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What is a Clinically Relevant Difference in MDADI Scores between Groups of Head and Neck Cancer Patients?

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Abstract

Objective/Hypothesis—To describe clinically relevant between group differences in MD Anderson Dysphagia Inventory (MDADI) scores among head and neck cancer (HNC) patients.

Study Design—Retrospective cross-sectional study was conducted in 1,136 HNC patients seen for modified barium swallow (MBS) studies.

Methods—The MDADI was administered by written questionnaire at the MBS appointment. MDADI global, composite, and subscale scores were calculated. Anchor-based methods were employed to determine clinically meaningful between group differences by feeding tube status, aspiration status (per MBS study), and diet level.

Results—Mean MDADI scores for the 1,136 patients were: emotional 65.8±17.3, functional 68.1±19.6, physical 60.1±18.6, global 59.3±28.3, and composite 64.0±17.1. Three hundred-seventy-eight patients (33%) were feeding tube dependent and 395 (34.8%) were aspirators; 122 (11%) were nothing per oral (PSS-HN diet=0) and 249 (22%) ate unrestricted, regular diets (PSS-HN diet=100). Statistically significant ($p<0.0001$) between group differences (feeding tube vs. no feeding tube, aspirator vs. non-aspirator, oral vs. non-oral diet, PSS-HN diet levels) were observed for all mean MDADI scores (global, composite, and subscales). A mean difference of 10 points in composite MDADI scores differentiated feeding tube dependent from non-tube dependent patients, aspirators from non-aspirators, and distinct PSS-HN diet levels.

Conclusions—We identify that a 10 point between-group difference in composite MDADI scores was associated with clinically meaningful between-group differences in swallowing function.

Keywords

dysphagia; head and neck cancer; MD Anderson Dysphagia Inventory (MDADI)

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INTRODUCTION

Dysphagia is a key outcome of interest in head and neck cancer. Measures of dysphagia include instrumental examinations of swallowing physiology and bolus transport, most commonly videofluoroscopy, and patient-reported outcomes (PRO) questionnaires. Since its introduction in 2001, the MDADI has become a popular PRO measure of swallowing-related quality of life. A review of the literature finds MDADI scores reported in more than 40 publications and the instrument is validated in 5 languages.¹⁻⁵ Given widespread adoption in clinical research in the last 15 years, the MDADI is arguably the principal PRO measure of perceived dysphagia in head and neck cancer research, and as such is included as an endpoint measure in both domestic and international cooperative group trials of organ preservation strategies.

A major challenge facing investigators is the lack of consensus on the clinical relevance of observed differences in MDADI scores. For instance, statistically significant differences in 19-item composite MDADI scores reported in comparative studies range from 4 to 18 points.⁶⁻⁹ It is not clear, however, if these differences represent truly clinically meaningful variations in swallowing outcomes or are merely statistically significant. Methods have been defined to statistically quantify meaningful change in PRO measures, often described as the minimal clinically important difference (MCID). Under this distribution based approach, the MCID equates to roughly half the pooled standard deviation. Using this distribution-based approach, the MCID of the 19-item composite is roughly 8.5 points (assuming standard deviation of 17). While the consistency of half a standard deviation has been robustly demonstrated,¹⁰ authors suggest that distribution-based approaches of meaningful change be evaluated and modified on the basis of relevant clinical anchors.¹¹ Clinical anchors are established or validated observer-rated reference measures that discriminate varying levels of the construct of interest, such as feeding tube, diet or aspiration status as discriminators of swallowing performance. Thus, the objective of the present study was to define clinically relevant between group differences in MDADI scores using aspiration, feeding tube status, and diet as anchor-based criterion standards. Meaningful differences in MDADI scores by clinical anchors were also compared to a distribution-based MCID.

MATERIALS AND METHODS

Study Design and Eligibility

A retrospective cross-sectional study was conducted to identify clinically meaningful between-group differences in MDADI scores. HNC patients who completed MDADI questionnaires at the time of routine modified barium swallow (MBS) studies (03/2003-06/2011) were eligible for inclusion in the study. Inclusion criteria were: 1) diagnosis of oral cavity, oropharyngeal, nasopharyngeal, laryngeal, or thyroid cancer, and 2) complete MDADI scores recorded in the MDACC MBS Database. Nineteen hundred eighty-nine potentially eligible head and neck cancer patients with complete MDADI scores were identified by a search of the MDACC MBS tracking database. Eight hundred twenty-four patients were excluded according to the following criteria: more than 1 site of disease, metastatic disease, recurrent disease, patient <18 years of age at the time of MDADI, and those who underwent MBS in the early postsurgical period (within 6 weeks of surgery)

when PO intake has not yet been attempted to allow appropriate completion the questionnaire. Therefore, 1,136 patients were included in this analysis. Institutional review board approval and a waiver of informed consent were obtained.

MD Anderson Dysphagia Inventory (MDADI)

The MDADI was administered by written questionnaire at the time of arrival for MBS studies. The MDADI is a 20-item self-administered questionnaire that quantifies swallowing-related quality of life. The MDADI has been validated with regard to content, criterion and construct validity and is considered reliable based on test-retest correlations (0.69-0.88) and overall Cronbach's coefficient = .96.¹² Each item is scored on a 5 point Likert scale (strongly disagree, disagree, no opinion, agree, strongly agree). The MDADI quantifies an individual's global (G), physical (P), emotional (E), and functional (F) perceptions of their swallowing ability. Two summary scores can be obtained from the MDADI: 1) global and 2) composite. The global scale is a single question, scored individually, to assess the overall impact that swallowing abilities have on quality of life ("my swallowing impacts my day-to-day life"). The composite MDADI score summarizes overall performance on remaining 19-items of the MDADI, as a weighted average of the physical, emotional, and functional subscale questions. Global, composite, and emotional subscales assess domain-specific performance. Summary and subscale MDADI scores are normalized to range from 20 (extremely low functioning) to 100 (high functioning). The composite MDADI score was chosen as the primary endpoint for this analysis because it reflects overall performance on 19-items. Only one MDADI questionnaire was analyzed per subject; the MDADI was taken from the first eligible MBS study in cases where multiple were completed during the review period.

Assessing Clinically Relevant Difference in MDADI by Clinical

An anchor-based method was used to determine clinical relevant differences in the composite MDADI score. MDADI scores were stratified by 3 clinically relevant swallowing outcomes: 1) feeding tube status at time of MBS, 2) aspiration status (per MBS study), and 3) diet level (according to the Performance Status Scale- Head and Neck [PSS-HN] normalcy of diet subscale) at time of MBS. Feeding tube status and aspiration were coded as binary (yes/no) variables. Diet levels were rated according to the validated PSS-HN normalcy of diet subscale in which 0 indicates non-oral nutrition and 100 indicates a regular, unrestricted oral diet. Diet level was rated during the patient interview by the SLP prior to the MBS study thus reflecting the diet status at the time when the MDADI was completed, and not reflected any recommended changes to diet level on the basis of MBS findings.

Assessing Clinically Relevant Differences in MDADI by Distribution-based Approach (MCID)

The MCID of the summary MDADI scores (composite, global) and subscale scores (emotional, functional, physical) was also evaluated using a distributional approach. The MCID was calculated as half the baseline standard deviation of the total sample.

Statistical Methods

Descriptive statistics were calculated to describe the sample characteristics, distributions of MDADI scores, and between-group differences. Between-group differences for binary variables (feeding tube status and aspiration) were compared using the student's t-test. Between group differences by PSS-HN diet levels were evaluated using one-way anova. Statistical significance was considered α -level 0.05. Statistical analyses were performed using the STATA data analysis statistical software, version 10.0 (StataCorp LP, College Station, TX).

RESULTS

Sample characteristics

1,136 HNC patients seen for modified barium swallow (MBS) studies (03/2003-06/2011) were included. The median age was 60 years (range: 18-93) and 73% (833/1,136) were male. Oropharyngeal (480/1,136, 42%) and laryngeal/hypopharyngeal (373/1,136, 33%) cancers were most common. MBS studies and MDADI questionnaires were completed before HNC treatment in 245 patients (51%) and after treatment in 891 (78%, median 4.5 months posttreatment). Three hundred seventy-eight (33%) were feeding tube dependent; 262 were partially tube dependent, and 116 were fully tube dependent (NPO). Thirty-five percent (395/1,136) were aspirators per MBS. One hundred twenty-two patients (11%) were nothing per oral (PSS-HN diet=0) and 249 (22%) ate unrestricted, regular diets (PSS-HN diet=100). Table I describes patient characteristics.

Distributions of MDADI Scores

Mean MDADI scores for the 1,136 patients were: emotional 65.8 ± 17.3 , functional 68.1 ± 19.6 , physical 60.1 ± 18.6 , global 59.3 ± 28.3 , and composite 64.0 ± 17.1 . Among summary scores, mean global scores were lower and more variable than composite scores. Among the three subscale scores, mean physical domain scores were lowest and functional domain scores were highest.

Clinically Relevant Differences in MDADI Scores by Clinical Anchors of Swallowing Function

Statistically significant ($p < 0.0001$) between-group differences (feeding tube vs. no feeding tube, aspirator vs. non-aspirator, oral vs. non-oral diet, PSS-HN diet levels) were observed for all mean MDADI scores (global, composite, and subscales). Clinically meaningful differences were examined primarily for the 19-item summary composite MDADI score. Table II provides summary MDADI scores by clinical anchors and Table III provides subscale scores by similar stratifications. A mean difference of 9.0 to 10.8 points in composite MDADI scores differentiated feeding tube dependent from non-tube dependent patients, aspirators from non-aspirators, and distinct PSS-HN diet levels (Figure 1). Between PSS-HN diet levels, a mean difference of 9.6 to 12.7 points differentiated those on restricted solid food diets (PSS-HN 50-80) vs full diet requiring liquid assist (PSS-HN 90) vs a full diet requiring no restriction or assistance (PSS-HN 100). Mean differences between all PSS-HN diet groups ranged from 5 to 12.7 points (regular, restricted solids, and non-chewable/

pureed/liquid). With a standard deviation of 16.7, a 10 point between group difference in composite scores detects a medium to large effect size (Cohen's $d = 0.599$). Subgroup analysis of 480 patients with oropharyngeal primary tumors is presented in Table IV.

Minimally Clinically Important Difference (MCID) using Distribution-based Approach

Using a distribution-based method to determine MCID at 0.5 of the standard deviation, the MCID for the 19-item composite MDADI score is 8.35 points. The distribution-based MCID is larger for the global score, 14.2 points, due to larger variability in the 1-item global score. Distribution based MCID for subscale scores was: 8.6 (emotional), 9.2 (functional), and 9.3 (physical).

DISCUSSION

MDADI scores describe a patient's perception of swallowing abilities and their swallowing-related quality of life. In the last decade, the MDADI has gained substantial popularity among head and neck clinicians to standardize patient reporting of perceived dysphagia. The MDADI is now commonly used as the primary functional outcome measure in many clinical studies, and has been adopted as an endpoint measure of swallowing outcomes in current cooperative group trials in the United States (ECOG-3311, RTOG-1221, HN002) and abroad (ORATOR, PATHOS). Use of a consistent PRO measure facilitates the ability to compare outcomes across multiple studies with the potential for comparative effectiveness studies and meta-analyses.

Investigators face several decisions when designing studies using MDADI scores as an endpoint measure. First, investigators must choose which of the 5 scores to report (global, composite, functional, physical, or emotional). Subscale scores (emotional, functional, and physical) reflect specific domains of the individual's perceived swallowing abilities whereas 2 summary MDADI scores are intended to reflect the overall perception of swallowing abilities. Summary MDADI scores include: 1) the composite score, sometimes referred to as the total score, based on 19-items (excluding the global item) and 2) the 1-item global scale score. In this analysis, the composite score showed less variability (lower standard deviation) and a more consistent performance across clinical anchors of swallowing function.

Specifically, between group differences in composite scores ranged from 9.0 to 10.8 when stratified by aspiration status, feeding tube, and PO status while differences in global scores ranged from 13.2 to 18.2. For this reason and owing to better coverage of the MDADI domains, the 19-item composite score was selected as the primary endpoint of interest, and we suggest the 19-item score as the primary summary score of interest when using the MDADI as a clinical outcome measure.

Investigators using the MDADI as a primary endpoint in clinical studies must also specify the expected meaningful difference when performing power calculations to estimate sample size. Using anchor-based methods in a cross-sectional analysis of more than 1,000 patients, our data suggest that a 10-point between-group difference in the 19-item composite MDADI scores is associated with various clinically meaningful differences in swallowing function. Using the anchor-based method to define a meaningful difference requires a slightly larger, and thus more conservative, delta (10-points) than relying purely on a distribution-based

method in which the MCID is calculated as 8.5 points. As a method, the MCID was initially applied to within subject change over time in longitudinal studies,^{13,14} but between-group differences (not within subject changes) are much more commonly reported and analyzed both in observational studies of head and neck cancer survivors (cross-sectional) and clinical trials. Jointly, these issues highlight the potential limitation of relying solely on a distribution-based MCID to make decisions about effect size when planning research trials. Meaningful differences may not always be minimal (as per MCID). The important difference that translates to clinical relevance may exceed the *minimally* important difference (i.e., MCID) identified statistically by $\frac{1}{2}$ the SD,¹¹ and our analysis suggests this might be the case with the MDADI where the more liberal MCID of 8.5 may not always represent unequivocally meaningful differences in swallowing performance. This point is not trivial, especially when the MDADI is selected as the primary endpoint for therapeutic trials that have potential to influence practice changes. In this scenario, stringent criteria must be applied to define meaningful differences in PROs that could very conceivably motivate dramatic changes in practice toward de-intensification of cancer therapy. For this reason, we favor use of a 10-point between group difference in MDADI scores to define relevant differences between arms in therapeutic trials. As the complementary nature of PRO's and more objective swallow measures have been robustly described, our preferred approach is also to pair the MDADI with a panel of swallow-specific measures including MBS as an instrumental measure of swallow safety, efficiency and physiology, alongside the Normalcy of Diet subscale score from the Performance Status Scale of Head and Neck Cancer as a measure of swallow-specific functional status.^{15,16} Our study methods were designed to identify clinically relevant *between-group* differences in MDADI scores. We did not evaluate clinically relevant differences *within-subjects* (i.e., meaningful changes in an individual patient over time) or meaningful differences in *MDADI change scores* (i.e., MDADI pre vs. post). As such, the findings from this report can help to interpret findings or plan clinical trials comparing MDADI scores between treatment arms or observational comparative effectiveness studies comparing scores between groups. The between group differences we describe cannot, however, be interpreted as meaningful differences within individual patients over time. Our single survey cross-sectional methodology did not allow for analysis of longitudinal within-subject changes in MDADI scores. Beaton et al (2002)¹⁷ suggest that clinically meaningful differences between groups are commonly distinct from those within individuals. A recent methodological paper suggests that a change of 20 points in an individual's within-subject MDADI scores may be meaningful.¹⁸ We agree with this notion as a 20-point change in an individual's MDADI scores over time equates to consistently moving responses up or down one level on the 5-point Likert ratings of the questionnaire (e.g., from "strongly agree" to "agree", or from "disagree" to "strongly disagree"), and might be considered a candidate clinically relevant change within an individual subject. Meaningful individual changes (within-subjects) in MDADI scores were not analyzed in this study and require further assessment using longitudinal datasets.

It is important also to acknowledge that the clinical workflow made it possible that the SLP conducting the MBS study could review the MDADI results in the intake of the patient into the radiology suite. While there is potential that MDADI ratings might influence a clinician's grading of subjective MBS parameters such as qualitative summary ratings of

performance (e.g., mild, moderate, severe dysphagia), the MBS parameter we used in this analysis was an objectively benchmarked event of aspiration. Using validated, widely applied penetration-aspiration scale score criteria for aspiration events leaves virtually no opportunity for misclassification bias in aspiration status based on patient's perception of swallowing function based on the clinician's a priori knowledge of MDADI survey instrument responses.¹⁹

CONCLUSION

The MDADI is a popular PRO measure of swallowing outcomes in head and neck cancer research. We identify a 10-point between-group difference in composite MDADI scores is consistently associated with clinically meaningful differences in swallowing function using a variety of clinical anchors. These data will enable investigators to better interpret published MDADI outcomes and improve the ability to detect clinically meaningful differences when planning future studies.

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BIBLIOGRAPHY

1. Schindler A, Borghi E, Tiddia C, Ginocchio D, Felisati G, Ottaviani F. Adaptation and validation of the Italian MD Anderson Dysphagia Inventory (MDADI). *Rev Laryngol Otol Rhinol (Bord)*. 2008; 129:97–100. [PubMed: 18767327]
2. Speyer R, Heijnen BJ, Baijens LW, et al. Quality of life in oncological patients with oropharyngeal dysphagia: validity and reliability of the Dutch version of the MD Anderson Dysphagia Inventory and the Deglutition Handicap Index. *Dysphagia*. 2011; 26:407–414. [PubMed: 21279522]
3. Carlsson S, Ryden A, Rudberg I, Bove M, Bergquist H, Finizia C. Validation of the Swedish M. D. Anderson Dysphagia Inventory (MDADI) in patients with head and neck cancer and neurologic swallowing disturbances. *Dysphagia*. 2012; 27:361–369. [PubMed: 22105944]
4. Guedes RL, Angelis EC, Chen AY, Kowalski LP, Vartanian JG. Validation and application of the M.D. Anderson Dysphagia Inventory in patients treated for head and neck cancer in Brazil. *Dysphagia*. 2013; 28:24–32. [PubMed: 22684923]
5. Kwon CH, Kim YH, Park JH, Oh BM, Han TR. Validity and reliability of the Korean version of the MD Anderson Dysphagia Inventory for head and neck cancer patients. *Ann Rehab Med*. 2013; 37:479–487.
6. O'Hara J, Cosway B, Muirhead C, Leonard N, Goff D, Patterson J. Transoral laser microsurgery +/- adjuvant therapy versus chemoradiotherapy for stage III and IVA oropharyngeal squamous cell carcinoma: Preliminary comparison of early swallowing outcomes. *Head Neck*. May 31, 2014 doi: 10.1002/hed.23790. [Epub ahead of print].
7. Wilson JA, Carding PN, Patterson JM. Dysphagia after nonsurgical head and neck cancer treatment: patients' perspectives. *Otolaryngol Head Neck Surg*. 2011; 145:767–771. [PubMed: 21746839]
8. Shinn EH, Basen-Engquist K, Baum G, et al. Adherence to preventive exercises and self-reported swallowing outcomes in post-radiation head and neck cancer patients. *Head Neck*. 2013; 35:1707–1712. [PubMed: 24142523]

9. Hutcheson KA, Lewin JS, Holsinger FC, et al. Long-term functional and survival outcomes after induction chemotherapy and risk-based definitive therapy for locally advanced squamous cell carcinoma of the head and neck. *Head Neck*. 2014; 36:474–480. [PubMed: 23780650]
10. Norman GR, Sloan JA, Wyrwich KW. The truly remarkable universality of half a standard deviation: confirmation through another look. *Expert review of pharmacoeconomics & outcomes research*. *Expert Rev Pharmacoecon Outcomes Res*. 2004; 4:581–585. [PubMed: 19807551]
11. Sloan JA. Assessing the minimally clinically significant difference: scientific considerations, challenges and solutions. *COPD*. 2005; 2:57–62. [PubMed: 17136963]
12. Chen AY, Frankowski R, Bishop-Leone J, et al. The development and validation of a dysphagia-specific quality-of-life questionnaire for patients with head and neck cancer: the M. D. Anderson dysphagia inventory. *Arch Otolaryngol Head Neck Surg*. 2001; 127:870–876. [PubMed: 11448365]
13. Jaeschke R, Singer J, Guyatt GH. Measurement of health status. Ascertaining the minimal clinically important difference. *Control Clin Trials*. 1989; 10:407–415. [PubMed: 2691207]
14. Copay AG, Subach BR, Glassman SD, Polly DW Jr, Schuler TC. Understanding the minimum clinically important difference: a review of concepts and methods. *Spine J*. 2007; 7:541–546. [PubMed: 17448732]
15. List MA, D'Antonio LL, Cella DF, et al. The Performance Status Scale for Head and Neck Cancer Patients and the Functional Assessment of Cancer Therapy-Head and Neck Scale. A study of utility and validity. *Cancer*. 1996; 77:2294–2301. [PubMed: 8635098]
16. Hutcheson KA, Lewin JS. Functional outcomes after chemoradiotherapy of laryngeal and pharyngeal cancers. *Curr Oncol Rep*. 2012; 14:158–165. [PubMed: 22249533]
17. Beaton DE, Boers M, Wells GA. Many faces of the minimal clinically important difference (MCID): a literature review and directions for future research. *Curr Opin Rheumatol*. 2002; 14:109–114. [PubMed: 11845014]
18. Lu W, Wayne PM, Davis RB, et al. Acupuncture for dysphagia after chemoradiation in head and neck cancer: rationale and design of a randomized, sham-controlled trial. *Contemp Clin Trials*. 2012; 33:700–711. [PubMed: 22406102]
19. Rosenbek JC, Robbins JA, Roecker EB, Coyle JL, Wood JL. A penetration-aspiration scale. *Dysphagia*. 1996; 11:93–98. [PubMed: 8721066]

Figure 1.

Distributions of Composite MDADI Scores by Functional Status Measures. Mean of 9 to 10.8 points differentiated aspirators from non-aspirators (top), oral from non-oral patients (middle), and tube dependent from non-tube dependent patients (bottom), $p < 0.001$.

TABLE I

Sample Characteristics (n=1,136).

	N (%)
Sex	
Male	833 (73.3%)
Female	303 (26.7%)
Age	
Median (range)	60 (18-93)
Tumor site	
Oral cavity	151 (13.3%)
Oropharynx	480 (42.3%)
Nasopharynx	51 (4.5%)
Larynx or hypopharynx	373 (32.8%)
Thyroid	81 (7.1%)
HNC treatment	
No treatment (baseline)	245 (21.6%)
Radiation ± chemo	399 (35.1%)
Surgery ± chemo	116 (10.2%)
Surgery + Radiation ± chemo	376 (33.1%)
Post-treatment time	
Median mos. (range)	4.5 (0-410)

TABLE II

Mean Composite and Global MDADI Scores by Functional Status Measures (n=1,136).

	n	Composite MDADI Mean (SD)			Global MDADI Mean (SD)	
PO status						
Oral	1,014	65.0			61.1	
Non-oral (100% tube)	122	56.0	9.0 *		44.8	16.3 *
Feeding tube status						
No feeding tube	757	67.6			65.4	
Feeding tube	379	56.8	10.8 *		47.2	18.2 *
Aspiration status						
Non-aspirator	741	67.3			63.9	
Aspirator	395	57.8	9.5 *		50.7	13.2 *

Abbreviations: MDADI, MD Anderson Dysphagia Inventory; PO, per oral.

*
p<0.001

Table III

Mean MDADI Subscale Scores by Functional Status Measures (n=1,136).

	n	Emotional MDADI Mean (SD)	Functional MDADI Mean (SD)	Physical MDADI Mean (SD)
PO status				
Oral	1,041	66.7	69.4	60.9
Non-oral (100% tube)	122	58.1 8.6 *	56.8 12.6 *	53.9 7.0 *
Feeding tube status				
No feeding tube	757	68.9	73.0	63.3
Feeding tube	379	59.5 9.4 *	58.3 14.7 *	53.8 9.5 *
Aspiration status				
Non-aspirator	741	68.6	71.5	63.8
Aspirator	395	60.5 8.1 *	61.7 9.8 *	53.2 10.6 *

Abbreviations: MDADI, MD Anderson Dysphagia Inventory; PO, per oral.

*
p<0.001

Table IV. Subset analysis in oropharyngeal cancer patients (n=480).

	n	Composite MDADI Mean (SD)	
PO status			
Oral	436	65.0	
Non-oral (100% tube)	44	55.5	9.4 *
Feeding tube status			
No feeding tube	315	68.5	
Feeding tube	165	55.8	12.7 *
Aspiration status			
Non-aspirator	307	67.9	
Aspirator	173	57.4	10.5 *

Abbreviations: MDADI, MD Anderson Dysphagia

Inventory; PO, per oral.

*
p<0.001