The Minimum Clinically Important Difference of the International Consultation on Incontinence Questionnaires (ICIQ-UI SF and ICIQ-LUTSqol)

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OBJECTIVE To estimate the minimum clinically important difference (MCID) of the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) and the International Consultation on Incontinence Questionnaire-Lower Urinary Tract Symptoms Quality of Life (ICIQ-LUTSqol) using both anchor-based and distribution-based methods for women with stress urinary incontinence undergoing nonsurgical treatment.

MATERIALS AND METHODS Data from a randomized clinical trial evaluating efficacy of a nonsurgical intervention in women with stress urinary incontinence were used for analyses. The overall score of ICIQ-UI SF ranges from 0 to 21, with greater values indicating increased severity. The ICIQ-LUTSqol ranges from 19 to 76, with greater values indicating increased impact on quality of life. Instruments used in the anchor-based method were the Patient Global Impression of Improvement, patient satisfaction, 1-hour pad test and the incontinence episode frequency. The distribution-based method used an effect size of 0.5 standard deviation. Triangulation of findings was used to converge on a single value of MCID.

RESULTS At 12-month post-treatment, 106 (88.3%) participants completed the follow-up and were included in the analysis. Anchor-based MCIDs of the ICIQ-UI SF were between 3.4 and 4.4, while the distribution-based MCID was 1.7. Anchor-based MCIDs of the ICIQ-LUTSqol were between 4.8 and 6.9, while the distribution-based MCID was 5.2. Triangulation of findings showed that MCIDs of 4 for ICIQ-UI SF and 6 for ICIQ-LUTSqol were the most appropriate.

CONCLUSION For women undergoing nonsurgical treatments for incontinence, reductions of 4 and 6 points in ICIQ-UI SF and ICIQ-LUTSqol, respectively are perceived as clinically meaningful. UROLOGY 133: 91–95, 2019. © 2019 Elsevier Inc.

Patient-reported outcomes are frequently used as research outcomes in clinical trials evaluating efficacy of incontinence treatments.[1] The outcome measures need to have adequate validity, reliability and responsiveness to be clinically useful in assessing interventions.[2] An outcome may have adequate responsiveness (able to detect change following an intervention) but may not be able to estimate the smallest change that is considered clinically important.[3] Minimum clinically important difference (MCID) is an increasingly important concept used to indicate the smallest difference in outcome score which is perceived by patients as important and beneficial.[4-6] A statistically significant difference is conventionally interpreted as a change that is important; however, in the realm of healthcare, a statistically significant difference may have little or no importance to the patients.[7] The statistically significant result could also be due to the large sample sizes used.[7]

The International Consultation on Incontinence Modular Questionnaire (ICIQ) was developed in the early 2000s to promote use of an internationally uniform set of questionnaires.[8] The first module developed, the

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Conflicts of Interest: *This study used data from a randomized clinical trial sponsored by QRS International. Renly Lim was a PhD student who received a research allowance from QRS International during her PhD candidature. All other authors declare that they have no competing interests.*

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ICIQ-Urinary Incontinence Short Form (ICIQ-UI SF), is the most frequently used questionnaire in recent incontinence trials.[1] It is the most relevant outcome measure when evaluating the efficacy of stress urinary incontinence interventions.[1] The ICIQ-UI SF consists of 3 scored items which evaluate the frequency, volume of leakage, and overall impact of incontinence. The overall score ranges from 0 to 21, with greater values indicating increased severity. The second module, the ICIQ-Lower Urinary Tract Symptoms Quality of Life (ICIQ-LUTSqol), is a highly recommended module to measure the impact of incontinence on quality of life of patients.[9,10] The ICIQ-LUTSqol, which is based on the King's Health Questionnaire,[11] comprises 20 items which explores in detail the impact of incontinence on quality of life with particular reference to social effects. The ranges from 19 to 76, with greater values indicating increased impact on quality of life. Both questionnaires have undergone extensive validity and reliability testing,[12,13] but the MCIDs for the ICIQ-UI SF and ICIQ-LUTSqol at 12 months for nonsurgical treatments have not been estimated.

Knowing the MCID has several advantages: (1) assists researchers plan studies and report number of treatment responders, (2) helps clinicians interpret data which are clinically meaningful instead of merely results that are statistically significant, and (3) allows clinicians to more easily convey to patients what to expect from a treatment. The aim of this study was to estimate the MCIDs of the ICIQ-UI SF and the ICIQ-LUTSqol using both anchor-based and distribution-based methods for women with stress urinary incontinence undergoing nonsurgical treatment.

MATERIALS AND METHODS

Data from our randomized clinical trial evaluating efficacy of a nonsurgical intervention (pulsed magnetic stimulation) in the treatment of women with stress urinary incontinence were used for analyses.[14,15] The detailed study design has been published previously.[16] Briefly, eligible participants were female aged 21 years old or older with urine leak upon coughing and an ICIQ-UI SF score of 6 points or greater.[16] A total of 120 women were randomized to receive either the active or sham pulsed magnetic stimulation. Follow-ups were conducted at 3-, 6-, and 12-month post-treatment. Participants who completed the follow-up at 12-months post-treatment were included for analysis in this study. The 1-year period was chosen because it is recommended that trials evaluating efficacy of incontinence treatment should follow-up participants for at least a year.[9] Thus, establishing the MCIDs at this time-point would be considered the most relevant.

The instruments of interests in this study are the ICIQ-UI SF and the ICIQ-LUTSqol. There are various methods to determine the MCIDs of the instruments of interest.[3,4] Two recommended methods to estimate the MCIDs are the anchor-based and the distribution-based methods.[3,4] Anchor-based method estimates the MCID based on various relevant patient-based or clinical indicators. In contrast, the distribution-based method uses statistical characteristics of the obtained scores of the instruments.

In the anchor-based method, participants were divided into 2 subgroups (improvement vs no change/worse) based on their response to the anchors. The MCID was calculated as the mean difference in scores between the 2 subgroups.[3] The anchors were used only if they had an acceptable correlation ($r \geq 0.3$) with the instruments.[3] It is recommended that multiple independent anchors should be used.[6] The subjective anchors included in this study were the Patient Global Impression of Improvement (PGI-I) and satisfaction with treatment results. The PGI-I scale is a self-rated single-item generic measure that allows participants to rate their condition regarding their response to the therapy.[17] It has 7 levels of responses: ranging from "very much better" to "very much worse". The difference in the mean ICIQ-UI SF scores between participants who reported “very much better” or “much better” vs all other responses was used. Satisfaction with treatment results was measured with the question “Overall, please rate how satisfied you are with the treatment”, with 5 possible answer ranging from "completely satisfied" to "completely dissatisfied”. The difference in the mean ICIQ-UI SF scores between “positive” (completely satisfied or mostly satisfied) and “neutral or negative” (neutral or mostly dissatisfied or completely dissatisfied) response was used. The objective anchors used were the 1-hour pad test and incontinence episode frequency on the 3-day bladder diary. The difference in the mean ICIQ-UI SF scores between patients with a ≥50% reduction in the objective measures (1-hour pad test or the incontinence episode frequency) and those with less than 50% reduction, no change or worse was used.[18] In the distribution-based methods, the MCID was calculated using an effect size of 0.5 standard deviation.[3] For each instrument, the effect size was calculated by dividing the difference between the baseline and the 12-month follow-up scores for all participants by the standard deviation at baseline.

Use of multiple methods will result in a range of MCID values.[3] It is recommended that triangulation is used to examine these values in order to converge on a small range of values or a single value.[3] It is also recommended that patients' perspective is the most important when determining MCIDs.[3] Therefore, the anchor-based method which calculates MCIDs using patient-based anchors will be given higher weightage during the triangulation analysis. We plotted and compared the MCIDs and 95% confidence intervals obtained from the anchor- and distribution-based methods.

RESULTS

At 12-month post-treatment, 106 (88.3%) participants completed follow-up and were included in the analysis. The mean age (standard deviation) of participants was 52.2 (9.0). There were improvements in the participants' incontinence symptoms, as demonstrated by the decrease in the ICIQ-UI SF scores from 9.9 (3.4) to 3.9 (3.6) (Table 1). The mean (standard deviation) scores of the ICIQ-LUTSqol decreased from 39.0 (10.3) to 27.6 (7.5), indicating improvement in quality of life (Table 1). Seventy-five (70.7%) of participants felt "very much better" or "much better" as measured using the PGI-I, while 70 (66%) were either "completely satisfied" or "mostly satisfied" (Table 1).

Anchor-based Method

The mean changes in the ICIQ-UI SF and ICIQ-LUTSqol scores according to response (improved vs no change/worse) to each anchor measure are shown in Table 2. Based on the PGI-I and satisfaction score (subjective anchors), the MCIDs (95% confidence

Table 1. Instruments and anchors at baseline and at 12 months post-treatment ($n = 106$)

	Baseline	12 Mo Post-treatment
ICIQ-UI SF, mean (SD)	9.9 (3.4)	3.9 (3.6)
ICIQ-LUTSqol, mean (SD)	39.0 (10.3)	27.6 (7.5)
PGI-I, frequency (%)		
Very much better	-	19 (17.9)
Much better	-	56 (52.8)
A little better	-	25 (23.6)
No change	-	6 (5.7)
A little worse	-	0 (0)
Much worse	-	0 (0)
Very much worse	-	0 (0)
Satisfaction, frequency (%)		
Completely satisfied	-	30 (28.3)
Mostly satisfied	-	40 (37.7)
Neutral	-	30 (28.3)
Mostly dissatisfied	-	6 (5.7)
Completely dissatisfied	-	0 (0)
One hour pad test (patients with ≥50% reduction), frequency (%)	-	84 (79.2)
Incontinence episode frequency (patients with ≥50% reduction), frequency (%)	-	71 (66.9)

ICIQ-LUTSqol, International Consultation on Incontinence Questionnaire-Lower Urinary Tract Symptoms Quality of Life; ICIQ-UI SF, International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form; PGI-I, Patient Global Impression of Improvement; SD, standard deviation.

intervals) of the ICIQ-UI SF were 3.8 (2.7, 4.9) and 4.4 (3.4, 5.4), respectively. Based on the 1-hour pad test and the incontinence episode frequency (objective anchors), the MCIDs of the ICIQ-UI SF were 3.4 (2.0, 4.8) and 3.8 (2.1, 5.5), respectively.

Based on the PGI-I and satisfaction score (subjective anchors), the MCIDs (95% confidence intervals) of the ICIQ-LUTSqol were 6.9 (2.9, 11.0) and 5.4 (1.3, 9.5), respectively. Based on the 1-hour pad test and the incontinence episode frequency (objective anchors), the MCIDs (confidence intervals) of the ICIQ-LUTSqol were 5.2 (0.5, 9.8) and 4.8 (1.4, 10.9), respectively.

Distribution-based Method

The MCIDs for the ICIQ-UI SF and ICIQ-LUTSqol based on 0.5 standard deviation were 1.7 and 5.2, respectively.

Triangulation of Findings

The MCIDs for the ICIQ-UI SF and ICIQ-LUTSqol obtained from the anchor- and distribution-based methods are visually represented in Figure 1. The MCIDs for ICIQ-UI SF obtained using the anchor-based method were higher than the MCID obtained using the distribution-based method. The MCIDs for ICIQ-LUTSqol from the anchor-based method were similar to that using the distribution-based method. Triangulation of findings showed that MCIDs of 4 for the ICIQ-UI SF and 6 for the ICIQ-LUTSqol were the most appropriate.

Table 2. Mean changes in the ICIQ-UI SF and ICIQ-LUTSqol scores based on response to each anchor measure and the corresponding MCIDs at 12 months post-treatment

Anchor Measure	ICIQ-UI SF	ICIQ-LUTSqol
PGI-I		
Improved (very much better, much better), mean (SE)	7.1 (0.3)	12.9 (1.1)
No change or worse (a little better, no change, a little worse, much worse, very much worse), mean (SE)	3.3 (0.5)	6.0 (1.5)
MCID (95% CI)	3.8 (2.7, 4.9)	6.9 (2.9, 11.0)
Satisfaction		
Improved (completely satisfied, mostly satisfied), mean (SE)	7.3 (0.3)	12.5 (1.2)
No change or worse (neutral, mostly dissatisfied, completely dissatisfied), mean (SE)	2.9 (0.4)	7.1 (1.5)
MCID (95% CI)	4.4 (3.4, 5.4)	5.4 (1.3, 9.5)
One hour pad test		
Improved (≥50% reduction), mean (SE)	6.7 (0.3)	12.0 (1.1)
No change or worse (<50% reduction), mean (SE)	3.3 (0.6)	6.8 (1.9)
MCID (95% CI)	3.4 (2.0, 4.8)	5.2 (0.5, 9.8)
Incontinence episode frequency		
Improved (≥50% reduction), mean (SE)	6.6 (0.3)	11.4 (1.1)
No change or worse (<50% reduction), mean (SE)	2.8 (0.9)	6.6 (2.7)
MCID (95% CI)	3.8 (2.1, 5.5)	4.8 (1.4, 10.9)

CI, confidence interval; ICIQ-LUTSqol, International Consultation on Incontinence Questionnaire-Lower Urinary Tract Symptoms Quality of Life; ICIQ-UI SF, International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form; MCID, minimum clinically important difference; PGI-I, Patient Global Impression of Improvement; SE, standard error.

DISCUSSION

We estimated the MCIDs of 2 clinically relevant and frequently used outcome measures in incontinence trials. We determined the anchor-based MCIDs using 2 subjective (PGI-I, satisfaction) and 2 objective (pad test, incontinence episode frequency) measures. Triangulation of the results supports MCIDs of 4 for the ICIQ-UI SF and 6 for the ICIQ-LUTSqol.

The change in an outcome measure score is important but less intuitive to clinicians because it has no defined unit and is difficult to comprehend.[19] Further, a statistically significant result is not the same as a clinically meaningful result. A small difference in mean outcome score may result in a statistically significant difference between treatment groups when the sample size is very large. Thus, it is important that patient-reported outcomes used in

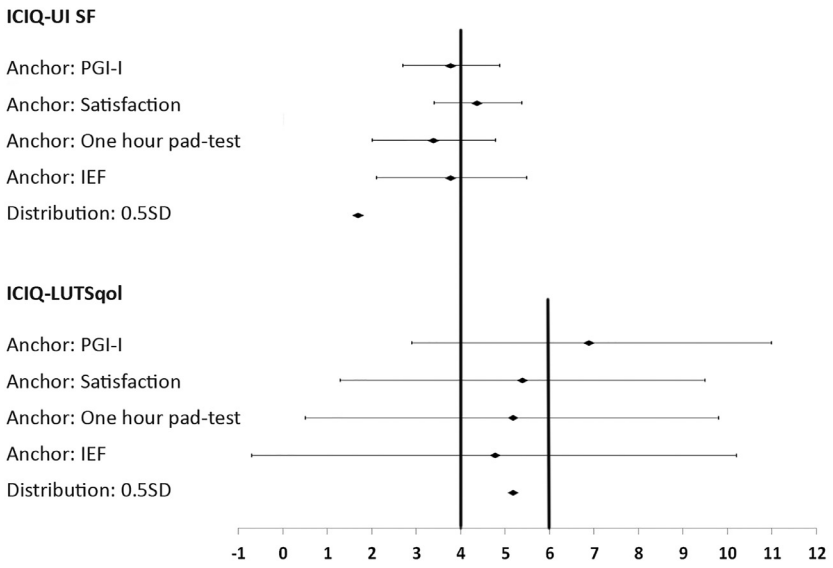

Figure 1. Minimum clinically important difference for the ICIQ-UI SF and ICIQ-LUTSqol using both anchor- and distribution-based methods.

clinical trials have a defined MCID to facilitate interpretation of results.

In our study, higher weightage was given to the anchor-based methods during the triangulation analysis. It is recommended that MCIDs should primarily be calculated from relevant patient-based and clinical anchors to provide meaningful estimates.[3] The distribution-based methods can be used to support estimates from anchor-based approaches or where anchor-based estimates are unavailable.[3] Use of multiple methods to determine MCID will always result in a range of MCID values. Several studies have shown that MCIDs from distribution-based method yield much lower values than anchor-based values, and the MCID values from the distribution-based methods were disregarded.[20,21]

The MCID for the ICIQ-UI SF has been previously suggested in a randomized controlled trial comparing surgical treatments (specifically retropubic vs transobturator midurethral slings) in women with stress urinary incontinence.[21] The study reported a slightly higher MCID at 12 months (5 points) when compared with our results with an MCID of 4.[21] This small difference in MCID may due to differences in complexity of treatment (surgical or nonsurgical), disease severity (mild, moderate, or severe), types of anchors, and goals and expectations of patients.[22] Patients undergoing invasive surgical treatment will presumably expect a better treatment outcome compared with those who receive a nonsurgical treatment.[23] Therefore, it is unlikely that the MCIDs suggested in a trial on surgical intervention will be appropriate for all other interventions and across all patient populations.[3]

Another study estimated the MCIDs of ICIQ-UI SF and ICIQ-LUTSqol using data from a randomized controlled trial comparing 2 different formats of pelvic floor muscle training.[24] The study reported MCIDs of 2.52 for ICIQ-UI SF and 3.71 for ICIQ-LUTSqol. The lower MCIDs are likely explained by the different calculations used to establish the MCIDs and the different follow-up time points. The study used the mean ICIQ scores for patients who responded "a little better" on the PGI-I. In contrast, we calculated the difference in the mean ICIQ scores between participants who reported "very much better" or "much better" vs all other responses. The study used only 1 anchor (PGI-I) whereas we used 4 anchors, which may also partly explain the differences in the MCIDs. It is recommended that multiple independent anchors should be used when estimating the MCID.[6] In addition, the authors calculated the MCIDs using data collected at the 4-month follow-up.[24]

The major strength of our study is the estimation of the MCIDs at the 12-month follow-up; the minimum time point recommended for evaluating efficacy of incontinence treatments.[9] To our best knowledge, no studies have estimated the MCIDs of the ICIQ-UI SF and ICIQ-LUTSqol for nonsurgical interventions at the 12-month follow-up. Another strength is that we used 4 clinically relevant anchors (PGI-I, satisfaction, 1-hour pad test, and incontinence episode frequency) to estimate the MCIDs. The consistent results based on the 4 subjective and objective anchors mean that we can be confident the triangulated MCIDs are reliable.

Our study has a few limitations. We used data from a randomized controlled trial which included only women with stress urinary incontinence. Hence, the results may not be generalizable to other types of incontinence, or in men with incontinence. Our data are from a developing country in South East Asia, which is socially, culturally, and economically different from the western population or developed countries. MCIDs may vary depending on the patients' expectations; expectations may not be similar between patients from developed vs developing country. However, we included patients from one of the most

urbanized district in this region, which may alleviate some of these differences.

CONCLUSION

For women undergoing nonsurgical treatments for stress urinary incontinence, reductions of 4 and 6 points at the 12-month follow-up in the ICIQ-UI SF and the ICIQ-LUTSqol, respectively are perceived as clinically meaningful.

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