Minimal Clinically Important Change and Minimal Clinically Important Difference of knee osteoarthritis outcome measures: a systematic review

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Research question

What are the Minimal Clinically Important Change and Difference (MCIC and MCID) values for knee osteoarthritis outcome measures?

Background

- Treatment efficacy is commonly evaluated using statistical significance regardless of clinical importance.

- It is important how patients judge clinical importance.

- Minimal Clinically Important Change and Difference (MCIC and MCID) are important at an individual level to evaluate if the patient has responded to the treatment they perceive as "minimally improved" and at a group level to clinicians and researchers to assess the clinical efficacy of an intervention.

- MCIC: The change (pre and post) of a clinical outcome within one group over time.

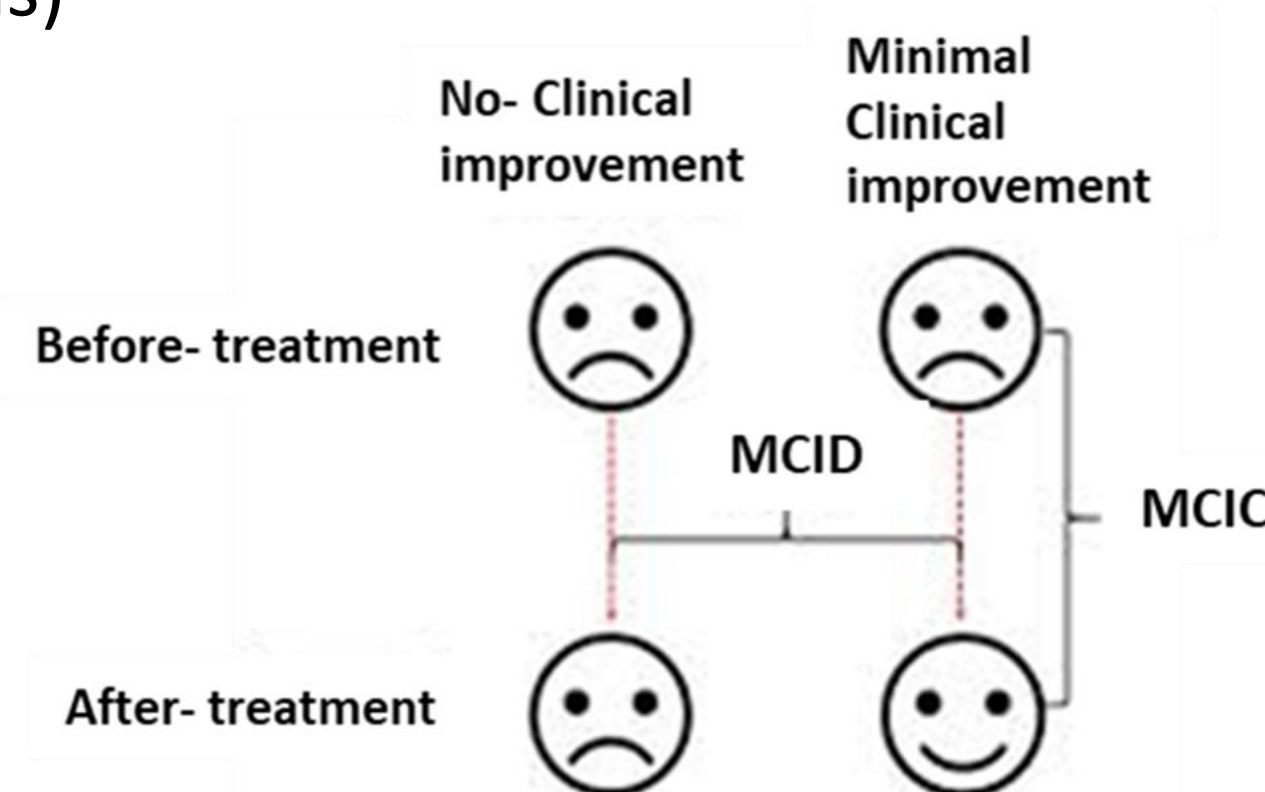- MCID: The difference between two independent groups after treatment (e.g. randomized clinical trials)

Figure 1: Definition of MCIC and MCID adapted from Beard, 2015[1]

- Three basic methods are used to estimate MCIC and MCID:

  1. **Anchor-based method** — patient estimates scores compared to an external measure (global rating change)

  2. **Consensus-based method** — panel of experts or patients directly state and the best estimate is considered

  3. **Distribution-based method** — Estimates statistically based on the variance of outcome data
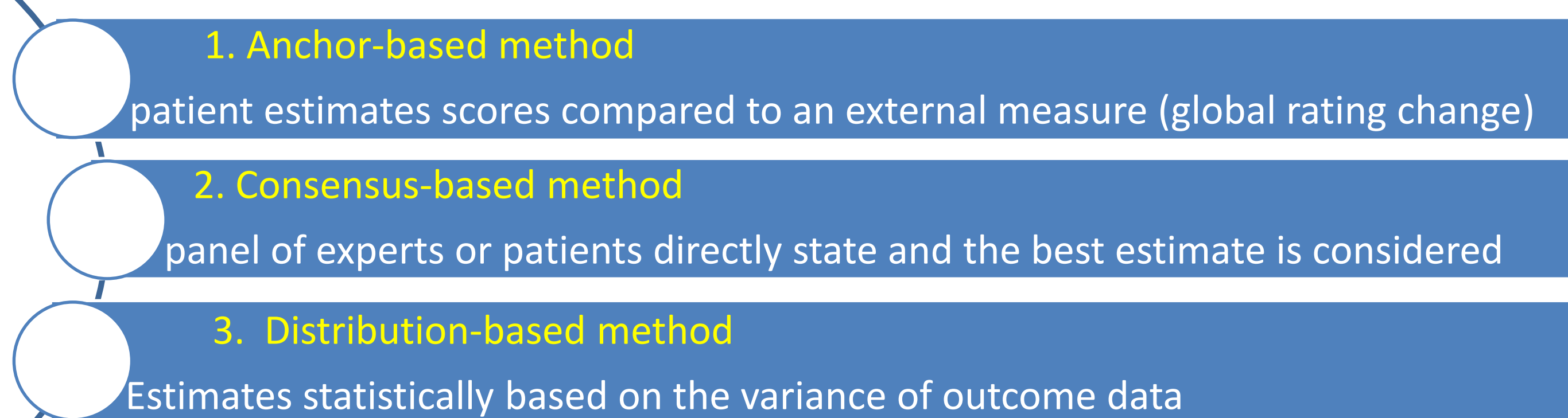
Figure 2: The MCIC and MCID estimation methods

Box 1: Facts regarding the calculation methods:

- The anchor-based method is most widely considered to be the most valid because it is based on the patients' perceptions
- The validity of consensus method is improved by involving patients, clinicians, researchers and policymakers.
- The distribution-based method is purely statistical. Therefore, it is the least valid method.

Methods

- **Study design :**   Systematic review

- **Databases:**   MEDLINE, Embase, Cochrane, Web of Science, CINAHL

- **Eligibility:**   Studies assessed MCIC or MCID values for knee OA outcome measures using any methods (anchor, consensus or distribution methods) are included

- **Risk of bias of studies:**

  Anchor-method studies-   credibility instrument by Devji (2020)[1]

  Consensus-method studies-CASP checklist[2]

  Distribution-method studies- NIH quality assessment tool[3]

- **Data synthesis:**   Median and range of MCIC and MCID values were reported. We reported distribution-based values separately as it is the least valid method (Minimum detectable change (MDC*) values.

*MDC: the smallest change that can be detected by the instrument beyond measurement error
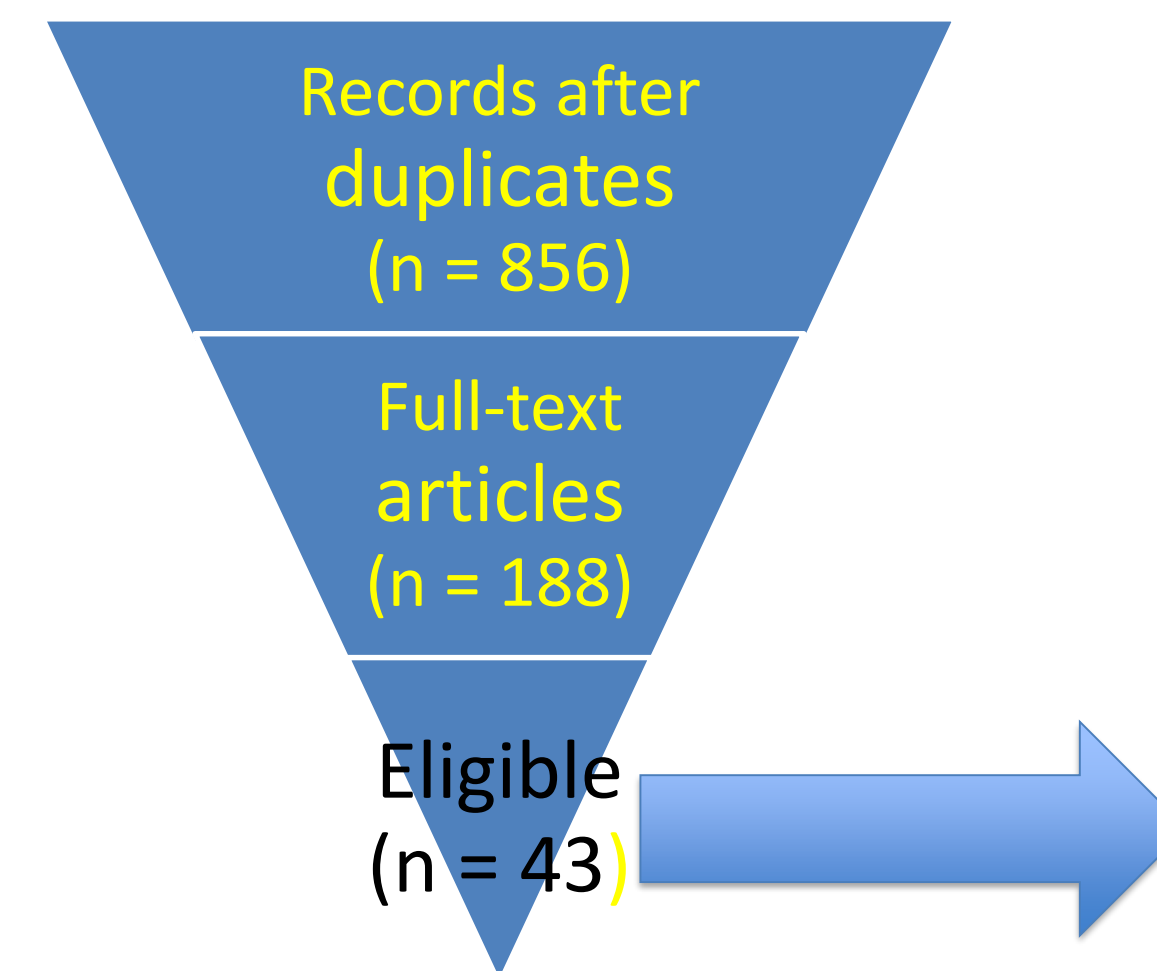
Results

Records after duplicates (n = 856)

Full-text articles (n = 188)

Eligible (n = 43)

1. Anchor-method studies n= 12
2. Consensus-method studies n=1
3. Distribution-method studies n=30

Figure 3: Study selection

- Eight studies estimated the MCID values (between groups difference)

- Seven studies estimated the MCIC values (within-group change)

Table 1: MCIC values for knee outcome measures

Outcome measure	Median MCIC estimate	Minimum estimate	Maximum estimate	Number of estimates
KOOS- pain	14.3	4.3	16.6	4
OKS- pain	17.3			1
ICOAP- pain	15.9	13.4	18.5	2
Pain on numeric rating scale	19.9	1.0	40.8	3
WOMAC- function	17.1	9.1	26	4
OKS- function	10.6			1
KOOS- function	2.2			1
Function on numeric rating scale	2.6	2.50	2.8	4

Table 2: MCID values for knee outcome measures

Outcome measure	Median MCID estimate	Minimum estimate	Maximum estimate	Number of estimates
WOMAC- pain	7.9	7.1	8.7	2
OKS- pain	14.3			1
KOOS- pain	7.8	4.0	15.4	9
PROMIS- pain	2.4	2.4	2.4	2
SF-36- pain	9.3	8.2	10.4	2
ICOAP-pain	7.8			1
DAP with numeric rating scale	24			1
WOMAC- function	12.9	11.3	14.5	2
OKS- function	9.5			1
PROMIS- function	2.1	1.9	2.2	2
SF-36- function	4.0	3.8	4.2	2

Table 3: Minimum Detectable Change (MDC) values for knee outcome measures

Outcome measure	Median MDC estimate	Minimum estimate	Maximum estimate	Number of estimates
WOMAC- pain	3.6	3.37	3.8	2
OKS- pain	11.1	6.2	16	2
KOOS- pain	17	3.6	20.2	3
SF-36- pain	3.5	3.31	3.7	2
Numeric pain rating scale	16.5	13.3	19.6	2
LEFS- function	18.3	14.7	22.6	6
WOMAC- function	3.1	3.05	18.7	3
OKS- function	15			1
SF-36- function	2.4	2.3	2.4	2

BOX 1: List of outcome measures:

WOMAC: Western Ontario and McMaster Universities Arthritis Index, OKS: Oxford Knee Score, KOOS: Knee injury and Osteoarthritis Outcome Score, PROMIS: Patient-Reported Outcome Measurement Information System, SF-36: 36-item Short Form Health Survey Knee Society Score, ICOAP: Intermittent and Constant Osteoarthritis Pain, DAP: Dynamic Weight-bearing Assessment of Pain, LEFS: Lower Extremity Functional Scale, Pain and function using numeric rating scale

Conclusion

- We reported nine MCIC and MCID values for knee osteoarthritis outcome measures.

- The provided MCIC, MCID and MDC values can be used to inform sample sizes and interpret treatment efficacy of knee osteoarthritis interventions.

- Differentiating MCIC and MCID is helpful to clinicians and researchers because, MCIC should be used for within groups studies and MCID for between-group studies.

For references, please scan the QR code

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