

The meaning of it all: evaluating knowledge of Minimal Clinically Important Difference (MCID) among chiropractic students

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Introduction: Patient-reported outcome measures are frequently used to monitor patient progress during chiropractic care, yet student interns utilizing such assessments are unfamiliar with what magnitude of change (MCID) is considered beneficial to the patient.

Objective: This work seeks to determine chiropractic intern knowledge of MCID.

Methods: A five-item survey was administered to 104 chiropractic student interns.

Results: Nearly one-third of the interns correctly defined the MCID acronym, and approximately one-third of the interns knew at least one MCID value for the outcome assessments in the EHR. Surprisingly, 20% of the interns reported knowledge of at least one MCID value, but answered incorrectly pertaining to the MCID acronym.

Conclusion: Student interns value patient perception, but have limited knowledge of MCID values. Addressing

Introduction : Les mesures de résultats rapportés par les patients sont fréquemment utilisées pour suivre les progrès du patient pendant les soins chiropratiques, mais les stagiaires qui utilisent ces évaluations ne sont pas familiers avec l'ampleur des changements (différence minimale cliniquement importante – DMCI) considérée comme bénéfique pour le patient.

Objectif : Cette étude vise à déterminer les connaissances, chez les stagiaires en chiropratique, de la DMCI.

Méthodologie : Une enquête comportant cinq points a été menée chez 104 stagiaires en chiropratique.

Résultats : Près d'un tiers des stagiaires ont correctement défini l'acronyme DMCI (MCID en anglais), et environ un tiers d'entre eux était au courant au moins d'une valeur de DMCI pour les évaluations de résultats dans le DSE. Étonnamment, 20 % des stagiaires ont indiqué connaître au moins une valeur de DMCI, mais n'ont pas su reconnaître l'acronyme DMCI.

Conclusion : Les stagiaires accordent de l'importance à la perception des patients, mais ont une connaissance

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this gap will improve their understanding of patient progress and inform their treatment decisions both in the outpatient clinic and in their practices following graduation.

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KEY WORDS: chiropractic, education, minimal clinically important difference, MCID

Introduction

The ultimate goal for any chiropractic treatment plan is favorable patient outcome. Towards this end, outcome assessments (OAs) are utilized to establish baseline deficiencies in patients, and to monitor progress during the course of care. Outcome assessments are defined as tools used to measure and report patient perceptions during observational studies.¹ These semi-objective and quantifiable assessments can be useful for the clinician to plan future therapeutic strategies and for a patient to realize the benefit (or lack thereof) of care.^{2,3} Of great importance is identifying what amount of change is indicative of clinical response in a patient. This can be challenging since traditional definitions of statistical significance may not always correlate to clinical relevance (e.g. p-values).³ For instance, the meaningfulness of an identical num-

limitée des valeurs de DMCI. Comblant cette lacune permettra d'améliorer leur compréhension des progrès des patients et d'informer leurs décisions de traitement tant en consultation externe que dans leurs pratiques après l'obtention du diplôme.

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MOTS CLÉS : chiropratique, éducation, différence minimale cliniquement importante, DMCI

erical change on an outcome assessment varies among different patient populations.⁴ Further, statistical significance is integrally linked to sample size; thus, significant changes observed in a large population may be clinically irrelevant.⁵ In 1989, Jaeschke *et al.*⁶ defined a measure of health status referred to as the minimal clinically important difference (MCID). MCID is defined as the smallest improvement considered worthwhile for a patient.⁷ Not to be confused with similar terms such as MID (minimally important difference), MCD (minimal clinical difference) or MCSID (minimal clinically significant difference) which all refer to changes outside the standard variations of the outcome assessment of interest; MCID specifically relies on patient perception (with the exception of Delphi method-calculated values, discussed below).^{3,8} Importantly, calculating the MCID value of a given outcome assessment allow clinicians to follow patient progress by quantifying subjective measures.

Methods for calculating MCID values can be divided into three categories: distribution-based, anchor-based, and the Delphi method.⁷ Distribution-based methods are derived from statistical measures of the spread of data, and compare a change in score to measures of variability. These approaches include standard error of measurement (SEM), standard deviation (SD), effect size, minimum detectable change (MDC), reliable change index (RCI) or standardized response mean (SRM).⁷⁻¹⁴ Underlying each of these methods are a number of general concepts; these methods and concepts are summarized in Table 1.

Anchor-based methods compare the change in OA score to a second global measure of change. As an example, the MCID value for an outcome measure specifically designed to assess the level of chronic musculo-

Table 1.
Methods used to calculate MCID.

SEM	an MCID value smaller than the SEM likely results from error ^{8,9}
SD	the MCID value corresponds to one-half the standard deviation ⁶
Effect size	MCID is equal to the smallest calculated effect size and a function of standard deviation of baseline values ¹⁰
MDC	an MCID value must be at least equal to the smallest detectable change (MDC) ¹¹
RCI	closely related to the concept behind MDC, MCID is a function of the SEM ⁴
SRM	similar to the concepts underlying effect size, except the MCID and effect size values are a function of the standard deviation across change values. ¹²

skeletal pain intensity might be calculated by comparing scores to a Patient Global Impression of Change score.¹⁵ Approaches falling into these methodological categories are reviewed in greater detail in Wells et al, 2001.⁸

Dissimilar from the distribution and anchor-based methods for calculating MCID, the Delphi method is an opinion-based technique in which, a panel of experts in a given field and with extensive familiarity with the health disorder and with the specific outcome assessment are repeatedly queried until a consensus on the minimum clinically significant change is reached.¹⁶ Consensus methods have been commonly used in the development of clinical guidelines, and provide great value for evaluating patient progress. The challenges of using this method, however, include implied cues within the questionnaire, selection of the panel members, selection and presentation of scientific knowledge, and methods of finalizing the consensus (e.g. defining agreement, addressing outliers).¹⁷ One example of a commonly used outcome assessment is the Visual Analog Scale (VAS).¹⁸ This scale attempts to measure a characteristic which occurs across a continuum (here, the continuum referred to is pain) that is not easily measure or described.¹⁹ As depicted in Table 2 MCID values for VAS differ between acute²⁰⁻²⁴ and chronic lower back pain^{20,25-27}, two related yet different conditions, and even within the same condition across multiple studies^{20,25}. These discrepancies highlight a challenge of using MCID value: lack of standardization; however, MCID remains a reliable tool for evaluating clinically relevant changes in patient populations.

Anecdotally, chiropractic students have both an interest in identifying significant improvements in patient well-being and a lack of knowledge of the term MCID and relevant MCID values for the outcome assessments that they regularly administer. Although a recent article summarizes MCID comprehensively²⁸, there are no reports addressing use of MCID in chiropractic and no work addressing the value of MCID as an educational topic in chiropractic colleges. As a first step towards determining chiropractic intern knowledge of MCID, this work seeks to query students about what the MCID acronym represents and whether students are familiar with MCID values for the outcome assessments commonly used in our outpatient clinic. Gathering such preliminary information will identify strengths and areas for improvement, to provide a basis for increasing instruction and developing novel tools on the topic.

Table 2.
Representative MCID values for the Visual Analog Scale (VAS).

Population	MCID Score (mm or units)
Acute Lower Back Pain (< 2 weeks)	20 – 35 ^{18,22}
Chronic Lower Back Pain (> 12 weeks)	18 – 19; 20 – 25 ^{18, 23-25}

Table 3.
Student knowledge and attitudes about MCID.

KNOWLEDGE
Which phrase is represented by the acronym MCID?
Have you administered either of the following outcome assessments using the HER system, Future Health Smart Cloud™?
Rank the top FIVE assessments you currently use.
For which of the following outcome assessments do you know the MCID values
ATTITUDE
Do you think it is important to have a tool with which to compare a patient’s outcome assessment score(s) and thus have a sense of patient response to treatment?
Which of the following do you think is most relevant as it relates to a patient’s overall outcome?

Methods

An anonymous questionnaire was administered to chiropractic interns. Participation was strictly voluntary, and sampling was based on student availability. The study was reviewed and approved by the University’s Institutional Review Board.

Participants

Chiropractic interns were recruited by a peer (who was excluded from completing the questionnaire) when passing in the hallway. Of a total 104 eligible student interns enrolled at the time the instrument was administered, 58 interns completed the survey with a response rate of 55.8%.

Survey Instrument and Procedure

The questionnaire instrument included two demographic questions (gender and trimester in chiropractic program) and six survey items (*Appendix A*). Gender was recorded to determine whether respondents were representative of all student interns on campus (Figure 1). The trimester of study was used to confirm that only student interns completed the study. The purpose of the instrument was to determine student intern knowledge of MCID, use of outcome assessments, and use of MCID values in their outpatient clinic practice (Table 3). Further, two survey items were designed to evaluate student intern attitudes concerning need for objective patient response and relevance of the patient and/or clinician perspective to a patient's overall outcome (Table 2). Although formal validity of this piloted survey instrument was not evaluated (discussed further in Limitations), face validation by two independent clinical instructors was performed. These independent reviewers evaluated the goals and objectives of the survey, the readability of the survey items, and whether the instrument appropriately addressed the intended audience. During the independent review, both instructors found that the survey items matched the stated goals and objectives of the research study and that the instrument was written to address its intended audience. Further, they found the questions were clear and concise, suggesting easy readability; a Flesh reading ease score of 59.5 and a Flesch-Kincaid Grade Level of 9.3 supported this finding.^{29,30} Student interns were verbally consented to completing the anonymous questionnaire, and questionnaires were not administered during class time.

Statistics

All descriptive statistical observations were calculated using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Released 2015, Armonk, NY). Frequencies were calculated and reported as percent (%) of total responders. Where indicated, cross-tabulation was performed to compare variables. The histogram plot was generated by calculating the frequency. Cross-tabulation data were reported as frequency, with percent (%) of totals calculated within groups and across the entire population of responders in parentheses.

Results

To address the goal of evaluating our student intern know-

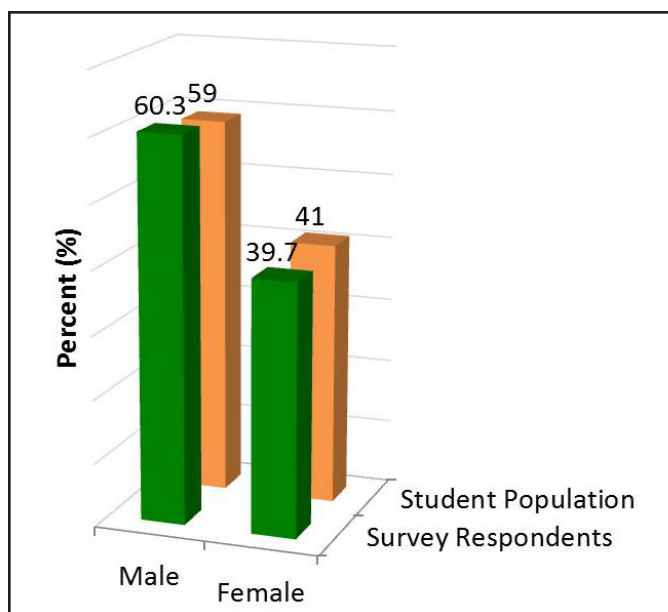


Figure 1.
Gender distribution of survey respondents
and student population.

ledge and understanding of how to identify clinical relevance of a change in score on an outcome assessment, we queried the interns to identify what percentage could define the acronym MCID. Based on the demographic question, the gender of our study population was comparable to the total study population (respondents: 60.3% male, 39.7% female; student population: 59% male, 41% female; Figure 1). Nearly one-third (32.8%) of the respondents correctly identified the phrase “minimum clinically important difference” (Figure 2). The outpatient chiropractic clinic currently utilizes 14 outcome assessments (OAs) through its EHR software. Every responder had used at least two of the OAs, and histogram analysis revealed an expected bell-shaped plot (median = 6 outcome assessments used; Figure 3); however, 70.7% of respondents did not know MCID values for any of the 14 OAs in use in the clinic (Table 4). Using a simple cross-tabulation calculation, student intern knowledge of the MCID acronym was compared with knowledge of actual MCID values for the 14 outcome assessments available in the EHR system. Interestingly, 17.2% of respondents did not know the MCID acronym but knew one or more MCID values (Table 4).

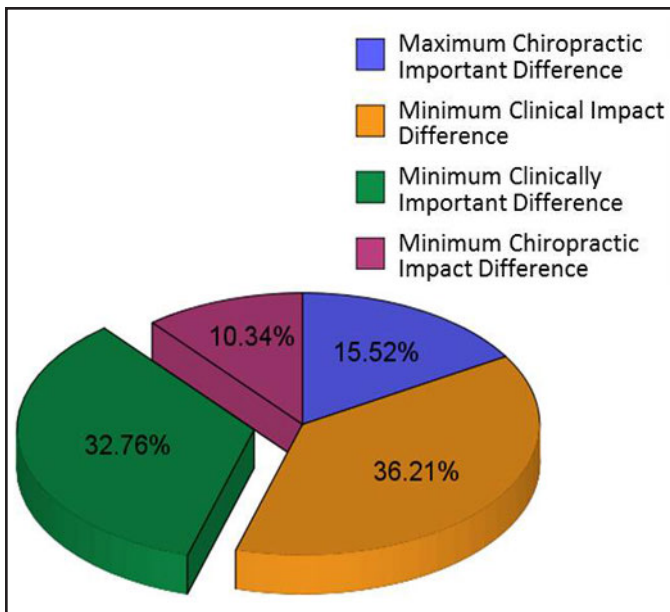


Figure 2.

Response distribution for meaning of MCID acronym.

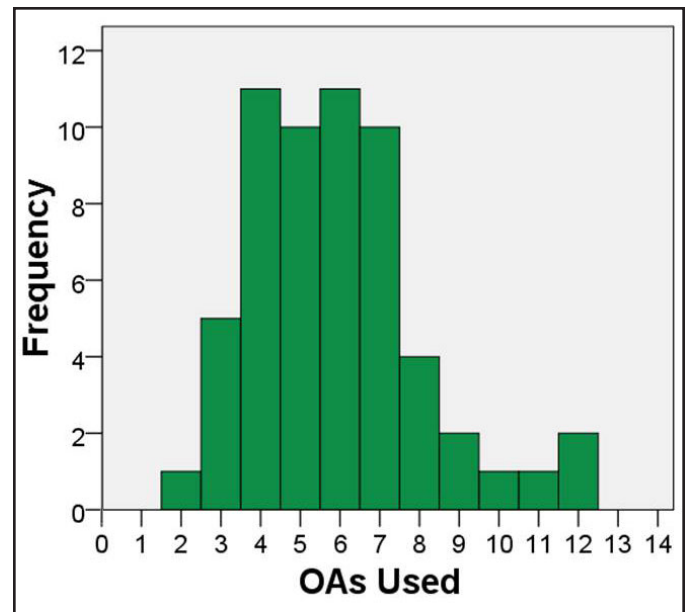


Figure 3.

Number of different outcome assessments (OAs) employed.

Discussion

The overall goal of this preliminary study was to gain insight into whether chiropractic interns know the MCID acronym, whether they know MCID values associated with the OAs currently in use, and their general perception of both the value of patient perception and importance of quantifying changes in such perceptions. Our results suggest that approximately one-third of student interns enrolled at the University know the phrase represented the MCID acronym. Further, approximately one-third of

these interns report knowing one or more actual MCID values for the commonly used outcome assessments used in the outpatient clinic. These data may suggest a gap in knowledge between assessing a patient (at baseline and subsequent visits) and recognizing the clinical significance of observed changes in the patient.

It is important to note that since there are a number of methods for calculating MCID values (up to nine published)⁸, there are inconsistent reported MCID values for

Table 4. MCID acronym.

	Maximum Chiropractic Important Difference	Minimum Clinical Impact Difference	Minimum Clinically Important Difference	Minimum Chiropractic Impact Difference	No Response	Total
Do Not Know MCID Values	6	16	14	4	1	41 (70.7%)
Knows One or More MCID Values	3	5	5	2	2	17 (29.3%)
Total	9 (15.5%)	21 (36.2%)	19 (32.8%)	6 (10.3%)	3 (5.2%)	58 (100.0%)

many patient-reported outcome assessments (e.g. Health Status SF-36)^{8,27,31-33}. Other challenges presented when calculating MCID value for a given outcome assessment include recall bias of patient (response more reflective of current health status versus comparison between current and baseline reported values), variability of the health status across a patient population leading to wide standard deviations (particularly in distribution-based methods), and, pertinent to anchor-based methods, inherent flaws in the tools used as the anchor measure.^{32,34-36} Thus, it is important to carefully weigh the use of calculated MCID values with the knowledge and experience of the clinician. However, we maintain that use of MCID is a valuable tool for integrating subjective, patient centered research into evidence based literature.

Currently, chiropractic interns at our institution receive didactic instruction (Introduction to Research course) on the difference between statistical significance and clinical difference over the course of 1-2 lectures, during the third trimester of the program. In the future, we seek to address this problem by integrating the concept of clinically important difference more frequently during the Research Methods course (often taken during the 8th trimester) while students are completing their clinic internship responsibilities. Additionally, we plan to develop a MCID reference guide for the OAs found within our EHR system; copies will be available in the clinic for use. Further, follow-up studies will validate the current survey instrument and subsequently administer to chiropractic students in various stages of study including prior to and following completion of each of the two research courses in our curriculum and following the first year of employment after matriculation. We hypothesize those students'

attitudes towards the importance of patient perception of improvement and their knowledge of tools (namely, MCID) to measure the clinical significance of patient-reported improvement will increase greatly.

In a larger context, patient-reported outcome measures are increasingly used to inform evidence-based clinical practice, and complete documentation of patient outcomes is more often expected documentation for third-party payers.^{28,37} Necessarily, standardization of such subjective measures has arisen as a potential tool for use in the development of evidence, and as a means to eliminate costly treatments with no measurable benefit. In fact, an editorial published in Science Magazine highlights the importance of enhancing practical use of outcome measures in terms of clinical significance through increasing practitioner familiarity and by implementing technological tools to lessen the time burden that consistent use of such measure may cause.³⁸

An increase of the scientific literature to support evidence-based chiropractic practice supports both the intra-professional perception of chiropractic as an integrative health care approach and the expansion of payer coverage for care, both of which are contemporary challenges in the field.³⁹⁻⁴¹ As chiropractic student interns represent the future of chiropractic, it is important both to engage students in the research that supports scientific literature and to equip them with tools that allow them to pursue evidence based clinical practice in their independent careers. In fact, recent research has demonstrated that at one chiropractic college 99% of students surveyed agree that research is necessary for positive professional growth.⁴² A second study of students representing 12 North American chiropractic colleges found that chiro-

Table 5. Summary of literature search – MCID in chiropractic education.

Search Terms	Results in PubMed	Relevant to Topic	Results in Index to Chiropractic Literature	Relevant to Topic
“Education” AND “MCID”	20	0	1335	0
“Education” AND “Minimum Clinically Important Difference”	12	0	1336	0
“Chiropractic Student” AND “MCID”	0	–	50	0
“Chiropractic Student” AND “Minimum Clinically Important Difference”	0	–	51	0

practic students either agree (34.8%) or strongly agree (52.2%) that is important that practicing chiropractors are educated in evidence-based practice. The majority of these students also responded affirmatively (agree or strongly agree) when asked if it's appropriate to update and enrich chiropractic theories based on scientific advancement and if scientific evidence is more important than traditional chiropractic theory, 86.8% and 51.9% respectively.⁴³ Taken together, these data emphasize the growing interest in research and evidence based clinical decision making among chiropractic students.

Limitations

The survey instrument used in this study was only subjected to face validation, which is a subjective assessment of the measurements. We acknowledge that more stringent validation techniques should be employed were responses to be used as a basis for major curriculum decisions. The sample size of this study was small, and limited to the number of interns who were readily available to complete the survey over the course of 3 days. It is worthy to note, however, that based on the number of total eligible interns our response rate (55.8%) was comparable to what has been observed using paper surveys in the past.⁴⁴

Conclusion

To the best of our knowledge, this work represents the first peer-reviewed discussion of chiropractic student intern knowledge of MCID. Searches of either PubMed or Index to Chiropractic Literature (performed during February 2016; Table 5) revealed no research on the topic. Here, we sought to initiate a pilot study to determine basic intern knowledge of MCID, and attitudes towards perception of patient improvement (patient versus clinician perspective) among interns at our institution. While these data are limited, they serve as an early measure of MCID knowledge among our interns and can be used to justify more extensive study on the topic. Our future goal is to use a combination of quantifiable and consensus-based methods to develop a standardized method for calculating MCID values, and to subsequently develop and integrate a guideline for evaluating patient progress for use in the outpatient clinic. Ultimately, we seek to give student interns the tools to implement an evidence-based course of treatment for patients in their care, both during training and in their individual practices upon matriculation.

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Appendix A.
MCID Survey Instrument.

MCID Questionnaire

Please take a few minutes to fill out this survey on issues related to MCID and outcome assessments in chiropractic practice. Participation in this survey is voluntary, and your answers will be kept anonymous. Mark the box to the left of the chosen response. Thank you for your participation.

General Information

1. Gender

₁ Male ₂ Female

2. Trimester

____/12 ____/10

Knowledge

1. Which phrase is represented by the acronym MCID?

₁ Minimum Clinically Important Difference ₂ Minimum Clinical Impact Difference
₃ Maximum Chiropractic Important Difference ₄ Minimum Chiropractic Impact Difference

2. Have you administered either of the following outcome assessments using the EHR system, Future Health Smart Cloud™ (please check all that apply)?

₁ Quadruple Visual Analogue Questionnaire
₂ Pain Intensity
₃ Patient Progress
₄ Health Status (SF-36)
₅ Headache Questionnaire
₆ Neck Disability Index (Vernon Mior)
₇ Oswestry Back Pain - Modified
₈ Roland-Morris Disability Questionnaire
₉ Copenhagen Neck Functional Disability Scale
₁₀ Functional Rating Index
₁₁ Shoulder Injury
₁₂ Boston Carpal Tunnel Syndrome Questionnaire
₁₃ Anterior Knee Pain
₁₄ Zung Depression Index
₀ None of the above

3. Rank the top FIVE assessments you currently use (please only select five assessments, ranking them 1 – 5 where 1 is the most commonly used assessment)?

- ₁ Quadruple Visual Analogue Questionnaire
- ₂ Pain Intensity
- ₃ Patient Progress
- ₄ Health Status (SF-36)
- ₅ Headache Questionnaire
- ₆ Neck Disability Index (Vernon Mior)
- ₇ Oswestry Back Pain - Modified
- ₈ Roland-Morris Disability Questionnaire
- ₉ Copenhagen Neck Functional Disability Scale
- ₁₀ Functional Rating Index
- ₁₁ Shoulder Injury
- ₁₂ Boston Carpal Tunnel Syndrome Questionnaire
- ₁₃ Anterior Knee Pain
- ₁₄ Zung Depression Index
- ₀ None of the above

4. For which of the following outcome assessments do you know the MCID values (please check all that apply)?

- ₁ Quadruple Visual Analogue Questionnaire
- ₂ Pain Intensity
- ₃ Patient Progress
- ₄ Health Status (SF-36)
- ₅ Headache Questionnaire
- ₆ Neck Disability Index (Vernon Mior)
- ₇ Oswestry Back Pain - Modified
- ₈ Roland-Morris Disability Questionnaire
- ₉ Copenhagen Neck Functional Disability Scale
- ₁₀ Functional Rating Index
- ₁₁ Shoulder Injury
- ₁₂ Boston Carpal Tunnel Syndrome Questionnaire
- ₁₃ Anterior Knee Pain
- ₁₄ Zung Depression Index
- ₀ None of the above

Attitude

5. Do you think it is important to have a tool with which to compare a patient's outcome assessment score(s) and thus have a sense of patient response to treatment?

- ₅ Strongly Agree
- ₄ Agree
- ₃ Neutral
- ₂ Disagree
- ₁ Strongly Disagree

6. Which of the following do you think is most relevant as it relates to a patient's overall outcome?

- | | |
|---|--|
| <input type="checkbox"/> ₁ Outcome based on the patient's perspective | <input type="checkbox"/> ₂ Both of these |
| <input type="checkbox"/> ₃ Impression of change from the clinician's perspective | <input type="checkbox"/> ₄ Neither of these |