



Multicriteria decision analyses for healthcare decisionmaking: feedback from the field on the value of the EVIDEM framework in Canadian and South African settings

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Mireille M Goetghebeur PhD,¹ Jacqui Miot PhD,² Michele Tony*, Monika Wagner PhD,¹ Hanane Khoury PhD,¹ Donna Rindress PhD,¹ Paul Oh MD³

¹BioMedCom, Montreal, Quebec, Canada

²Division of Clinical Epidemiology, University of Pretoria, South Africa

³Endocrinology Toronto Rehabilitation Institute, Toronto, Ontario, Canada

*MSc Candidate, University of Montreal

Acknowledgments

Committee members

- ❖ Drug Advisory Committee, Workplace Safety Insurance Board (WSIB) of Ontario, Toronto, Canada
- ❖ Clinical Policy Unit, Discovery Health, Johannesburg, South Africa

Web developers

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Structuring the natural thinking process

Background: MCDA & EVIDEM

❖ Multicriteria decision analysis (MCDA)

- ❖ Reflection on criteria at play in healthcare decisionmaking
- ❖ Reflection on perspectives, values and priorities
- ❖ Simultaneous consideration & quantification of a wide range of criteria of decision (beyond cost-effectiveness model)

❖ EVIDEM Collaboration

- **Framework***: Comprehensive set of standard components of decision with tools and processes to consider them
- **Collaborative Registry**: open web based interactive relational database with synthesized evidence for decisionmaking contexts globally

Standard components of decision

Quantitative considerations (intrinsic value - MCDA matrix)

Disease impact

- Disease severity
- Size of population affected by disease

Context of intervention

- Clinical guidelines
- Comparative intervention limitations

Intervention outcomes

- Improvement of efficacy/effectiveness
- Improvement of safety and tolerability
- Improvement of patient reported outcomes

Type of benefit

- Public health interest (e.g., prevention, risk reduction)
- Type of medical service (e.g., symptom relief, cure)

Economics

- Budget impact on health plan (cost of intervention only)
- Impact on other spending (e.g., hospitalization, disability)
- Cost-effectiveness of intervention

Quality of evidence (uncertainty)

- Adherence to requirements of decisionmaking body
- Completeness and consistency of reporting evidence
- Relevance and validity of evidence

Qualitative considerations (extrinsic value - tool)

Ethical framework

- Goals of healthcare - **utility**
- Opportunity costs - **efficiency**
- Population priority & access - **fairness**

Other components

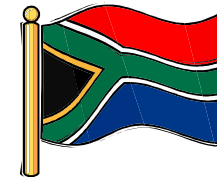
- System capacity and appropriate use of intervention
- Stakeholder pressures
- Political/historical context

Objectives

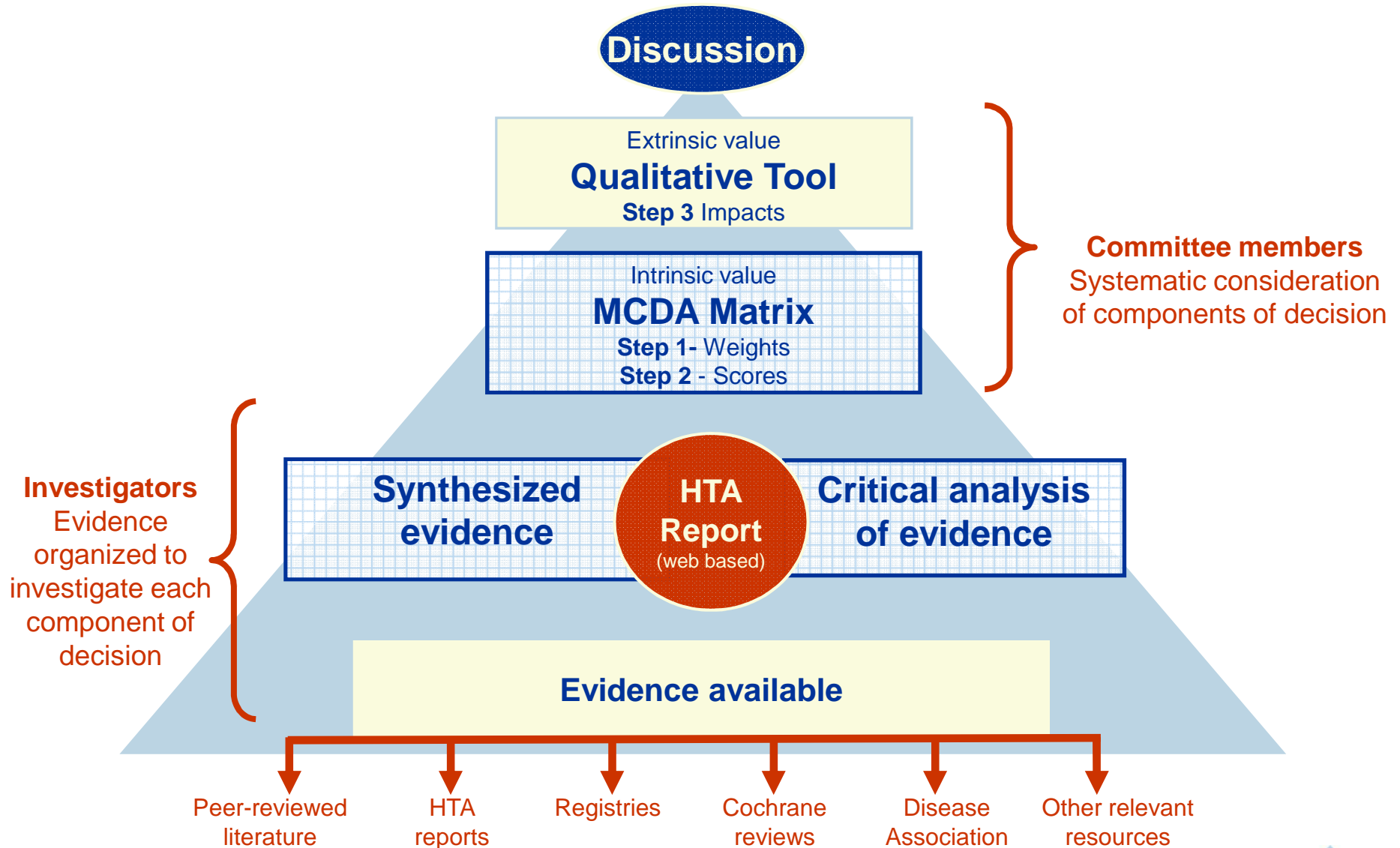
- ❖ Field test the framework using case studies selected by decisionmaking committees
- ❖ Tramadol for chronic non-cancer pain for a public Canadian health plan



- ❖ Liquid-based cytology for screening cervical cancer for a private South African health plan



Methods



Data collection & analyses

- ❖ **Weights, scores and impacts:** elicited during workshop sessions with committee members
- ❖ **Feedback on framework :** elicited via survey & discussion during workshop sessions
- ❖ **MCDA estimate:** linear model [sum of value contribution (V_x) of combined normalized weights (W_x) and scores (S_x) for applicable components (n) of the matrix]

$$V = \sum_{x=1}^n V_x = \sum_{x=1}^n \left(\frac{W_x}{\sum_{x=1}^n W_x} \times S_x \right)$$



Results



Web based interactive HTA reports

- ❖ Open source software (Tikiwiki)
- ❖ Access to evidence
 - ❖ Structured by component of decision
 - ❖ Synthesized evidence
 - ❖ High level synthesis (to get a quick grasp of issues)
 - ❖ Synthesis (with more details on studies and data)
 - ❖ Full text sources of data
 - ❖ Web links to data sources (peer-review journals, Cochrane reviews, reports etc)
- ❖ Data entry & collection
 - ❖ Weights, scores, impacts, feedback
 - ❖ Data collection (MySQL database)

Record menu

PREAMBLE

The prototype below includes data on tramadol for patients with chronic non-cancer pain in Canada. To access highly synthesized data with hyperlinks to details and sources, visit [EVIDEM lite](#).

The objective of the EVIDEM framework is to support systematic consideration of components of decision when evaluating a healthcare intervention. The framework includes a standard set of components of decision with a process to report evidence tailored to investigate each component of decision.

These components are categorized as:

- quantifiable from a universal standpoint - defining the intrinsic value of an intervention, estimated using the MCDA Value Matrix (steps 1 & 2)
- not quantifiable from a universal standpoint and related to healthcare system, ethics and priorities - defining the extrinsic value of an intervention explored using the Extrinsic Value Tool (step 3)

Tramadol for chronic non-cancer pain in Canada

See methodology to develop this EVIDEM record

EVALUATOR INSTRUCTIONS

Step 1: Weighting MCDA Value Matrix components Step 2: Scoring intervention (MCDA Value Matrix) Step 3: Considering impact of Extrinsic Value Tool components Step 4: See my data



QUANTIFIABLE COMPONENTS (INTRINSIC VALUE)

Value estimate is obtained by combining normalized [weights](#) assigned independent of intervention and [scores](#) based on synthesized data available (MCDA Value Matrix)

Components	Highly synthesized information	Minimum score for intervention (0)	Maximum score for intervention (3)
Disease impact			
D1 Disease severity	Chronic non-cancer pain includes nociceptive (tissue damage) and neuropathic (nerve pathology) pain; 37% of low back pain of neuropathic origin. Disabling condition interfering with activities of daily living (28% patients), work (lost income in 49% patients) and education. Associated with depression and/or anxiety (40% patients). <i>(Assign score/See data details)</i>	Not severe	Very severe
D2 Size of population	Prevalence/Incidence: Canadian pain study 2004 (N=1055 in general population): 25% with chronic pain (88% moderate or severe); mean duration 9.8 years. <i>(Assign score/See data details)</i>	Very rare disease	Common disease
Context of intervention			
C1 Clinical guidelines	Canadian Pain Society guidelines: Chronic non-cancer pain (2002): no mention of tramadol - mild to moderate: 1st line non-opioid, 2nd line opioid (moderate to severe pain: switch to opioid earlier) Chronic neuropathic pain(2007): 3rd line tramadol/conventional opioid Other countries recommending tramadol for: *Osteoarthritis: 2nd line, USA *Chronic low back pain: 2nd line, USA and Europe *Fibromyalgia: 2nd line, USA <i>(Assign score/See data details)</i>	No recommendation	Strong recommendation
C2 Comparative interventions limitations	NSAIDs and COX-2 inhibitors: ceiling effect in pain reduction; organ damage after long term use (cardiac and renal; and gastric for NSAIDs) Opioids: not efficacious in pain of neuropathic origin; gastrointestinal (constipation, nausea, vomiting), respiratory (respiratory depression) and neurologic (dizziness, somnolence) side effects; risk of tolerance/dependence/abuse Specific to neuropathic pain: *Anticonvulsants (e.g. ,gabapentin, pregabalin): sedation, dizziness, ataxia, somnolence, confusion *Tricyclic antidepressants (e.g. , amitriptyline): sedation, dry mouth, constipation, orthostatic hypotension, weight gain *SNRIs (e.g. ,duloxetine, venlafaxine): nausea, dyspepsia, sweating, somnolence and insomnia *SSRIs (e.g. fluoxetine): agitation, anxiety, sleep disturbance, tremor, sexual dysfunction and headache <i>(Assign score/See data details)</i>	No or very minor limitations	Major limitations
Intervention outcomes			
I1 Improvement of efficacy/ effectiveness	<i>Trial results obtained with WOMAC and other scales were recalculated to be expressed on a normalized scale from 0 (minimum improvement) to 100 (maximum improvement). If not mentioned, no significant difference</i> 5 Head to head randomized controlled trials (osteoarthritis, low back pain & other; 4 to 12 weeks; N =108 to 1001; 1 in Canada, 4 in USA): *Pain intensity reduction from baseline: tramadol: 15-24; diclofenac: 16; celecoxib: 26 (P=0.05 vs placebo); placebo: 19 <i>(significant difference for all vs baseline)</i> *Pain intensity reduction after 6 hrs: tramadol: 21; codeine: 18 Placebo randomized controlled trials (Cochrane reviews): *Pain intensity reduction versus placebo: *8.5 (osteoarthritis, 3 trials, N= 92 to 307) , *10.8 (chronic low back pain, 3 trials, N= 254 to 336) *Patients achieving 50% pain relief: 63% tramadol vs 37% placebo (neuropathic pain, 3 trials, N=67 to 127) <i>(Assign score/See data details)</i>	Lower than comparators	Major improvement
I2 Improvement of safety &	Summary of common AEs (> 5% of patients in RCTs and frequency > twice of placebo in tramadol product	Lower than	Major improvement

11 Improvement of efficacy/effectiveness

SCORING INSTRUCTIONS

- Score the efficacy/effectiveness of the intervention in relation to comparative interventions presented (consider clinical significance of outcomes measures)
- Score from a relative point of view (relative to comparative interventions)
- Comments may be provided to communicate data needs

Scoring example (for information only):

0: Lower efficacy/ effectiveness than comparators

1: Same efficacy as comparator

2: Some improvement in efficacy/ effectiveness

3: Major improvement in efficacy/effectiveness, larger eligible population

Score	Comments
<input type="radio"/> 0 Lower efficacy/effectiveness than comparators presented	
<input type="radio"/> 1	<input type="checkbox"/> Low Score due to data limitation - specify
<input type="radio"/> 2	Scoring by memberall
<input type="radio"/> 3 Major improvement in efficacy/effectiveness	

[Submit, return to scoring menu](#)

SYNTHESIZED EVIDENCE

5 Head to head randomized clinical trials (osteoarthritis, low back pain & other; 4 to 12 weeks):

Inclusion criteria for trials: Age: ≥ 18 years; adults patients with chronic non cancer pain for ≥ 12 weeks; intensity level \geq moderate

Exclusion criteria for trials: patients not relevant to the insured population, including those with diabetic peripheral neuropathy, postherpetic neuralgia, rheumatoid arthritis, postoperative pain, and acute flares of chronic conditions

Results in trials recalculated to be expressed on a normalized scale from 0 (minimum improvement) to 100 (maximum improvement):

Pain intensity reduction from baseline: tramadol: 15-24; diclofenac: 16; celecoxib: 26 (P=0.05 vs placebo); placebo: 19 (significant difference for all vs baseline)

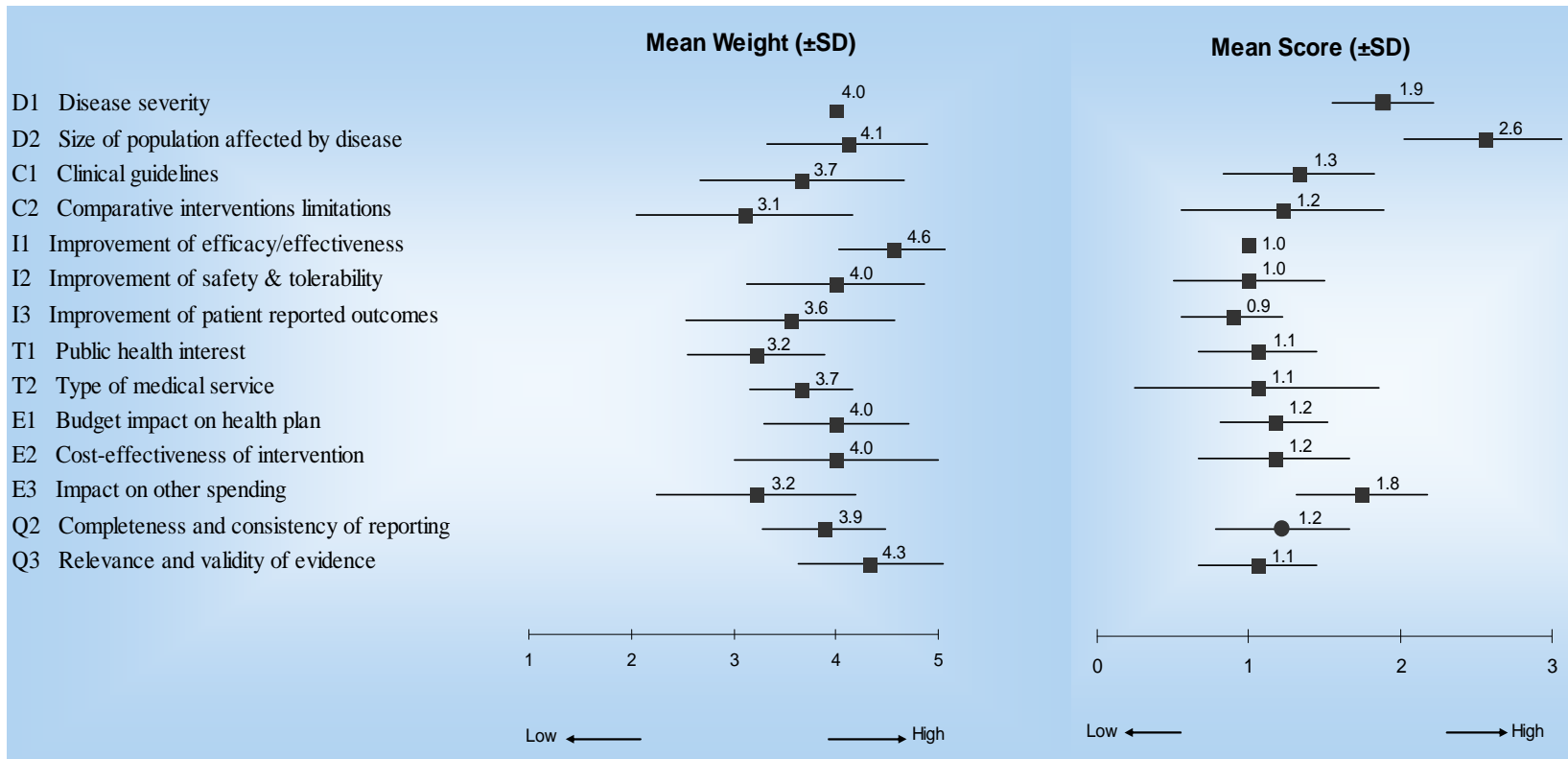
Pain intensity reduction after 6 hrs: tramadol: 21; codeine: 18

Trial	Population (n)	Duration	Relief in pain at specified time after taking medication	Pain intensity
Beaulieu et al 2008	Osteoarthritis	6 weeks		WOMAC pain subscale (VAS: 0 to 500) Mean change from baseline
Tramadol 200-400 mg CR ^a	62		NA	73.2 \pm 99.9 (P=.0001)
Diclofenac 75-140 mg SR ^a	66		NA	80.2 \pm 108.1(P=.0001)
				Pain intensity VAS: 0 to 100 Mean change from baseline
Tramadol 200-400 mg CR ^a	62		NA	17.3 \pm 22.6 (P=.0001)
Diclofenac 75-140 mg SR ^a	66		NA	16.4 \pm 24.4(P=.0001)
Pavelka et al 1998	Osteoarthritis	4 weeks[†]		WOMAC pain subscale (VAS: 0 to 500) Mean change from baseline
Tramadol/APAP 50-300 mg	54		NA	Modest improvement (no data)
Diclofenac 25-150 mg	54		NA	Modest improvement (no data)
Mullican et al 2001	Low back pain & Osteoarthritis	4 weeks (data at day 22)	LS: 0 to 24 Mean (SD) relief over 6 hours[‡]	LS: -6 to 18 Mean (SD) reduction from time of administration over 6 hours[§]
Tramadol/APAP 37.5-375 mg/325-3250 mg	309		11.9 (5.83) [¶]	3.8 (4.06) [¶]
Codeine/APAP	153		11.6 (6.24)	3.3 (3.90)

Canadian study

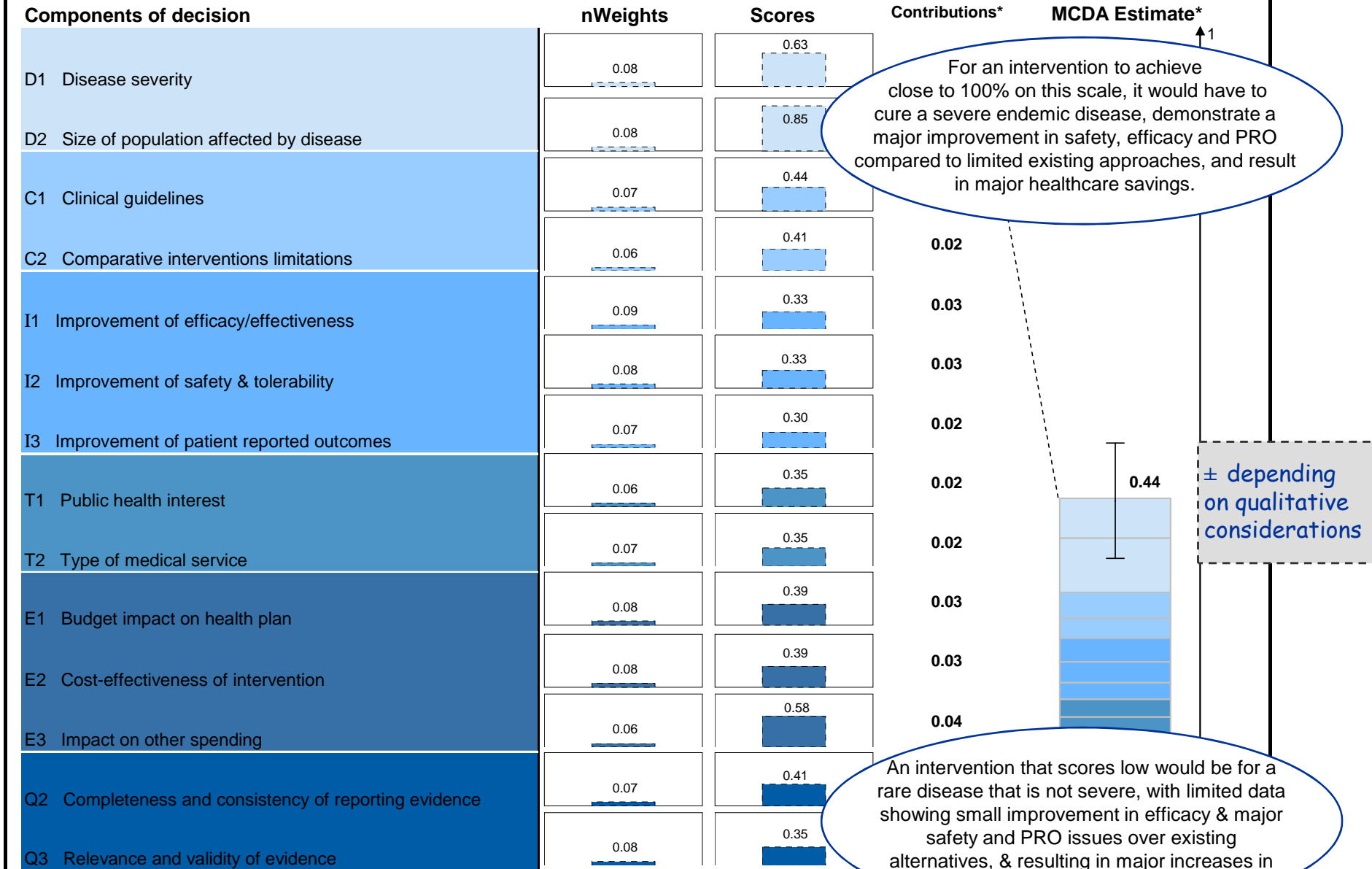
→ Step 1 - MCDA weights values of committee

→ Step 2 - MCDA scores tramadol for chronic non-cancer pain



→ Step 3 - Qualitative impact of extrinsic components

Appraisal of tramadol for chronic non-cancer pain in Canada

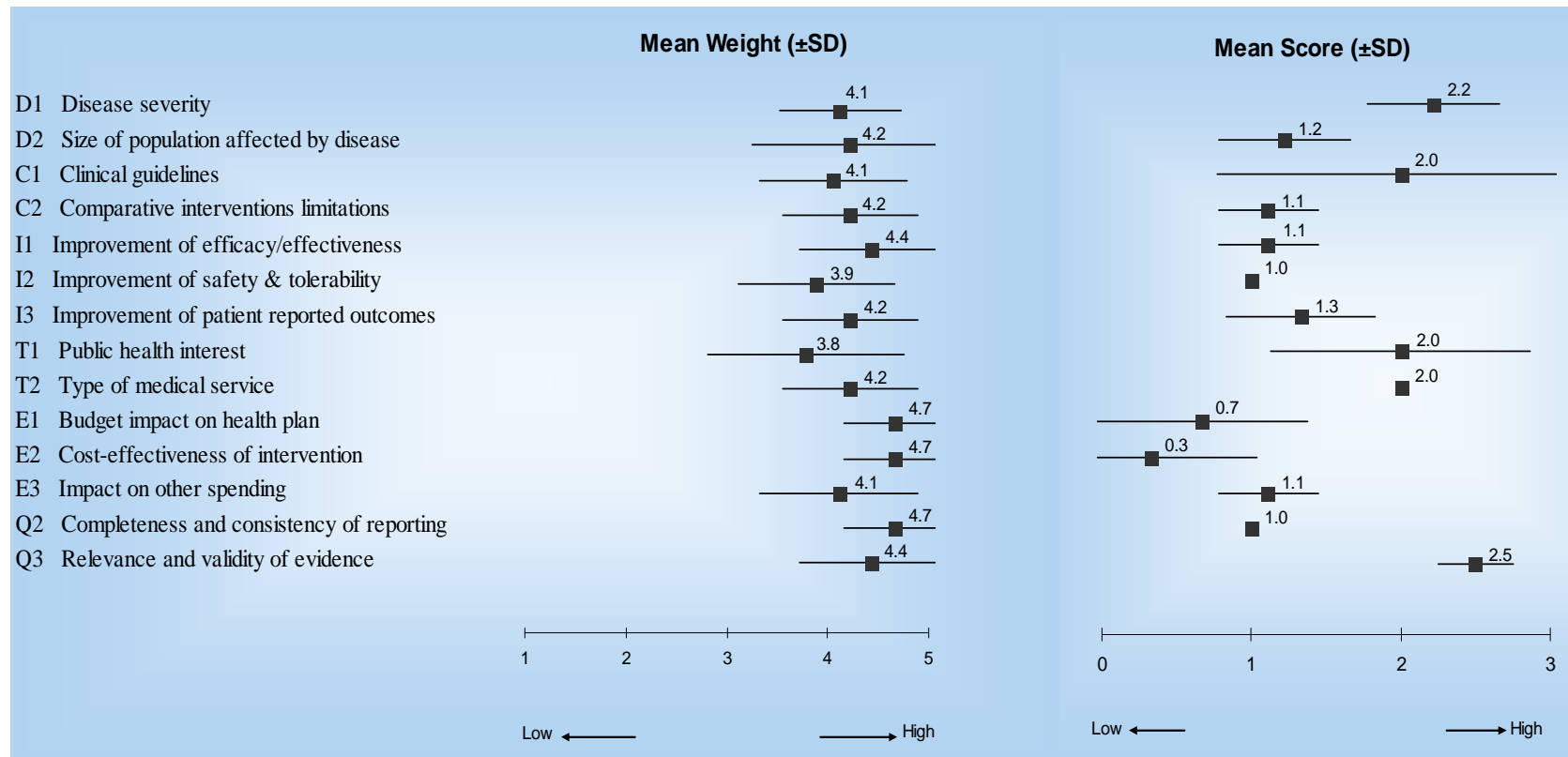


*Normalized (n) weights x Scores, linear additive model

South African study

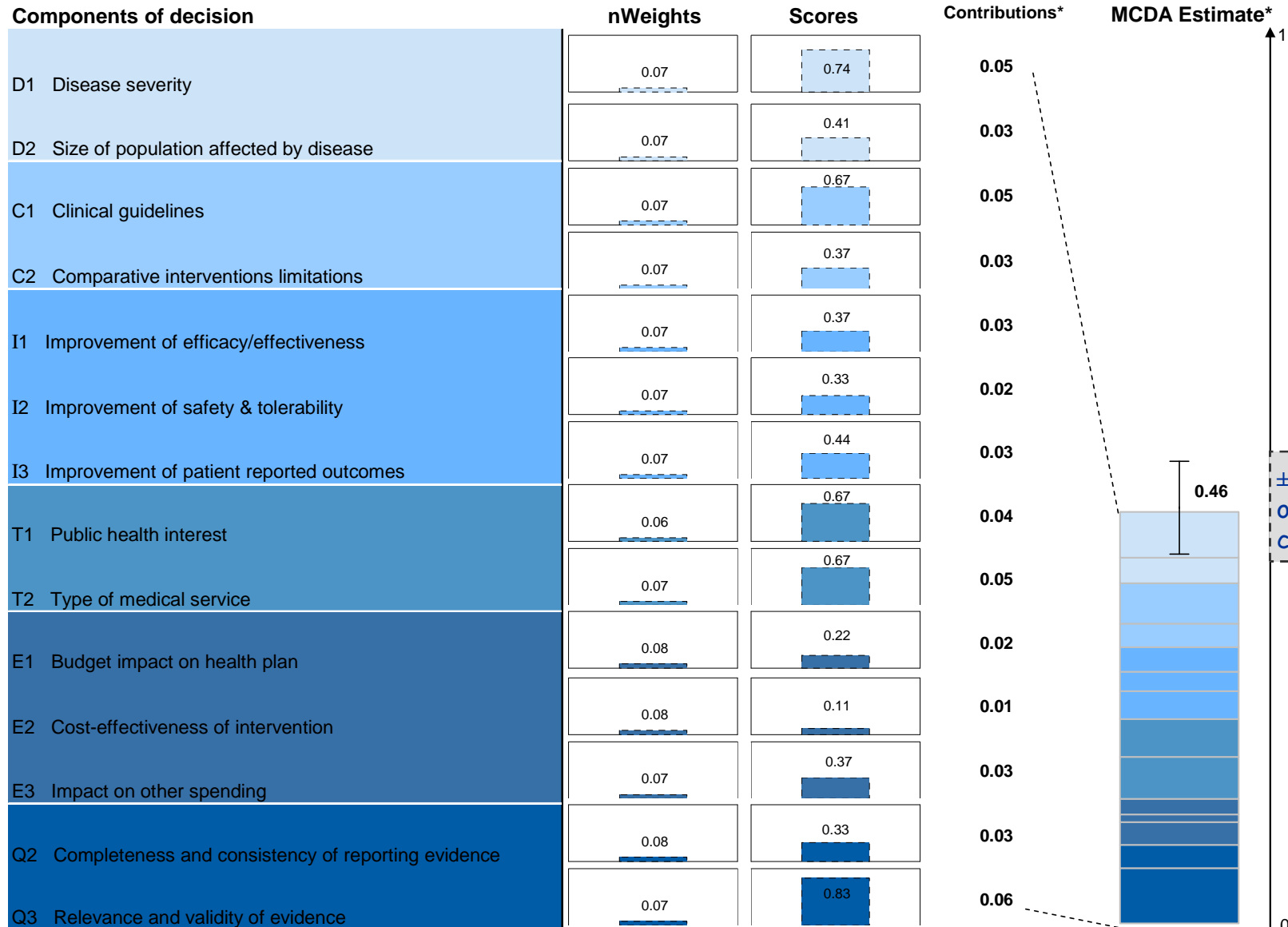
→ Step 1 - MCDA weights values of committee

→ Step 2 - MCDA scores liquid based-cytology for cervical cancer screening



→ Step 3 - Qualitative impact of extrinsic components

Appraisal of liquid based cytology for cervical cancer in South Africa



*Normalized (n) weights x Scores, linear additive model

Outcomes of applying framework

- ❖ Transparent record of evidence for each component of decision
- ❖ Quantitative considerations
 - ❖ Preferences (weights) of the group/committee
 - ❖ Performance of intervention (scores)
 - ❖ MCDA estimate
 - ❖ Specific to committee
 - ❖ Comprehensive measure
- ❖ Qualitative considerations: positive, neutral or negative impact on value of intervention

→ Decision: ranking & striking a balance



Feedback from the field

❖ Components of the framework

- ❖ Most components should be systematically considered

❖ Components questioned by some members

- ❖ **Intrinsic:** Size of population, Disease severity, Improvement of patient-reported outcomes (PRO), Public health interest

- ❖ **Extrinsic:** Stakeholders pressures, Political/historical context

Feedback from the field

❖ Advantages

- ❖ Systematic consideration of all aspects of decision
- ❖ Consistency of decision process
- ❖ Transparency & clarity
- ❖ Understanding of intervention (ZA)
- ❖ Understandability of decision by stakeholders (ZA)

❖ Challenges

- ❖ Language & understanding of some components of decision
- ❖ Perceived difficulties in distilling information/evidence to populate framework
- ❖ Lack of reference point for MCDA estimates (ranking)

Applications

- ❖ Decisionmaking/priority setting
 - ❖ Knowledge translation
 - ❖ Communication
 - ❖ Research planning
- Further testing and validation needed to develop MCDA approaches in healthcare decisionmaking

Plans for the Future

❖ Collaborative studies

- ⇒ Field testing (beta-testing package)
- ⇒ Methodological validation
- ⇒ International survey

❖ Web collaborative registry

- ❖ Open access to evidence on health care interventions for end users globally
 - ❖ Ranking of interventions
- ➔ Optimize resources, decisions and health

⇒ Framework tools available from the
EVIDEM Collaboration

www.evidem.org

Thank you