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**A specific quality of
life scale
in secondary upper
limb
lymphoedema after
breast cancer**

Launois R. ⁽¹⁾, Mègnigbêto A. ⁽¹⁾, Le Lay K. ⁽¹⁾, Alliot F. ⁽²⁾

(1) REES France, PARIS, France

(2) Clinique Hartmann, NEUILLY SUR SEINE, France

Clinical Case

- A 51 years old woman is suffering from secondary upper limb lymphoedema after a breast cancer discovered in 1996.
- The therapeutic strategy consisted in surgery with axillary lymph node clearance, radiotherapy and chemotherapy.
- The « big arm », appeared immediately after radiotherapy. Functionnal consequences, pain, and aesthetic problems are still observed
- The subject is treated by complexe decongestive physiotherapy. The patient has to wear daily an elastic sleeve

A Specific Quality of Life Questionnaire for Upper Limb Lymphoedema is Needed

- **The existing classifications for upper limb lymphoedema (ULL), based on oedema volume, underestimate disturbance**
- **Specific concepts of upper limb lymphoedema are not assessed by generic quality of life scales: NHP ,SIP,SF-36**

Development Stages of the Specific HRQOL Scale

- ***Phase I : qualitative survey*** (24 patients)
 - collecting verbatims reports : 1 166
 - formation of the bank of 70 questions
- ***Phase II : quantitative survey*** (154 patients)
 - reduction to produce the initial questionnaire : 28 items
 - identification of the dimensions
- ***Phase III : validation study*** (304 patients)

Project Manager & Coordinator : ***Françoise Alliot***

Head of the Lymphology Department, Clinique Hartmann, Neuilly sur Seine

Investigation Team

- (1) Hôpital Cognacq Jay, Paris (Service de Lymphologie) - Françoise Alliot, Robert Victor Cluzan, MD, Marina Pascot, MD
- (2) Hôpital Paul Brousse, Villejuif (Service d'Hématologie et Biologie de tumeurs) - Claude Jasmin, Professor
- (3) Centre René Huguenin, St Cloud (Service d'exploitations isotopiques) - Alain Pecking, MD
- (4) Hôpital Saint Eloi, CHU Montpellier (Service de Medecine Interne – Angiologie) - Charles Janbon, Professor, Virginie Soulier-Solto, M D
- (5) Hôpital Saint-Louis, Paris (Pole des maladies du sein) - Marc Espié, MD
- (6) Hôpital Saint-Joseph, Paris (Service de Médecine Interne et vasculaire) - Pascal Priollet, MD
- (7) Hôpital de Toulouse (Service d'Angiologie) - Henri Boccolon, Professor, Marie Elias, MD
- (8) Hôpital de Tours (Service d'Angio-Dermatologie) - Loïc Vaillant, Professor

Sous l'égide de la Société Française de Lymphologie

Conceptual Domains of the Instrument

- **3 dimensions**
 - Physical (15 items)
 - Psychological (7 items)
 - Social (5 items)
- **1 global index** (27 items)

Characteristics of the Instrument

- **Self-administered questionnaire**
- **Rating scales : 5 points likert scales**
- **Median time to complete the questionnaire : 11 ± 1 mn**

The Quality of Life Scale to Be Validated (27 items)

Physical functioning :	Psychological dimension :
1. Difficulties grasping high objects	16. Feeling sad
2. Difficulties maintaining certain positions	17. Feeling discouraged
3. Arm feels heavy	18. Feeling a lack of self-confidence
4. Arm feels swollen	19. Feeling distressed
5. Difficulties dressing	20. Feeling well in ones self
6. Difficulties getting to sleep	21. Feeling a wish to be angry
7. Difficulties sleeping	22. Having confidence in the future
8. Difficulties grasping objects	Social dimension :
9. Difficulties holding objects	23. Difficulty taking advantage of good weather, in life outside the housde
10. Difficulties walking / heavy arm	24. Difficulty with personal projects, holidays or hobbies
11. Difficulties washing	25. Difficulties in emotional life with spouse or partner
12. Difficulties taking public tranport	26. Difficulty in social life
13. Tingling, burning feelings	27. Fearful of looking in a pirror
14. Feelings of swollen, hard, tense skin	
15. Difficulties in working relationships and tasks	



Methods

Methods

- **Design of the study**
- **Grades of patient severity**
- **Benchmark criteriae**
- **Arithmetic of scores**
- **Evaluation of psychometric properties**
- **Statistical tests**

Design of the Study

- **Non randomized multicentric open study**
- **Inclusion criteria: patients suffering from ULL secondary to breast cancer, Age > 18 years**
- **Non-inclusion criteria: advanced cancer, ongoing radiotherapy or chemotherapy, signs of plexitis, past history of lymphangitis < 2 months**
- **Number of evaluable patients : 301**

Grades of Patient Severity

- **Oedema not measurable**
(>150 ml & < 300 ml)
- **Clinical low volume oedema**
(> 300 ml & <500 ml)
- **Clinical medium volume oedema**
(>500 & <800)
- **Clinical large volume oedema**
(> 800)

Benchmark Criteria

- **Oedema volume measurement**
- **Global Symptom Index : GSI** (*heaviness, tension, hardness - frequency and severity*)
- **Patient's Arm Comfort Scale : ACS**
- **Global Clinical Impression : GCI**
- **Generic quality of life scale :**
SF36 (*8 dimensions*) **PF-RP-BP-GH-VT-SF-RE-MH**

Arithmetic of Scores

- **Volume** : addition of cone trunks
 - **GSI** (*Global Symptom Index*) :
1 dimension and a global score
 - **ACS** (*Arm Comfort Scale*) :
1 dimension; transitional scale : -, +, =
 - **GCI** (*Global Clinical Impression*) :
1 dimension; transitional scale : -, +, =
 - **ULL-27** : 3 dimensions and a global score
 - **SF-36** : 8 dimensions and no global score
- Standardization of the dimensions SF-36, ULL 27, ACS*
(Observed value - min) / (max - min) x 100

Statistical Validation Tests

- Intraclass correlation coefficients on stable patients between D0 and D28 - Cronbach Alpha coefficient at D0
- Pearson's items-scale correlation coefficients at D0 . Stability of the factorial structure in various populations
- Spearman's correlations coefficients between ULL-27 scale and other scales on D0 and by grade
- Effect size

Statistical Validation Tests

- **Cronbach Alpha coefficient - Spearman correlation coefficient**
- **Stability of the factorial structure in various populations**
- **Correlations between ULL scale and other indicators on D0, D28 and by grade**
- **Correlation between increments in the ULL scale and other indicators between D0 and D28**

Psychometric Norms

Properties	Statistical methods	Limits of validity
Precision	Intraclass correlation coefficients (ICC) on stable patients between D0 and D28	$\triangleright 0.80$
	Cronbach's α coefficient at D0	> 0.70
Internal validity	Pearson's items-scale correlation coefficients at D0 PPPPPPPPPPPEEE	> 0.40
External validity	Correlation at baseline between clinical criteria and QoL scores	$p < 0.05$
	Spearman correlation coefficient	> 0.40
Responsiveness to change	Effect size	> 0.40

Results



Results

- **Descriptive parameters**
- **Past medical history**
- **Internal validity**
- **External validity**
- **Responsiveness to change**

Descriptive Parameters

- Final analysis of 301 patients
- Age : 61.61 ± 1.16 years
- Height : 1.61 ± 0.01 m
- Weight : 68.20 ± 0.74 kg
- Body mass index : 26.25 ± 0.27
- All educational levels
- 48.2 % of women were retired

Past Medical History

- Surgical treatment for cancer and lymph node clearance : 98.67 % of women
- Radiotherapy : 92 %
- Chemotherapy : 45 %
- Hormone therapy : 24 %
- Median time between surgery and development of ULL : 17 months
- Length of history of ULL at the time of the study : 61.45 ± 10.58 months

Precision

- **Reproducibility in stable patients (D0/D28)**
 - **Physical dimension : 0.86 (p<0.001)**
 - **Psychol. dimension : 0.80 (p<0.001)**
 - **Social dimension : 0.70 (p<0.001)**
- **Cronbach alpha coefficient**
 - **Physical dimension : 0.93**
 - **Psychol. dimension : 0.86**
 - **Social dimension : 0.82**

⇒ *Excellent reproducibility in stable patients*

Internal Validity :

Multi-traits/Multi-items Matrix

STAGES	PHYSICAL DIMENSION (15 items)	PSYCH. DIMENSION (7 items)	SOCIAL DIMENSION (5 items)
Internal consistency of items	0.48 - 0.71	0.42 - 0.77	0.55 - 0.71
Success rate ($r \geq 0.40$)	100%	100%	100%
Discriminatory ability of items	0.23 - 0.48	0.13 - 0.60	0.27 - 0.52
Success rate ($r_1 \geq r_2$)	93%	100%	100%

⇒ *Good internal consistency but a moderate discriminant validity*

External Validity ⁽¹⁾ :

Comparison of the ULL27 Dimensional Scores at D0 Accross Severity Stages

STAGES	PHYSICAL	PSYCHOL.	SOCIAL
Stage 1-n=30	65.27	62.05	71.50
Stage 2-n=47	57.17	61.72	63.83
Stage 3-n=69	51.74	61.64	63.53
Stage 4-n=90	50.54	61.62	55.99
p (Anova)	0.008	0.99	0.02

⇒ *Good correlations between quality of life scores and clinical stages verify the clinical validity of the instrument*

External Validity ⁽²⁾ :

*Correlations between the ULL-27 Subscales
and the other Scales at D0*

Are statistically significant and > 0.40 between

- **Physical Dimension :**

ACS (*Arm Comfort Scale*) - **GSI** (*Global Symptoms Index*) -
all **SF36** subscales (except GH)

- **Psychological Dimension :**

SF36 (except PF and GH)

- **Social Dimension :**

VT - SF - MH (except PF RP RE BP and GH)

Responsiveness to Change ⁽¹⁾ :

Mean test comparisons between D28 and D0

- **ULL-27 Scale : significant statistical differences for the 3 dimensions**
- **GSI (*Global Symptoms Scale*) ; ACS (*Arm Comfort Scale*) :
Volume Index ; significant statistical differences**
- **SF-36 Scale : not significant differences for PF - RP - GH dimensions**

Responsiveness to Change ⁽²⁾ :

Correlations Between incremental changes D28/D0

- Changes in the *ULL-27 Physical dimension* between D0 and D28 for improving patients are significantly correlated with changes in the GSI (*Global Symptoms Scale*), the ACS (*Arm Comfort Scale*) and the SF36 subscales : PF, BP
 - Changes in the *ULL-27 Psychological dimension* are correlated with changes in ACS (*Arm Comfort Scale*) and in SF36 subscales : PF - BP - VT – MH
 - Changes in the *ULL-27 Social dimension* are correlated with the SF36 subscales : VT-SF - MH
- ⇒ *These results confirm that ULL-27 is sensitive to change*

Responsiveness to Change ⁽³⁾ :

Effect size

DIMENSIONS	STANDARDISED RESPONSE MEAN	EFFECT SIZE
ULL27		
Physical Dimension (PHD)	0.41	0.58
Psychological dimension (PSD)	0.42	0.62
Social dimension (SD)	0.28	0.38
Arm comfort scale (ACS)	1.24	1.17
Global symptom index (GSI)	-1.21	-1.30
Variation in volume of the arm (VVA)	0.38	1.11

⇒ *The force of the signal is higher than the magnitude of the noise*

Overview of the Results

Properties	Results
Precision	<ul style="list-style-type: none">-Intraclass coefficients > 0.80-All Cronbach Alpha > 0.80
Internal validity	<ul style="list-style-type: none">-Correlations > 0.40 between items and subscore per dimension
External validity	<ul style="list-style-type: none">- Correlations > 0.40 between ULL-27 physical dimension and symptoms scales, between ULL-27 psychol and social dimensions and SF 36- High statistical significance ($P < 0.0001$) of the correlation coefficients
Responsiveness	<ul style="list-style-type: none">- Good responsiveness to clinical improvement in all dimensions, and global index ($p = 0.0001$)- Effect Size > 0.40



Conclusion

- Volume of oedema poorly reflects the impact of the illness upon the patient, it neglects completely the social and psychological consequences of the illness.
- Specific quality of life scale reflects appropriately and completely all the possible impacts of the lymphoedema in the women daily life.
- The ULL27 scale seems to be a consistent instrument that adds to our ability to measure outcomes of relevance in upper limb lymphoedema.