Studies comparing Numerical Rating Scales, Verbal Rating Scales and Visual Analogue Scales for assessment of pain intensity

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The European Palliative Care Research Collaborative - EPCRC

• Funding: 6th Framework Programme of the EC (2006-2010)
• Overall objective
  – to improve the treatment of pain, depression and fatigue / cachexia through translation research
• Another major objective
  – develop a computer based symptom assessment and classification tool for pain, physical function (cachexia) and depression for use in PC

An international computerized data collection closed, Dec 2009, n= 1051
Background and objectives

• Consensus-based recommendation
  – pain intensity (PI) should be assessed by uni-dimensional scales like NRS, VRS or VAS

• According to the EPCRC methodology
  – several thorough literature reviews were performed to guide the selection of items in the EPCRC-CSA

• Objectives
  – to investigate studies aiming to compare scales for assessment of PI
    • NRS, VRS or VAS
    • use and performance of scales
    • versions, compliance, acceptability and anchor descriptors
    • specific emphasis on NRSs
Research questions

- What was the objective of comparing scales, and which scales were most frequently compared?
- Did compliance differ between scales?
- Did the verbal anchor descriptors, number of response options, and time frames vary?
- What kind of statistics was used to report the results?
- Were patient-rated and observer-rated pain intensity compared?
- Were patients’ preferences for scales examined?
- Did the results from cancer patients differ from results in other patient groups?
- Were any of the scales recommended to the other(s) for research purposes and/or clinical use, and if so, why?
Methods

• All major databases, 1950 – through April 2010
• Search terms:
  – Search term groups representing
    • 1) the NRS/VRS/VAS scales
    • 2) evaluation, validation, comparison, clinimetry (including the clinimetric filter for PubMed/MEDLINE (Terwee et al 2009)
    • 3) pain
  – Limits: English language, humans, adults
Results

- **54** of 239 papers were included
  - Criterion for inclusion:
    - comparing scales as an explicit study objective

- Major aim for comparing
  - compare different pain ratings to find the most applicable scale for clinical use in a given population
  - heterogeneous samples, sample size 12-1387
- P-O and ER pain most frequent (n=13 & 8), only 6 studies in cancer
- Scales presented in random order in 25 studies (46%)
- Repeated measures in 32 studies
Compliance

- NRS superior to the other scales in 15 studies
- 16 studies did not provide any such information
- VAS lower compliance in 9 studies, associated with
  - higher age, degree of trauma or other impairments
Results, versions and anchors

- VAS by far most used, 59 scales in 52 studies
  - NRS 41 scales, VRS 39 scales
- Eight versions of the NRS (NRS-6 to NRS-101) were used
- Five versions of the VRS (VRS-4 to VRS-11) were used
- All VAS scales were 100mm lines

- Overall, 24 different descriptors were used to anchor the extremes
  - 22 studies had different descriptors in the scales being compared
  - 14 for the NRSs
    - “no pain – horrible pain”, “no pain – worst pain ever”
    - “no pain – worst pain experienced”, “least possible pain – worst possible pain”
Results, probe questions and timeline

• Exact wording of the probe questions not reported in all papers
  – 36 studies: “current pain”, “present pain” or “pain right now”
  – + “weakest”, “worst/strongest”, “recalled”, “anticipated” or “average pain”

• Situational
  – “at rest”, “when moving / coughing”, “maximal pain last hour”, “worst pain ever experienced”, “average pain”

• Timeframes:
  – “last week”, “last 24 hours”, “last night”, “last month”
Results, statistics

- Descriptive statistics in all studies
  - Correlation statistics; comparing scale scores, test-retest, inter-rater reliability and evaluation of treatment effect etc
    - Mostly good correlation between scales, particularly NRSs and VASs
    - Few studies provided confidence intervals, or Intra Class Correlation statistics
    - When different, NRS scores higher than the VAS
    - But, one study found that more than 75% of the patients provided ratings that were not mathematically equivalent on NRS and VAS

- Psychometric evaluations
- Statistical modelling papers (4)
Results, patient preferences, patient vs provider

• Patient preferences, 6 studies
  – in rheumatoid arthritis (1), geriatrics (2), chronic pain (2), cancer (1)
  – all studies used VASs and different VRSs, supplemented by the NRS-11, -21, or 101 and other scales
  – VRS preferred by the less educated and the elderly
  – NRS the instrument of choice in an age-mixed population, chronic pain patients and in head-and-neck cancer patients

• Comparing patient-rated and observer-rated pain, 3 studies
  – Nurses over-estimated (low levels) and underestimated patients’ pain (high levels)
Results, recommendations

- The majority of papers; 29, did not recommend one tool over the other(s)
  - Two of the statistical modeling papers recommended the use of VRS for research, because NRS/VAS provide false impressions of being reliable measures
  - NRS was considered superior in 11 studies, VRS in 7, VAS in 4
- Recommendations based on ease of use, low age-dependent failure rates, superior psychometric properties, responsiveness etc in the given populations
Discussion

• The limitations
  – Heterogenity in studies
    • Population, design, outcomes, methods, scales
    • “acute PI” different from chronic PI, different from cancer pain

• The advantages
  – Good demonstration of the heterogeneity in assessment!
  – Broad coverage

• The implications
  – Need for a standardization
    • Format, wording, probe questions, timeline
Related work

- The Milan Consensus Conference, Sept 2009
  - organized by the EPCRC plus PRC (the European Palliative Care Research Centre), Norway, the Mario Negri Institute and Istituto Nazionale dei Tumori, Italy, EAPC Research Network and participants from PROMIS, WHO, EMA

- Objective (in relation to PI)
  - produce recommendations on how to assess and classify cancer pain

- Recommendation (in relation to PI)
  - Cancer pain intensity to assessed by
  - NRS 0-10, with “no pain” and “pain as bad as you can imagine” as anchors
  - Average pain intensity over a clinically relevant period of time
  - “How would you rate your average pain intensity…” last 24 hours / last week
Conclusion

• NRSs are applicable for uni-dimensional assessment of PI in most settings
• Whether the variability in anchors and response options directly influences the numerical scores, needs to be empirically tested
• A consensus based, standardized assessment of pain intensity is preferable, regardless of cause and diagnosis