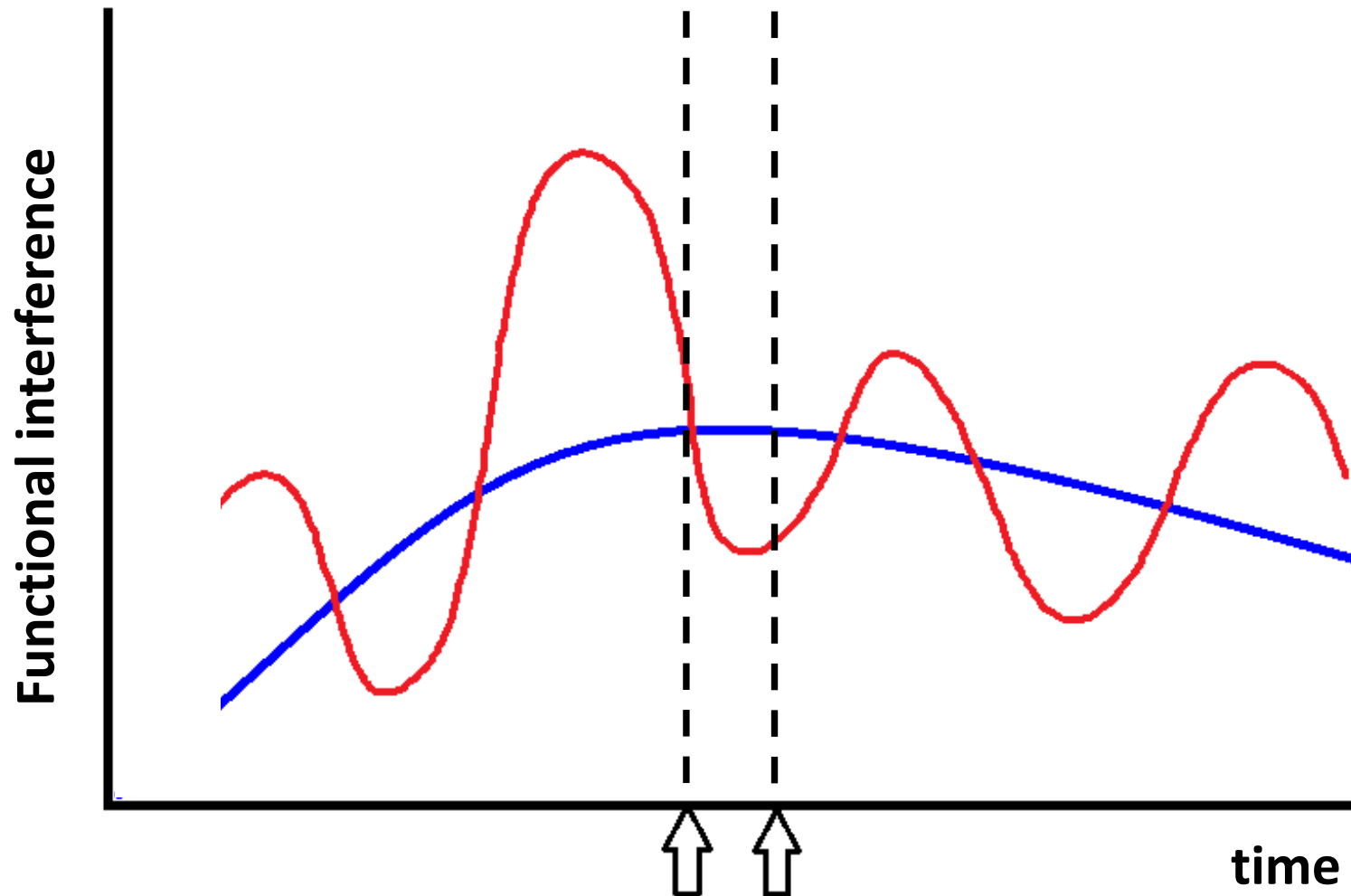
Pain course



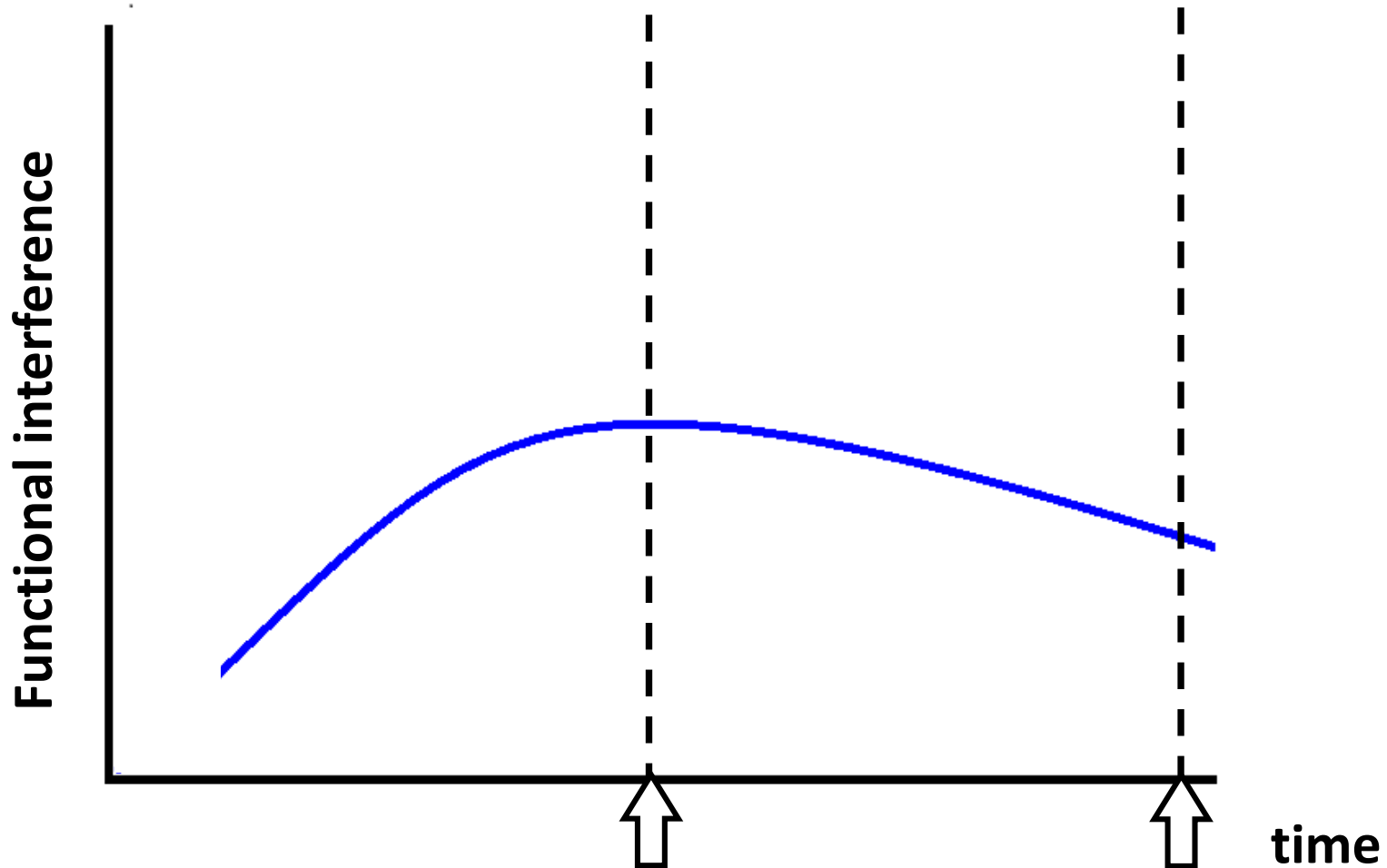
Validity



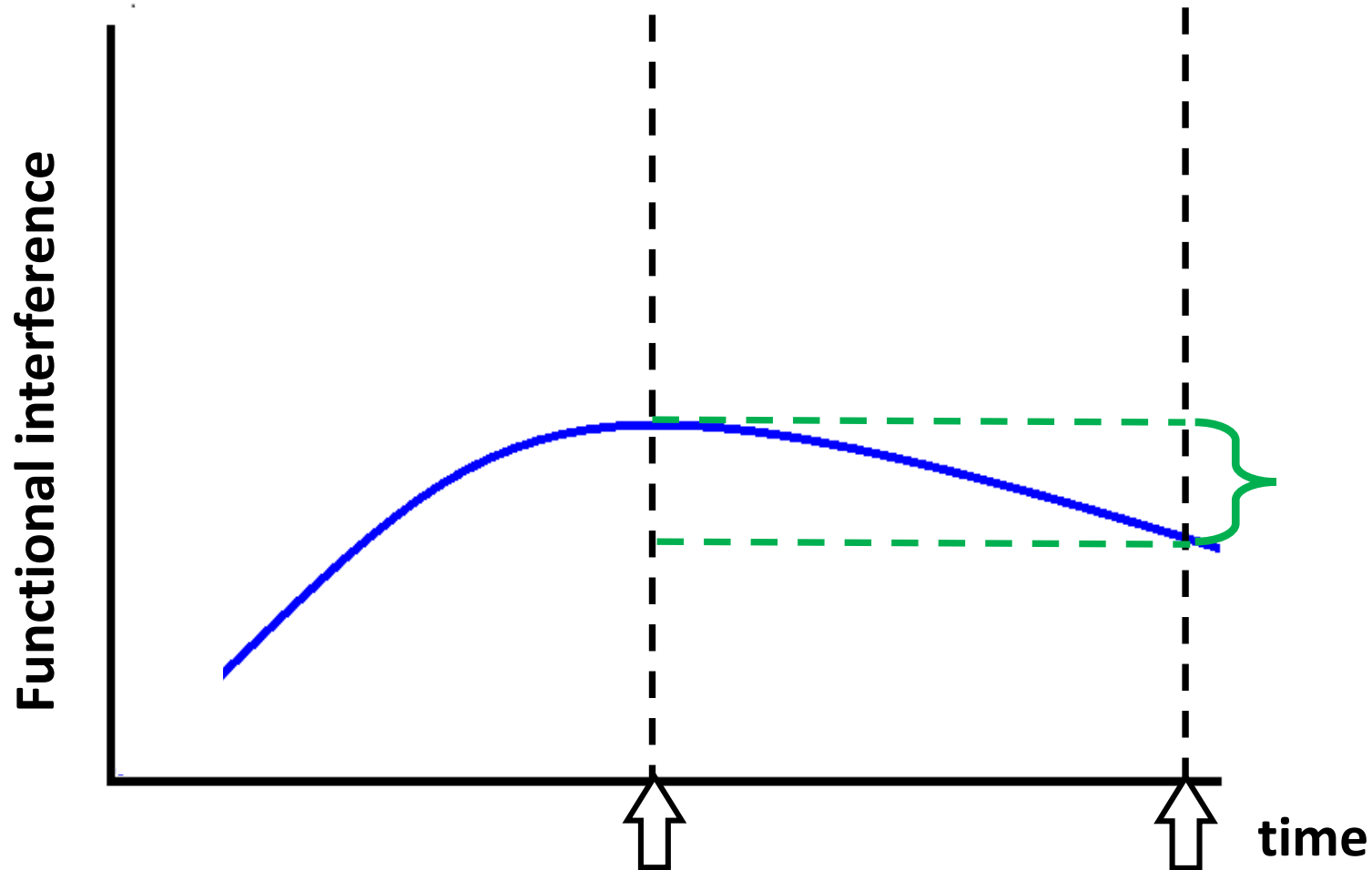
Test-retest reliability



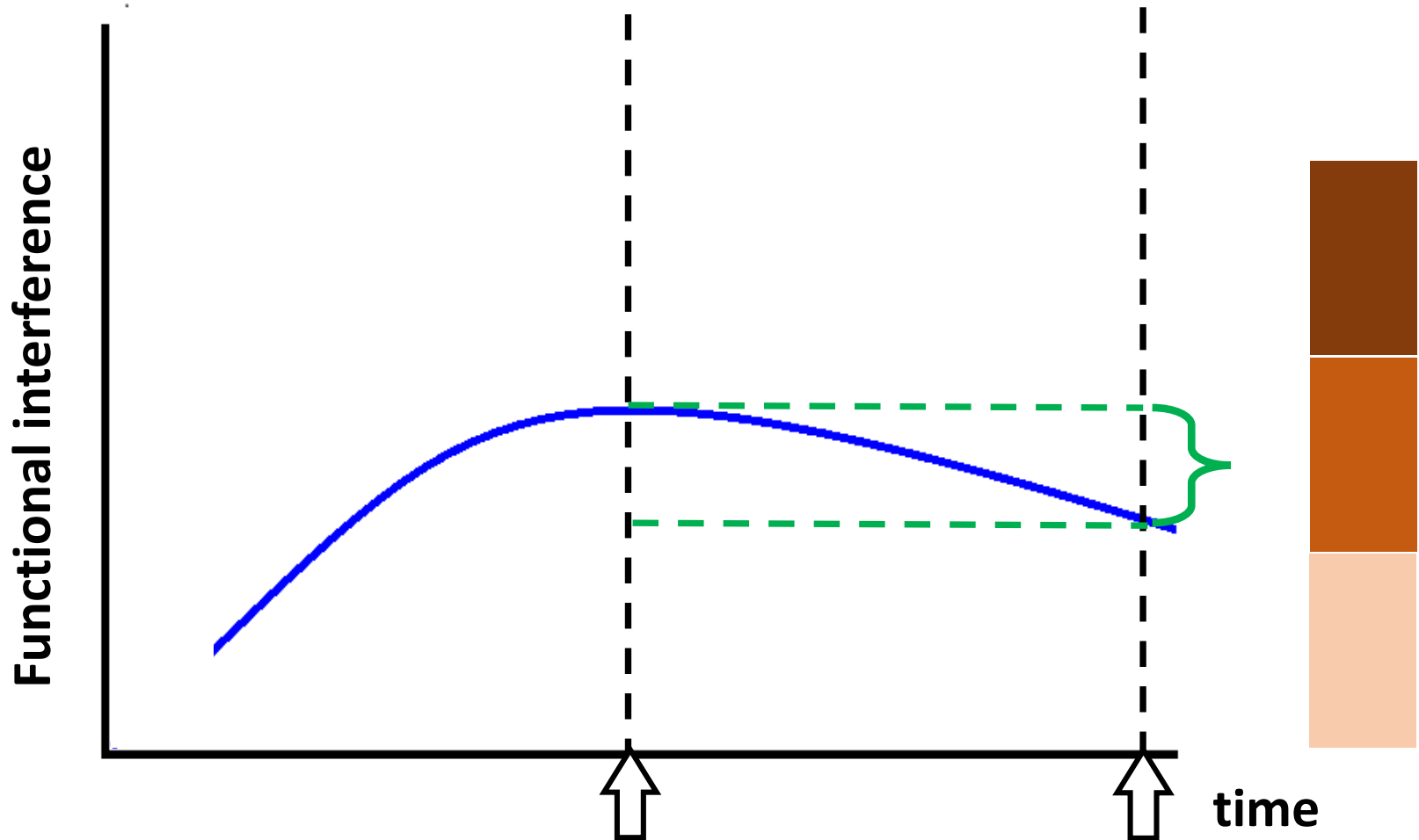
Responsiveness



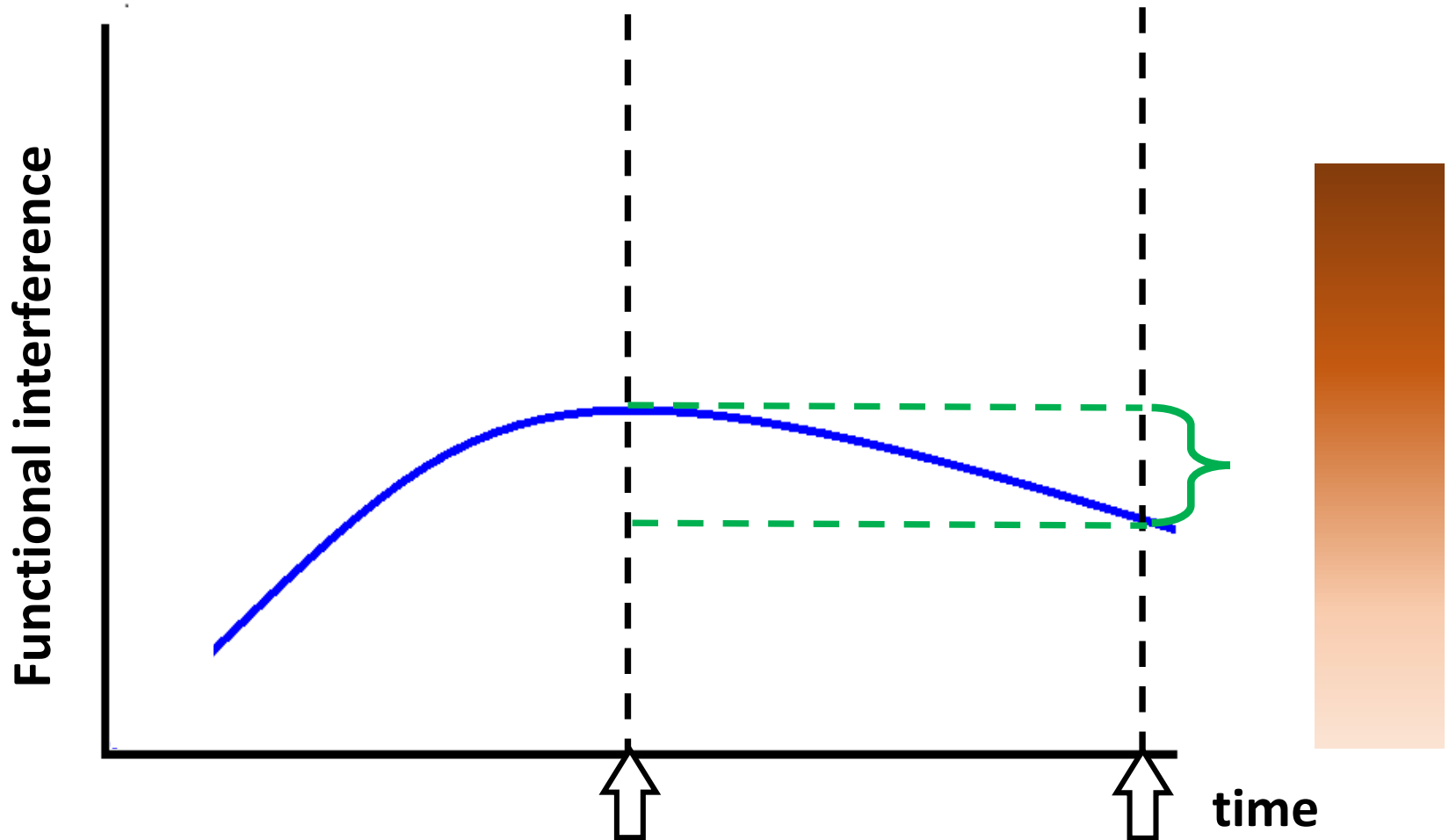
Responsiveness



Responsiveness



Responsiveness



Minimal important difference: MID

Two key approaches, sometimes combined

- Clinically important: often with an *anchor*
 - Patient Global Impression of Change (PGIC)
- Statistically detectable

King MT. 2011. *Expert Rev Pharmacoeconomics & Outcomes Research* 11(2): 171-184.

Guyatt GH et al. 1987. *J Chronic Dis* 40(2): 171-178.

Jaeschke R et al. 1989. *Control Clin Trials* 10: 407-415.

Guyatt GH et al. 2002. *Mayo Clin Proc* 77(4): 371-383.

Methods

MEDLINE (Ovid) search

January 1, 2000-January 31, 2017

English language

Other literature sources (not date-limited)

Reference lists

- of included studies, relevant systematic reviews

Operational partner suggestions

PubMed, Google Scholar, National Center for Biotechnology Information (NCBI)

Web sites specific to measures of interest

Methods

Inclusion criteria:

Adults with chronic musculoskeletal pain

≥3 months or described as “chronic”

condition, if named, is musculoskeletal

Self-report measure of pain severity or pain-related functional limitation due to pain

17 measures suggested by operational partners

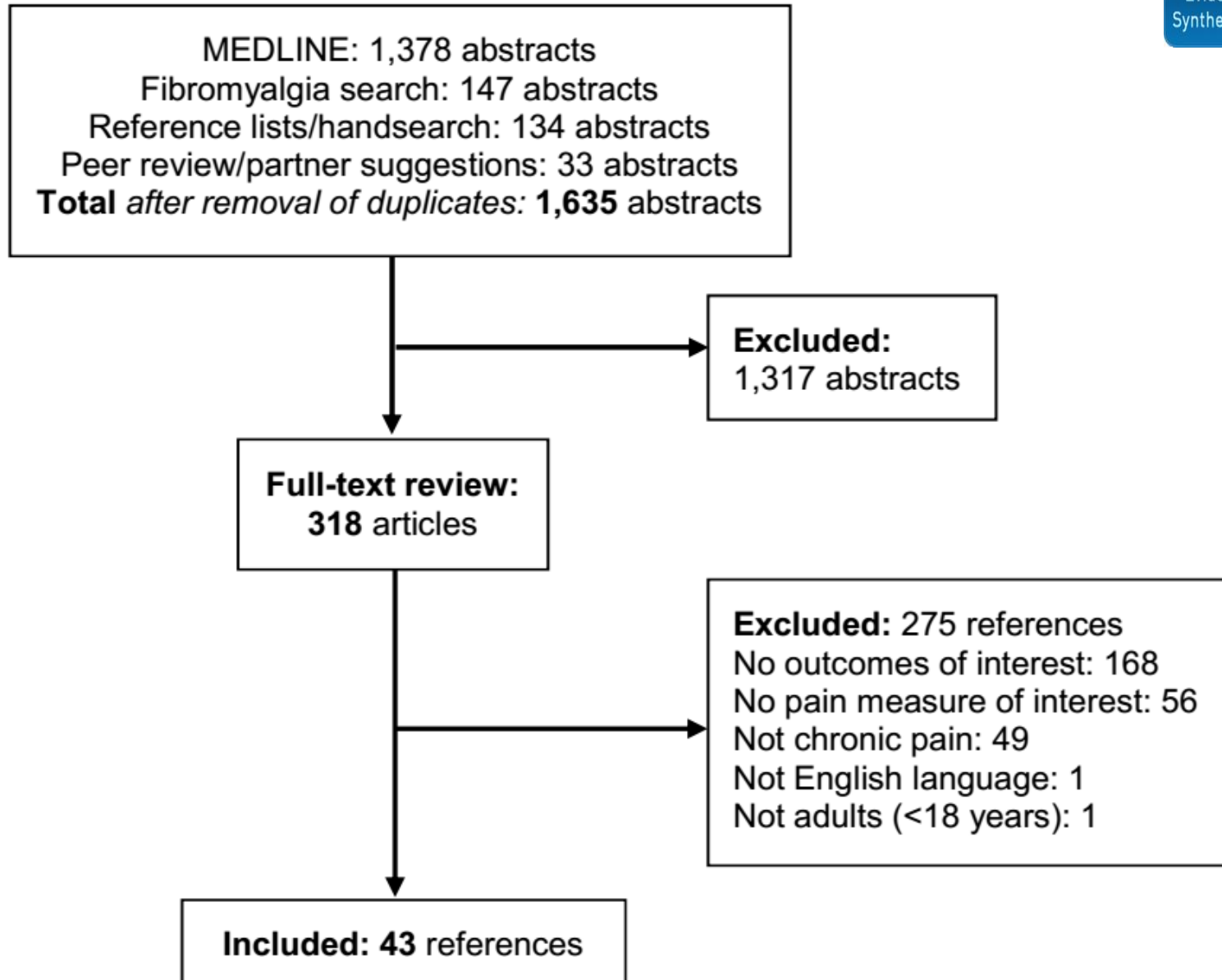
Outcomes of interest (any)

minimal important difference (primary outcome), reliability, validity (concurrent and/or discriminant), responsiveness

Excluded:

Non-English language adaptations; chronic pain not noted; conditions not musculoskeletal in origin

Literature flow



Results: study characteristics

- Nationality
 - US: 23, 4 exclusively Veterans and 2 including Veterans
 - Europe: 11
 - Australia: 5; Canada: 3; South America: 1
- Pain condition
 - LBP most common: 16 studies exclusively
 - Any chronic musculoskeletal pain: 13 studies
- Mean age ranged from 32 – 80
- Sex
- Race/ethnicity

What we did / did not do

- Described and collated studies assessing psychometric properties of these measures, comparing where possible
- Described feasibility of measures, study population characteristics
- Did not assess methodological quality of different mathematical approaches to psychometric assessment
- Did not combine numeric results of different mathematical approaches

Results: heat map

Number of studies with reported data

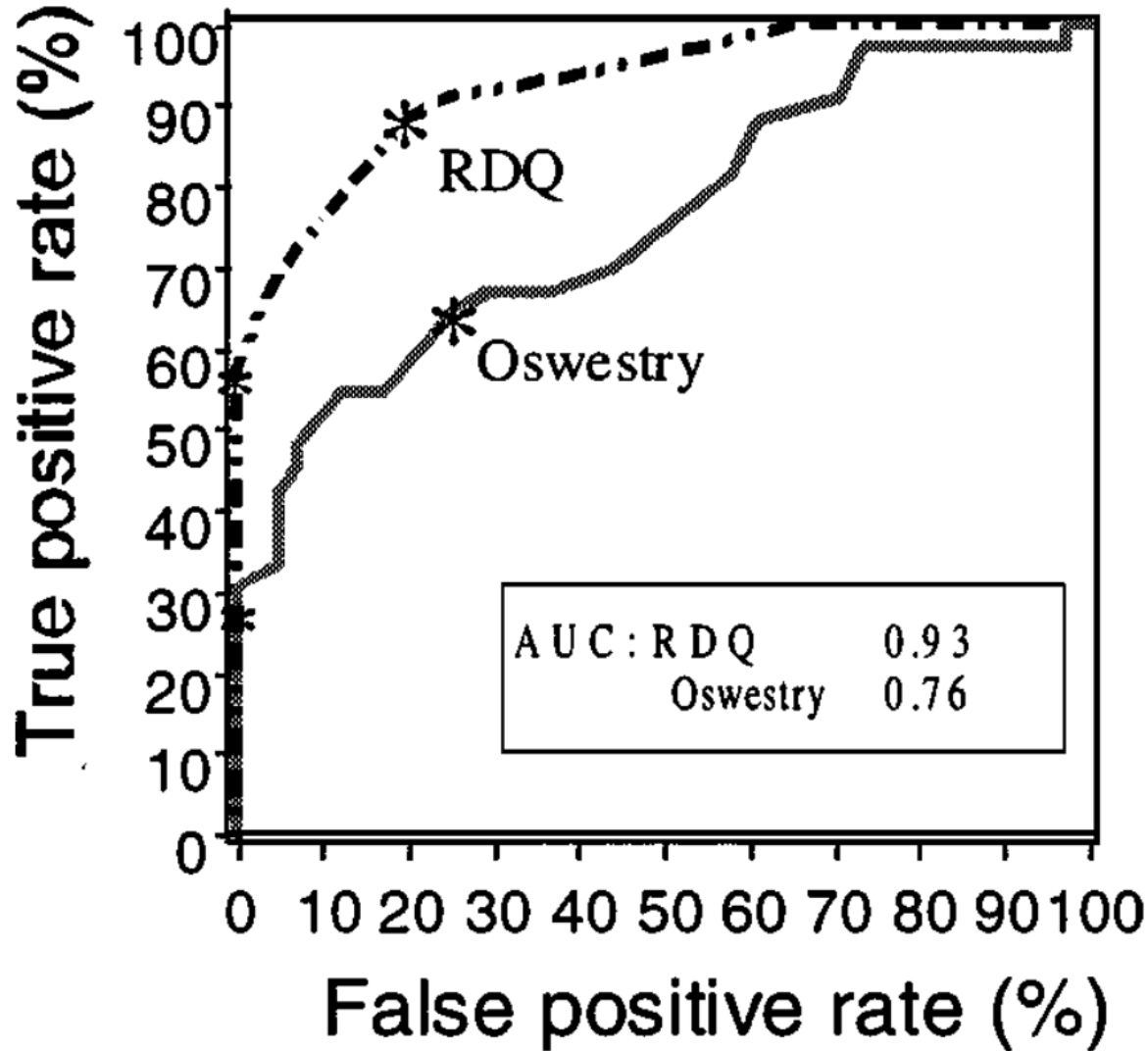


	MID	Responsiveness	Concurrent Validity	Discriminant Validity	Test-retest Reliability
Brief Pain Inventory (BPI)	1	6	3	0	0
Defense and Veterans Pain Rating Scale (DVPRS)	0	0	0	0	0
Graded Chronic Pain Scale (GCPS)	1	3	2	0	0
Hip Osteoarthritis Outcomes Scale (HOOS)	0	1	1	0	0
Knee Osteoarthritis Outcomes Scale (KOOS)	0	0	0	0	0
McGill Pain Questionnaire (MPQ)	0	1	2	1	1
Multidimensional Pain Inventory (MPI/WHYMPI)	0	1	3	1	1
Numerical Rating Scale (NRS)	3	5	4	1	3
Oswestry Disability Index (ODI)	3	5	6	1	3
Patient Global Impression of Change (PGIC)	0	2	1	0	0
PEG	1	3	1	0	0
Patient-reported Outcomes Measurement Information System-Pain Interference (PROMIS-PI)	0	3	1	0	1
Roland-Morris Disability Questionnaire (RMDQ)	3	7	5	0	1
SF-36 Bodily Pain Scale (SF-36 BPS)	1	7	7	1	1
Visual Analogue Scale (VAS)	2	3	3	0	4
Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC)	0	3	3	0	1
Wong Faces Scale/ Wong-Baker Face Scale	0	0	0	0	1

Results: more detail

Measure	Number of studies	Total Participants	MID	Responsiveness	Concurrent validity	Discriminant validity	Test-retest reliability
Brief Pain Inventory (BPI)	6	1,996	Krebs 2010 (S,I)	Chien 2013 (S) Kean 2016 (S,I) Keller 2004 (S,I) Krebs 2010 (S,I) Krebs 2009 (S,I) Tan 2004 (S,I)	Keller 2004 (S,I) Krebs 2009 (S,I) Tan 2004 (S,I)	-	-
Graded Chronic Pain Scale (GCPS)	3	1,058	Krebs 2010 (S,I)	Keller 2004 (S,I) Krebs 2010 (S,I)	Keller 2004 (S,I) Krebs 2009 (S,I)	-	-
McGill Pain Questionnaire (MPQ)	3	366	-	Burnham 2012 (S)	Kerns 1985 (S) Lovejoy 2012 (S)	Lovejoy 2012 (S)	Burnham 2012 (S)

Responsiveness, external



Responsiveness, external



AUC values, *any* improvement

Study (sample size)	Pain Measures							
	BPI (total)	PEG	SF-36 BPS	PROMIS	RMDQ	CPG	NRS	ODI
Kean 2016 (n=244)	0.73	0.71	0.68	Range 0.56 to 0.61		-		
Krebs 2010 RCT (n=205)	0.81	0.78	0.72	-	0.81	Range 0.75 to 0.78		
Krebs 2010 Cohort (n=222)	0.78	0.73	0.68	-	0.70	Range 0.65 to 0.75		
Maughan 2010 (n=48)					0.64		0.50	0.67
Stewart 2007 (n=134)			0.73				Range 0.68 to 0.70	

Minimally important difference

Measure	Range	Number of studies	N per study	Estimated using a clinical anchor				Estimated using statistical approaches		
				ROC / optimal cutoff	95% limit cutoff	Average change among responders	Change difference, responders vs. non-responders	Minimal detectable change	Smallest detectable difference	SEM
Oswestry Disability Index	0-100	3	47	4.0		8.2	8.3	2.0†		
			63	7.5				16.7‡		
			107					10.7§		
Visual Analog Scale	0-10 mm	1	47	3.0		3.2	2.0	2.2†		
Visual Analog Scale	0-100 mm	1	118						49	
Bodily Pain Index	0-10	2	205							0.6
			222							0.7
PEG	0-10	2	205							1.8
			222							1.9
Chronic Pain Grade-intensity	0-100	2	205							9.0
			222							9.9
Chronic Pain Grade-disability	0-100	2	205							8.7
			222							10.3
Roland Morris Disability Questionnaire	0-24	4	63	3.5					4.9‡	
			205							1.0
			222							1.2
			143					7.5‡		
SF-36 Bodily Pain Scale	0-100	2	205							9.8
			222							11.8
Numeric Rating Scale	0-10	3	63	4.0					2.4‡	
			135	3.5	4.7					
			138	2.5		3.7			4.5‡	

Conclusions

No obvious superiority among measures assessed with respect to psychometric data in chronic musculoskeletal pain populations

- ODI, RMDQ, SF-36 BPS had data on all 4 main psychometric outcomes
 - As did NRS and VAS: single-item measures, question content varied across studies
- BPI (S, I), GCPS, PEG: responsiveness, validity, MID
- MPI/WHYMPI, MPQ, PROMIS-PI, WOMAC: responsiveness, validity, test-retest reliability

Conclusions

- Pain severity/intensity: most psychometric reporting for the NRS and VAS, followed by the MPQ
- Pain-related functional interference: most psychometric reporting for the ODI, PROMIS-PI, and RMDQ
- Choice of measures must depend on context
 - Pain site and type, recall period of interest and intervention length, analytic goals, study resources, etc.

Conclusions

- MID not frequently estimated; methods differed
 - clinically meaningful
 - statistically detectable
- Responsiveness, concurrent validity, discriminant validity, test-retest reliability
 - often challenging to compare across studies, measures
 - generally in fair to excellent range
- Feasibility, delivery mode, and public availability differed widely

Chronic musculoskeletal pain

- Definition and reporting variations
 - “Chronic”
 - Diagnostic cause, bodily site
 - Baseline pain level or duration, treatment use...
- These differences reflect current pain research discussions: when and how, for example...
 - Intermittent pain differs meaningfully from continuous
 - Duration, diagnostic cause, bodily site affect key pain qualities

Population characteristics

- Most studies did not report race or ethnicity; most that did had >75% white participants
- No studies reported outcomes stratified by age, sex, or race/ethnicity
- Age, sex, race/ethnicity can influence people's experience and reporting of pain
- Research would benefit from consistent demographic reporting, population diversity

Booker SS et al. 2014. *Pain Med* 16(2): 232-239.
Kroenke K et al. 1998. *Psychosom Med* 60(2): 150-155.
Fillingim RB et al. 2009. *J Pain* 10(5): 447-485.
Tait RC et al. 2014. *Am Psychol* 69(2): 131-141.

Needs and next steps

Challenges related to variations in

- methods of assessing psychometric outcomes
- definition and reporting of chronic musculoskeletal pain and pain-related factors
- reporting on demographics of patient populations

There is a need for additional methods research on self-report measures among people with chronic musculoskeletal pain.

The quantification of clinical pain...has as its basic tenet the postulate that the simplest and most reliable index of pain is the patient's verbal report. Louis Lasagna, 1960

If you have further questions, please feel free to contact:

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Full-length report and cyberseminar soon available on ESP website:

<http://www.hsrd.research.va.gov/publications/esp/>