

## CHES Comparative Evaluation – Headache-Specific TABLES

Table 1 Patient characteristics at baseline and follow-up

Characteristic	Baseline (n = 130)	2 weeks response (n = 115)		12 week response (n=103)	
	n (%)	n (%)	p-value <sup>1</sup>	n (%)	P-value <sup>1</sup>
<b>Age (years)</b>					
Mean (SD)	48.7 (13.2)	49.8 (13.1)	0.006	49.8 (13.1)	0.006
Range	21 - 77	21 - 77		21 - 77	
<b>Gender</b>					0.447
Female	107 (82.3%)	93(81%)	0.483	84(82%)	
Unknown	2 (1.5%)	2(2%)	-	1(1%)	
<b>Ethnicity</b>					0.004
White	124 (95.4%)	112(97%)	0.002	101(98%)	
Non-White	5 (3.8%)	2(2%)	0.002	1(1%)	
Not reported	1 (0.8%)	1(1%)	-	1(1%)	
<b>Left school at</b>					0.46
Age 13 to 16	35 (26.9%)	33(29%)	0.085	29(28%)	
Age 17 to 19	47 (36.2%)	41(36%)	0.085	37(36%)	
Age 20 or over	43 (33.1%)	37(32%)	0.085	34(33%)	
In full time education	3 (2.3%)	3(3%)		2(2%)	
Other	1 (0.8%)	0	-	-	
Not reported	1 (0.8%)	1(1%)	-	1(1%)	
<b>Employment status</b>					0.487
Employed	85 (65.4%)	73(63%)	0.724	65(63%)	
Retired from paid work	22 (16.9%)	21(18%)	0.724	20(19%)	
At school or in full time education	2 (1.5%)	2(2%)	-	2(2%)	
Looking after your home/family	11 (8.5%)	9(8%)	0.724	8(8%)	
Unable to work due to long term sickness	3 (2.3%)	3(3%)	-	3(3%)	
Other	2 (1.5%)	2(2%)	-	2(2%)	
Not reported	5 (3.8%)	5(4%)	-	3(3%)	
<b>Type Headache</b>					

Definite Chronic Migraine	59 (45.4%)	57(50%)	<0.001	48(47%)	<0.001
Probable Chronic Migraine	40 (30.8%)	37(32%)		37(36%)	
Chronic Tension	6 (4.6%)	5(4%)		6(6%)	
Unknown	25 (19.2%)	16(14%)		12(12%)	
<b>Medication over use</b>					
Yes	68 (52.3%)	66(57%)	<0.001	57(55%)	<0.001
No	37 (28.5%)	33(29%)		34(33%)	
Unknown	25 (19.2%)	16(14%)		12(12%)	

Footnote:

<sup>1</sup>P-values compare baseline characteristics of responders and non-responders at the 2-week and 12-week follow-up assessment point.

66(57%)	<0.001	57(55%)	<0.001
33(29%)		34(33%)	
16(14%)		12(12%)	

Table 2 Item and scale properties of the CHQLQ and HIT-6 at baseline (n= 130)

	Percentage missing	Mean	(SD)	Minimum score	Maximum score	Median	Response options <sup>c</sup>	
							% Floor (minimum score)	% Ceiling (maximum score)
<b>Headache-specific</b>								
<b>CHQLQ<sup>a</sup></b>								
<b>Items (score range 1-6)</b>								
<b>Role function – Restrictive (RR)</b>								
1. Interfered with family	1.00	3.17	1.26	1	6	3	8.5%	5.4%
2. Interfered with Leisure	1.00	3.27	1.20	1	6	3	5.4%	4.6%
3. Difficulty doing work	1.00	3.10	1.12	1	6	3	6.9%	0.8%
4. Getting work done	1.00	3.23	1.08	1	6	3	4.6%	2.3%
5. Limit work concentration	2.00	3.27	1.13	1	6	3	4.6%	0.8%
6. Left too tired	1.00	3.24	1.28	1	6	3	7.7%	3.8%
7. Limited energetic days	1.00	3.46	1.26	1	6	3	3.8%	5.4%
<b>Role function – Prevention (RP)</b>								
8. Had to cancel work	2.00	2.30	1.13	1	6	2	25.4%	1.5%
9. Needed help doing routine tasks	3.00	2.16	1.22	1	6	2	37.7%	1.5%
10. Stop work or daily activities	1.00	2.65	1.16	1	6	2	13.8%	1.5%
11. Not able to go to social activities	2.00	2.23	1.19	1	6	2	30.0%	0.8%
<b>Emotional Function (EF)</b>								
12. Often felt fed up or frustrated	0.00	3.88	1.34	1	6	4	2.3%	12.3%
13. Often felt like a burden	0.00	2.72	1.63	1	6	2	33.1%	7.7%
14. Often been afraid of letting others down	0.00	2.95	1.65	1	6	3	23.8%	11.5%
<b>Domain scores (0-100)</b>								
Role Restriction (RR) (Items 1-7) (n=124)	3.00	54.21	17.08	17	90	52	0.0%	0.0%
Role Prevention (RP) (Items 8-11) (n=124)	4.00	39.01	16.89	17	100	35.5	0.0%	0.8%
Emotional Function (EF) (Items 12-14) (n=124)	0.00	52.99	22.84	17	100	50	0.0%	3.8%

<b>HIT-6</b>								
<b>Items (score range 1-5)</b>								
1. How often is pain severe	0.00	3.63	0.74	2	5	4	0.00%	10.00%
2. Limit usual daily activities	0.00	3.25	0.85	1	5	3	3.10%	4.60%
3. Lie down	0.00	3.69	1.08	1	5	4	5.40%	24.60%
4. Felt too tired to do work or daily activities	0.00	3.16	0.87	1	5	3	5.40%	3.10%
5. Felt fed up or irritated	0.00	3.62	0.94	1	5	4	1.50%	17.70%
6. Limit ability to concentrate on work	0.00	3.38	0.85	1	5	3	2.30%	7.70%
<b>Index score (0-100)</b>								
HIT-6 (n=130)	0.00	62.51	6.91	38	78	63	0.00%	1.50%

#### Footnote

<sup>a</sup>CHQLQ: Each item has six descriptive response options, ranging from ‘None of the time’ (1 point) to ‘All of the time’ (6 points). Three domain scores: Role Function – Restrictive (RR); Role Function – Preventative (RP); and Emotional Function (EF) - are calculated as the sum of item responses across each domain, rescaled to a 0-100 scale, where the higher score indicates better headache-related quality of life. A floor effect at item level is where more than 15% of responders score at the minimum (floor) indicating ‘best’ health on the CHQLQ.

<sup>b</sup>HIT-6: Each item has five descriptive response options, with each awarded a specific number of points: ‘Never’ (6 points), ‘Rarely’ (8 points), ‘Sometimes’ (10 points), ‘Very often’ (11 points) and ‘Always’ (13 points). The score is the sum of item (points) responses. The index score ranges 36 to 78, where scores ≤49 indicates little to no impact on life; 50-55 indicates some impact on life; 56-59 indicates substantial impact on life; and ≥60 indicates very severe impact on life. A floor effect at item level is where more than 15% of responders score at the minimum (floor) indicating ‘best’ health on the HIT-6.

<sup>c</sup> End effects: where more than 15% of respondents score the minimum (floor) or maximum (ceiling) score respectively.

Table 3 Exploratory (EFA) and Confirmatory (CFA) Factor Analysis: standardized factor loadings for the proposed three-factor measurement model for the CHQLQ and single-factor measurement model of the HIT-6.

	Structural Validity			Internal consistency			Cronbach's alpha	
	EFA			CFA	cITC <sup>a</sup>			
	Eigenvalues >1.0							
<b>Headache-specific</b>	<b>RR</b>	<b>RP</b>	<b>EF</b>		<b>RR</b>	<b>RP</b>	<b>EF</b>	
Proportion variance	0.30	0.20	0.20					
Proportion variance explained	0.43	0.29	0.28					
<b>CHQLQ</b>								
<b>Role function – restrictive (RR)</b>							0.94	
1. Interfered with family	<b>0.59</b>	0.47		0.80	<b>0.76</b>	0.67	0.7	-
2. Interfered with Leisure	<b>0.71</b>			0.85	<b>0.83</b>	0.72	0.62	-
3. Difficulty doing work	<b>0.71</b>			0.89	<b>0.85</b>	0.74	0.69	-
4. Getting work done	<b>0.71</b>		0.41	0.86	<b>0.83</b>	0.72	0.6	-
5. Limit work concentration	<b>0.63</b>		0.41	0.78	<b>0.75</b>	0.67	0.59	-
6. Left too tired	<b>0.65</b>		0.42	0.85	<b>0.82</b>	0.75	0.65	-
7. Limited energetic days	<b>0.71</b>			0.80	<b>0.79</b>	0.65	0.55	-
<b>Role function – preventative (RP)</b>								0.89
8. Had to cancel work	<b>0.40</b>		<b>0.70</b>	0.83	0.72	<b>0.77</b>	0.58	-
9. Needed help doing routine tasks		0.46	<b>0.54</b>	0.78	0.69	<b>0.72</b>	0.65	-
10. Stop work or daily activities	0.44		<b>0.64</b>	0.81	0.71	<b>0.76</b>	0.54	-
11. Not able to go to social activities			<b>0.65</b>	0.81	0.7	<b>0.75</b>	0.6	-
<b>Emotional function (EF)</b>								0.87
12. Often felt fed up or frustrated	0.46	<b>0.48</b>		0.71	0.71	0.62	<b>0.64</b>	-
13. Often felt like a burden		<b>0.86</b>		0.93	0.67	0.65	<b>0.84</b>	-
14. Often been afraid of letting others down		<b>0.80</b>		0.86	0.61	0.57	<b>0.78</b>	-
<i>Assessment of model fit:<sup>b</sup></i>								
Chi-square p-value (DF)				<0.001 (74)				
CFI/TLI		0.95		0.95 / 0.94				
RMSEA (90% confidence interval)		0.079 (0.05, 0.09)		0.086 (0.06, 0.11)				
RMSR		0.03		0.06				

<b>HIT-6 (index score)</b>					-	0.90
1. How often is pain severe			0.71		<b>0.68</b>	-
2. Limit usual daily activities			0.85		<b>0.79</b>	-
3. Lie down			0.80		<b>0.75</b>	-
4. Felt too tired to do work or daily activities			0.85		<b>0.79</b>	-
5. Felt fed up or irritated			0.74		<b>0.72</b>	-
6. Limit ability to concentrate on work			0.78		<b>0.75</b>	-
<i>Assessment of model fit:<sup>b</sup></i>						
Chi-square (DF)			0.013 (9)			
CFI/TLI			0.974 / 0.957			
RMSEA (90% confidence interval)			0.101 (0.044, 0.158)			

## Footnote:

<sup>a</sup> cITC: Corrected Item-Total Correlations (the extent to which items are adequate reflections of the underlying construct [12,13]O: emboldened values represent corrected item-total correlations between items and their respective total domain scores.

<sup>b</sup> CFA model fit was examined using Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA)

Table 4 Two-week test-retest reliability (ICC 2,1), standard error of measurement (SEM) and smallest detectable change (SDC) for the CHQLQ and HIT-6.

		Baseline	Re-test	Change <sup>a</sup>	SEM <sup>b</sup>	SDC individual <sup>c</sup>	SDC group <sup>d</sup>	ICC (95% CI) <sup>e</sup>
	N	Mean (SD)	Mean (SD)	Mean (SD)				
<b>Headache-specific</b>								
<b>CHQLQ (domain scores 0-100)</b>								
RR	67	62.16 (17.05)	67.46 (16.72)	5.30 (11.44)	8.09	22.42	2.74	0.74 (0.55, 0.84)
RP	67	77.04 (18.00)	79.88 (16.99)	2.84 (11.96)	8.459	23.45	2.86	0.76 (0.63, 0.85)
EF	67	63.25 (23.64)	67.04 (24.83)	3.79 (14.96)	10.576	29.32	3.58	0.80 (0.69, 0.87)
<b>HIT-6 (range 35-78)</b>								
	73	62.56 (7.13)	61.03 (6.77)	-1.53 (3.42)	2.415	6.69	0.78	0.86 (0.75, 0.92)

## Footnote:

<sup>a</sup> Self-reported change in headache was captured on a headache-specific health-transition question at 2-weeks.

<sup>b</sup>SEM Standard Error of Measurement

<sup>c</sup>SDC<sub>individual</sub> represents the SDC in individuals and is calculated as:  $(SEM \times 1.96 \times \sqrt{2})^{15,16}$

<sup>d</sup>SDC<sub>group</sub> represents the SDC in a group of individuals and is calculated as:  $(1.96 \times \sqrt{2} \times SEM \sqrt{n}, \text{ where } n \text{ is the group size})^{6,15,16}$

<sup>e</sup>ICC (95% CI) Intra-class Correlation Coefficient (2,1) with 95% Confidence Intervals

Table 5 Convergent validity matrix between the CHQLQ and comparator measures<sup>a,b</sup>.

	Headache-Specific			Generic Health Status <sup>c</sup>					Domain-specific <sup>d</sup>			
	CHQLQ domains			Impact	Profile		Single-item Global	Utility	Emotional Well-being		Pain Self-efficacy	Social integration
					<i>Physical Health status</i>	<i>Mental Health status</i>		Health Status	<i>Anxiety</i>	<i>Depression</i>		
	RR	RP	EF	HIT-6	SF-12 PCS	SF-12 MCS	EQ-VAS	EQ-5D-5L <sup>e</sup>	HADS-A	HADS-D	PSEQ	SIS-HEIQ
<b>Headache-specific</b>												
<b>CHQLQ</b>												
Role Restriction (RR)	1	0.82	0.74	0.73	-0.43	-0.55	-0.48	-0.59	0.33	0.30	-0.68	-0.57
Role Prevention (RP)		1	0.69	0.68	-0.46	-0.38	-0.39	-0.59	0.17	0.28	-0.64	-0.50
Emotional Function (EF)			1	0.58	-0.22	-0.47	-0.41	-0.46	0.34	0.22	-0.58	-0.43
<b>HIT-6</b>	0.73	0.68	0.58	1	-0.34	-0.35	-0.24	-0.35	-0.18	0.25	-0.61	-0.48

Footnote:

a Strength of association (Cohen): small &lt;0.30; moderate 0.31 to 0.69; strong &gt;0.70.

b All comparator measures detailed in Appendix Table 1.

c Generic measures: SF-12 - Short-Form 12-item Health Status survey; PCS – Physical Component Score; MCS – Mental Component Score; EQ-VAS: EuroQoL Visual Analogue Scale; EQ-5D-5L: EuroQol 5-dimension Preference-based Utility Index.

d Domain-specific measures: Emotional Well-being assessed with the HADS - Hospital Anxiety and Depression Scale; A – Anxiety scale; D – Depression scale; Pain Self-Efficacy assessed with the PSEQ – Pain Self-Efficacy Scale; Social integration assessed with the SIS – HEIQ: Social Impact Scale of the Health Education Impact Scale.

e EQ-5D-5L item content – stronger focus on physical function (mobility, usual activities, self-care), so stronger association with physical than with emotional domains hypothesized



Table 6 Responsiveness of the CHQLQ and HIT-6 at 12-weeks.

<i>Headache-specific Health Transition<sup>a</sup></i>	<b>N</b>	<b>Baseline</b>	<b>3-months</b>	<b>Difference (MIC)<sup>b</sup></b>	<b>SEM<sup>c</sup></b>	<b>SDC Individual<sup>d</sup></b>	<b>SDC Group<sup>e</sup></b>	<b>ES<sup>f</sup></b>	<b>SRM<sup>g</sup></b>
<b>CHQLQ</b>									
<b>Role function – Restriction (RR)</b>									
Much better	10	70.50 (12.82)	90.00 (15.58)	19.50 (16.25)	11.49	31.85	10.07	1.521	1.2
Better	19	65.89 (17.31)	76.68 (14.50)	10.79 (10.98)	7.766	21.526	4.94	0.623	0.982
Same	53	62.94 (15.58)	69.98 (13.67)	7.04 (13.35)	9.44	26.167	3.59	0.452	0.527
Worse	12	61.75 (22.76)	58.58 (11.43)	-3.17 (14.35)	10.144	28.117	8.12	-0.139	-0.221
Much worse	0								
<b>Role function – Prevention (RP)</b>									
Much better	10	86.80 (10.36)	98.00 (3.89)	11.20 (11.26)	7.964	22.075	6.98	1.081	0.994
Better	19	83.89 (12.41)	89.16 (11.47)	5.26 (7.86)	5.557	15.403	3.53	0.424	0.67
Same	53	78.85 (14.65)	83.26 (13.86)	4.42 (12.71)	8.991	24.921	3.42	0.301	0.347
Worse	12	68.08 (23.18)	67.33 (15.44)	-0.75 (13.61)	9.621	26.667	7.7	-0.032	-0.055
Much worse	0								
<b>Emotional Function (EF)</b>									
Much better	10	69.30 (21.80)	88.70 (17.86)	19.40 (21.63)	15.294	42.393	13.41	0.89	0.897
Better	19	68.74 (19.11)	76.74 (17.11)	8.00 (10.78)	7.623	21.13	4.85	0.419	0.742
Same	53	66.32 (21.57)	68.89 (21.55)	2.57 (13.60)	9.618	26.66	3.66	0.119	0.189
Worse	12	58.67 (24.06)	56.42 (24.91)	-2.25 (14.59)	10.318	28.601	8.26	-0.094	-0.154
Much worse	0								
<b>HIT-6</b>									
Much better	11	58.91 (8.31)	51.36 (8.32)	-7.55 (5.18)	3.666	10.16	3.06	-0.908	-1.456
Better	20	62.30 (5.19)	59.15 (4.93)	-3.15 (4.86)	3.436	9.523	2.13	-0.607	-0.648
Same	57	62.44 (6.49)	60.35 (6.59)	-2.09 (5.03)	3.554	9.851	1.3	-0.321	-0.415
Worse	12	64.33 (9.13)	64.75 (7.63)	0.42 (2.43)	1.718	4.761	1.37	0.046	0.172
Much worse	0								

Footnote:

<sup>a</sup> Headache-specific Health Transition – self-reported change in headache-specific health status at 12-weeks: much better / better / same / worse / much worse.

<sup>b</sup>MIC Minimal Important Change – calculated as the mean change in those who have improved (better / much better) or deteriorated (worse).

<sup>c</sup>SEM Standard Error of Measurement

<sup>d</sup>SDC<sub>individual</sub> represents the SDC in individuals and is calculated as:  $(SEM \times 1.96 \times \sqrt{2})^{15,16}$

<sup>e</sup>SDC<sub>group</sub> represents the SDC in a group of individuals and is calculated as:  $(1.96 \times \sqrt{2} \times SEM \sqrt{n}, \text{ where } n \text{ is the group size})^{3,15,16}$

<sup>f</sup>ES Effect Size statistic – mean change in scores divided by the standard deviation of the baseline scores.

<sup>g</sup>SRM Standardised Response Mean – mean change in scores divided by the standard deviation of the change score.