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LETTER TO THE EDITOR

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The challenge to define a relevant change in medication appropriateness index score in older adults – An approach

The medication appropriateness index (MAI) is considered the most reliable and valid implicit instrument to measure medication appropriateness.[1] However, interpretation of MAI-results in the context of a study is challenging, as a clinically relevant threshold for a specific change in MAI-score is not established.[2] We address this issue by discussing three approaches based on content, distribution and context.

The content-based approach addresses the content and the construct measured by the scale. Considerations concerning content are often results of expert opinions on how the theoretical concept relates to the scale. Regarding the MAI, a drug is identified as inappropriate once a single item is rated as inappropriate. In several publications, the MAI-score was reported as summated score per subject[1] combining MAI-score per drug and drug count. Higher numbers of drugs are associated with higher risk for medication inappropriateness.[3] However, drug count is not equitable to the construct of inappropriate medication.[4] The summated MAI-score is not standardised. The division of the patient's score by patient's drug count results in a comparable and standardised score value.[5]

As medication appropriateness represents a latent construct, it is not recommendable to pick items out of the scale to interpret the change.[6] However, the weighting of the items is of qualitative importance (3 = definitely important, 1 = moderately important). A change in 3 points may mean that three drugs/items were rated *moderately inappropriate* or one drug was rated *inappropriate* in a definitely important item. The originators of the scale assumed a 3-point change to be qualitatively meaningful (personal communication with Prof. Hanlon, University of Pittsburgh). An expert discussion could determine a cut-off for the MAI-change to grant the meaning of the scale more transparency.

Since the underlying measure allows no direct interpretation a distribution-based approach is needed. The randomised controlled trials (RCTs) using MAI mostly reported the mean MAI-change and compared mean differences between groups as a measure of effect size.[1] However, the mean of MAI-change or MAI-score itself is not standardised impairing comparability. Also, if data are not normally distributed the use of the median is appropriate.

In case of MAI, a report of standardised effect sizes (e.g. Cohen's d) including confidence intervals is necessary to compare interventional effects.[6] Benchmarking effect sizes then allows interpreting results descriptively.

The effect size can also be used as standardised distributional measure of the minimum clinically important difference (MCID). The MCID is a threshold value for a change considered so meaningful that the patient would re-choose the intervention.[7] The smallest meaningful change is equivalent to a small effect size (d = 0.2). Thus, the MAI-change equivalent to the MCID can be calculated by multiplying the standard deviation of the baseline-score by 0.2[7] and serve as cut-off for the smallest effect of importance. As the clinical relevance of a MAI-score depends on the drug class (low/high risk of adverse drug reactions),[5] drugs could be stratified and MCIDs calculated for each risk class. However, no consensus exists about the appropriate method to define an MCID[7] and focusing on effect size only leaves the clinical meaning unsettled.

Therefore, the context-based approach focuses on the correspondence between a change in test score and actual change in patient outcomes and the comparison of testing values or effect sizes with previously found effects in other studies with similar intervention/setting/population. Context-dependent even small effects may be meaningful by triggering significant consequences.

Most RCTs showed a reduction of the overall MAI-score.[1,8] A Cochrane review addressing polypharmacy in older people[8] included five studies comparing the post-interventional mean MAI-score finding a 3.88 point lower score for the intervention groups. Another RCT[9] used this mean difference as cut-off for a major benefit. Its meaning for patient-relevant outcomes remains unclear.

The MAI-change is strongly related to pre-interventional appropriateness: the higher the MAI at baseline the higher the mean reduction. A MAI-baseline-score ≥24 was identified as a possible cut-off value to initiate a medication review.[9] In clinical practice the MAI could be used to pre-assess whose medication needs to be assessed and which patients potentially benefit from a medication review. However, the interpretation of the MAI-score itself is not common as it is mostly used as a measure of process.[1] In the Cochrane review,[8] by contrast, not only the change in MAI-score but also the post-interventional MAI-score was compared. It has to be considered that both strongly depend on the number of drugs, the investigated population and the thereby arising potential for improvement. Future research should assess the MAI combined with patient-relevant

outcomes in different settings to establish potential cut-off values for the mean MAI change. Currently, the approach is limited to certain interventions/populations.

As each of the presented approaches has limitations, combining them is useful to interpret MAI-results. It is not conducive to determine a single cut-off for MCID. To interpret the qualitative meaningfulness of a change the content of the scale is of primary importance; therefore, an expert consensus on this matter is needed (e.g. by establishing a cut-off of 3 points). Further the contextual aspects need to be added by adducting comparable studies with different populations using external criteria (e.g. cut-off of 3.88 points for the population of older adults). Distributional aspects are to be included by reporting and interpreting standardised measures of effect size (e.g. Cohen's d).

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COMPETING INTERESTS

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