Minimal important difference of pain numeric rating scale in patients with Hidradenitis suppurativa: results from THESEUS

Dear Editor,

The THESEUS study (1, 2) was a nonrandomized 12-month prospective cohort study set in 10 UK hospitals to describe current UK Hidradenitis suppurativa (HS) management pathways. HS is a chronic, painful disease affecting flexures and other skin regions, producing nodules, abscesses and skin tunnels. Patient reported outcomes collected in THESEUS included current pain numeric rating scale (NRS), a 15-point change in disease severity anchor item, referring to change since last seen for the study (3) and HiSQOL. (4) It is possible to use these data to estimate a minimal important difference (MID) for pain NRS in patients with HS.

The pain NRS change score was calculated as the value at a follow-up visit minus the value at the previous visit, and was only calculated if consecutive visit values were available. Data across follow-up visits was accumulated into a single database and thus it was possible to have a maximum of four rows of data from the same THESEUS participant. The lack of independence between values from the same THESEUS participant meant that only methodologies based on descriptive analyses could be implemented.

To calculate the MIC using the anchor-based method, the minimum threshold for the correlation between the anchor and the pain NRS change score was required to be $\geq|0.3|$. (5)

The 15-point disease severity anchor item was split into five groups:

- -7 to -4, Large and important negative change;
- -3 to -2, Small but important negative change;
- -1 to +1, No change;
- +2 to +3, Small but important positive change;
- +4 to +7, Large and important positive change.

The sign of the pain NRS change score for those reporting a 'Large and important negative change' or 'Small but important negative change' was reversed, and then the two 'Large and important' categories and the two 'Small but important' categories were combined to create three categories of 'No change', 'Small but important change', and 'Large and important change'. The value of the MIC was determined as:

- within the 'Small but important change' group inter-quartile range;
- close to the median of 'Small but important change' group;
- the value which jointly maximised the percentage of those in the 'No change' group with a lesser value and the percentage of those in the 'Large and important change' group with the same or a greater value.

To calculate the MIC using the distribution-based methods, HiSQOL change scores (HCS) and the standard deviation (SD) of HS were used to create an anchor:

- HCS > 0.5SD, Large and important negative change;
- 0.2 SD < HCS ≤ 0.5SD, Small but important negative change;
- HCS ≤ |0.2 SD|, No change;
- -0.2 SD > HCS ≥ - 0.5SD, Small but important positive change;

- HCS < -0.5SD, Large and important positive change.

Thereafter, the same algorithmic process for identifying the MID in the anchor-based method was used.

For the anchor-based method, n = 391 had a pain NRS change score and the 15-point disease severity anchor item values across the four follow-up visits of the THESEUS study. In the THESEUS population, mean pain scores varied from 3.9 (SD 2.8) at baseline, to 3.7, 3.9, 3.9, and 3.5 after 3, 6, 9, and 12 months respectively. The correlation anchor and the pain NRS change score was ρ = -0.316. The inter-quartile range for the 'Small but important change' group was -1.0 to 2.0, and the median was 0.0. For distribution-based methods, n = 383 had a pain NRS change score and HS across the four follow-up visits of the THESEUS study. The SD of HS was 12.8. The inter-quartile range for the 'Small but important change' group was -0.5 to 2.0, and the median was 0.0. In both cases therefore, the only potential MID values were 1 and 2. Results are given in Table 1 and show that the best estimate for the pain NRS is a MID of 1, as it gives the best balance across the 'No change' and 'Large and important change' groups, and has a higher overall accuracy compared to the potential MID of 2.

Table 1: MID results

Method	Potential MID	% less than potential MID in the No change group	% greater or equal to potential MID in the Small but important change group	% greater or equal to potential MID in the Large and important change group	Overall Accuracy	Overall Accuracy 95% CI*
Anchor-based	1	65% (89/137)	54% (63/117)	55% (76/137)	58% (228/391)	53 to 63
	2	75% (103/137)	37% (43/117)	39% (54/137)	51% (200/391)	46 to 56
Distribution -based	1	68% (75/110)	43% (30/69)	63% (129/204)	61% (234/383)	56 to 66
	2	83% (91/110)	35% (24/69)	51% (104/204)	57% (219/383)	52 to 62

*Binomial Proportion calculated by Wilson's Method. (6)

The results here estimate a MID of 1 for a current pain NRS in a sample of patients with HS. These analyses have several limitations:

- the 15-point disease severity anchor item is not specific to pain;
- the 15-point disease severity anchor item was not designed to be an anchor item for responsiveness analyses and therefore the five categories necessary have been imposed on it.

A systematic review of MCID in chronic pain found quite wide variation in values between studies, related to the baseline level of pain and possibly to differences between the medical conditions included. (7)

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