Assessing Quality of Life (QL) and Patient Reported Outcomes (PROs) in Clinical Trials and Clinical Practice: A Study Using a Hand-Held Computerized Form of the Validated LCSS Instrument in Patients with Non-Small Cell Lung Cancer (NSCLC).

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ABSTRACT *

Background: Improving survival, QL, and PROs are key goals in cancer treatment. Valid QL instruments are available; however, low feasibility in treatment settings remains a barrier to QL assessment. The LCSS was converted into a computerized format for inexpensive hand-held devices (pocket pc), providing an immediate graphic report of current scores and change over time. All data are automatically recorded without transcription. This study documents ease of use and psychometrics with this new approach, comparing the LCSS paper form with the electronic (LCSS-QL). The objectives were to: a) determine correlation of the LCSS-QL with the paper version; b) measure completion times; and c) assess acceptability of the LCSS-QL by patients, nurses, and physicians.

Methods: Patients were entered at 9 COMET clinics in Ontario. All had: a) stage IIIb or IV NSCLC , b) KPS ≥ 60, 3) no prior chemotherapy, and 4) received initial courses of docetaxel + platinum. 48 patients completed both the paper and electronic forms (pretreatment, and with the next 4 chemotherapy cycles - paper version with every other cycle). Characteristics: 58% men; KPS (median 80%; range 60% - 100%); age (median 71; range 47-81); Stage IV: 73%.

Results: The LCSS-QL had excellent acceptance by patients, nurses, and physicians. Patients required a mean of only 2.1 minutes (SD 1.58 min) to complete the LCSS-QL. Reliability coefficients using Cronbach's alpha were high for the paper (0.83) and electronic (0.88) versions. Correlation coefficients between paper and electronic forms were in near agreement (0.93, 0.92, 0.92 for each of 3 methods used: Pearson r, Intraclass Correlation Coefficient, Lin's concordance, respectively) for the total score.

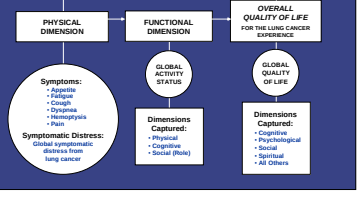
Conclusions: 1) The high acceptance rate by patients and professionals, the rapid completion time, good feasibility, reliability, and validity confirm that the electronic LCSS is practical for evaluating QL and PRO endpoints in clinical trials and in patient management; and 2) both the paper and electronic LCSS versions provide the same score for quality of life.

* Updated data are presented in the poster

BACKGROUND

- While all agree that QL evaluation in clinical trials and in clinical practice is an important goal in oncology, this endpoint is only occasionally prospectively assessed in current studies or patient management.
- Valid QL instruments are available; however, low feasibility in typical treatment settings remains a barrier to QL assessment.
- The Lung Cancer Symptom Scale (LCSS) is a validated and extensively used paper measure based on a tested model.
- The LCSS has been converted into a computerized format for a simple hand-held device (pocket PC).
- The electronic LCSS is available in more than 40 languages, making it feasible to collect reliable QL data rapidly in international trials, and for use in most countries.

QUALITY OF LIFE DIMENSIONS
- Conceptual Model for the LCSS and Clinical Trials



STUDY OBJECTIVES

1. To test the feasibility of an interactive QL assessment software program using a hand-held PC instrument, LCSS-QL, to evaluate if this method is appropriate for use in clinical trials and patient management.
2. To determine the correlation of the LCSS-QL with the paper version. If there is good correlation, then the extensive findings from prior experience with the paper version should apply to the electronic version.
3. To assess acceptability of the LCSS-QL by patients, nurses, and physicians.

METHODS

- This psychometric trial used a methodological design to evaluate the feasibility, reliability, and validity of a computer-generated QL instrument specific to patients with lung cancer – the Lung Cancer Symptom Scale electronic version (LCSS-QL).
- All patients have advanced NSCLC, KPS ≥ 60, no prior chemotherapy, and are receiving initial courses of docetaxel + platinum.
- Patients are entered in the community settings of 9 COMET Group clinics in Ontario, Canada.
- 200 patients with non-small cell lung cancer are planned; 63 patients to date.
- The initial 80 complete both the paper and electronic forms (pretreatment, and with the next 4 chemotherapy cycles – paper version with every other cycle). The final 120 complete only the LCSS-QL. The original paper VAS form is administered first, followed by the computer version to prevent bias of prior computer experience.
- A patient demographic and evaluation form (with time of completion/ease of use) is administered on two occasions to each of the first 80 patients (at baseline – visit 1; and at week 7 – visit 3).

TABLE 1. Demographic and Disease-related Characteristics of the Sample of Patients with NSCLC (N = 63)

Characteristic	Median or #	Range or %
Age	69	(47 - 81)
Age Group < 45 years 45 –72 years > 72 years	 0 46 17	 0% 73% 27%
Gender Male Female	 35 28	 56% 44%
Previous Experience With Computer	1	(1 - 10)*
Stage of Disease IIIa IIIb IV	 1 17 45	 2% 27% 71%
Karnofsky Performance Status 60% 70% 80% 90% 100%	 4 8 26 20 5	 6% 13% 41% 32% 8%

* 1 = Lowest experience with a computer, 10 = Highest experience

INSTRUMENTS

Patients complete both the patient and observer versions in both paper and electronic formats.

1. Original paper version (LCSS)
   - Published reliability and validity (see ref #4 below and website ***www.lcss-ql.com*** for full reference list)

   Patient version
   - Items measured on a 100-mm visual analogue scale (0=best score)
   - Total score = mean of 9 items
   - Average symptom burden index (ASBI) = mean of 6 symptoms

   Observer version
   - 6 categorical scales
2. A new computer version (LCSS-QL)
   - Preserves both the patient and the observer versions
   - Hand-Held PC device using stylus pen
   - Provides immediate color graphic reporting of current scores and change over time
3. Demographic forms for the patient, observer, and the physician
4. Evaluation forms to capture time to completion and perceptions of acceptability (patient, observer, physician)

Patient Version: LCSS Pain Scale Example

Directions: Please place a mark along the line where it would best describe the symptoms of your lung cancer **DURING THE PAST DAY** (within the last 24 hours).

How much pain do you have?

None — As much as it could be

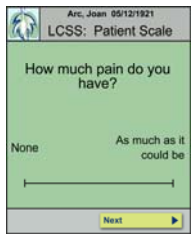
Observer Version: LCSS Pain Scale Example

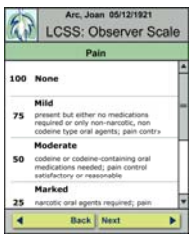
Directions: Direct the interview to separate lung cancer symptoms using the time frame of **DURING THE PAST DAY** (within the last 24 hours).

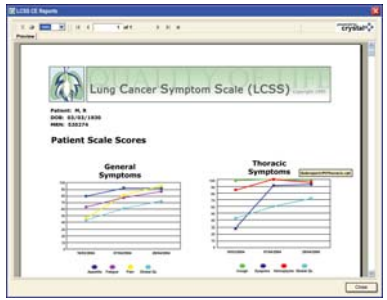
Pain Score:		
100	None	
75	Mild;	Present but either no medications required or only non narcotic, non-codeine type oral agents
50	Moderate;	Pain control satisfactory or reasonable
25	Marked;	Narcotic oral agents are required; pain control satisfactory, or reasonable
0	Severe;	Narcotic oral medications required but pain control not satisfactory or parenteral narcotics are required

Lung Cancer Symptom Scale
Strengths from Testing

PSYCHOMETRICS	CHARACTERISTICS
FEASIBILITY:	✓ Short administration time ✓ Low reading level required ✓ Easily understood ✓ Multi-center utility
CONTENT VALIDITY:	✓ Oncology expert agreement ✓ Patient agreement
RELIABILITY:	✓ Items internally consistent ✓ Intra / interrater agreement ✓ Patient reproducibility
CONSTRUCT VALIDITY:	✓ Based on conceptual model ✓ Valid for LC patients with different extents of disease
CRITERION-RELATED (CONCURRENT) VALIDITY:	✓ Compares well to "gold standards"
CLINICAL SIGNIFICANCE:	✓ KPS and LCSS Observer scales used as anchors
NORMATIVE DATA:	✓ 673 LC patients from two North American cancer trials (30 centers)







ANALYSIS

- Multiple agreement methods are recommended to show support for convergent validity.
- Pearson r does not correct for systematic bias, but shown for comparison.
- Analyses include:
  1) Perceptions of ease of completion by patients, nurses, and physicians to assess feasibility
  2) Completion times to assess feasibility
  3) Cronbach alpha to estimate reliability (internal consistency)
  4) General agreement (convergence) between electronic and paper forms (Pearson correlation, intraclass correlation, Lin's concordance correlation coefficient) to support construct validity
  5) Bland-Altman plots to characterize bias to enhance convergence (not shown)

RESULTS

✓ **Feasibility:** Acceptance of the LCSS-QL by 63 patients, 10 nurses, and 10 physicians has been excellent. As expected, previous patient experience with a computer (1=low; 10=high) is low (mean, 3.0; SD 2.57). Patient completion time is excellent (mean, 2.2 minutes; SD 1.51).

✓ **Reliability:** Cronbach's alphas were high for the paper (0.84) and electronic (0.88) versions (see Table 3). They meet Nunnally and Berstein's (1994) recommended guideline for reliability of greater than 0.70 for new measures and 0.80 for existing measures.

✓ **Validity:** Means and correlation coefficients between the paper and electronic forms were in near agreement for several correlation methods, including two that reduce measurement bias (see Tables 2 & 3).

TABLE 2. Electronic and Paper Formats for Lung Cancer Symptom Scale (LCSS) Scores and Items

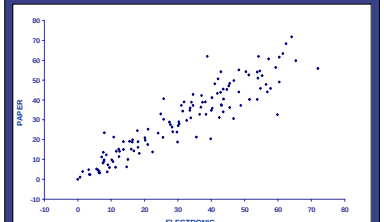
LCSS Score or Item	Electronic Means (SD) (N = 63)	Paper Means (SD) (N= 63)
Total Score	32.94 (18.09)	32.31 (17.60)
Symptom Score	28.41 (17.15)	27.75 (16.07)
Appetite	32.35 (25.02)	29.40 (26.60)
Fatigue	41.99 (25.49)	43.68 (26.30)
Cough	26.60 (23.63)	26.99 (24.26)
Dyspnea	36.01 (28.28)	37.57 (30.55)
Hemoptysis	7.79 (13.80)	6.75 (15.83)
Pain	25.73 (24.92)	22.09 (24.59)
Symptom Distress	36.74 (26.36)	35.51 (27.23)
Normal Activities	45.00 (26.68)	44.81 (30.84)
Global HRQL	44.17 (26.06)	43.88 (29.53)

TABLE 3. Electronic and Paper Formats for Lung Cancer Symptom Scale (LCSS) Scores and Items: Agreement Results (N=63)

LCSS Score or Item	Pearson r[1]	ICC[2]	Lin's CCC[3]	Lower 95%LL CI[4]	Upper 95%UL CI[4]	Cronbach Alpha Hand	Cronbach Alpha Paper
Total Score	0.926	0.925	0.924	0.9230	0.9286	N/A	N/A
Symptom Score	0.870	0.871	0.870	0.8679	0.8864	N/A	N/A
Appetite	0.805	0.806	0.805	0.8060	0.8246	0.87	0.83
Fatigue	0.714	0.716	0.714	0.7063	0.6856	0.86	0.82
Cough	0.808	0.809	0.808	0.8023	0.8142	0.88	0.83
Dyspnea	0.814	0.815	0.814	0.8093	0.8440	0.87	0.83
Hemoptysis	0.633	0.635	0.633	0.6257	0.8459	0.90	0.85
Pain	0.804	0.805	0.804	0.8079	0.8495	0.88	0.83
Symptom Distress	0.725	0.727	0.725	0.7202	0.7423	0.87	0.81
Normal Activities	0.889	0.890	0.889	0.8861	0.9032	0.87	0.81
Global HRQL	0.908	0.909	0.908	0.9058	0.9176	0.86	0.80

[1] Pearson r = non-recommended agreement method [shaded in tan] provided for comparison. [2] ICC = Intraclass Correlation Coefficient. [3] CCC = Lin's Concordance Correlation Coefficient [4] CI = Confidence Interval for CCC. Patients in all columns (N=63).

Plot of Paper and Electronic Global QL Scores for Lung Cancer Patients (N = 63)



CONCLUSIONS

- Quality of Life evaluation is easier to perform in practice settings or clinical trials, by using a hand-held computer and immediate graphic reports.
- Convergence between the two formats is high, and existing psychometric properties for the original measure can be generalized to the new format. There is no bias associated with the hand-held as shown by the equality of the measures of concordance.
- The high acceptance rate by patients and professionals, the rapid completion time, and good psychometric properties (feasibility, reliability, and validity) confirm that the electronic LCSS is valid and practical for evaluating QL and PRO endpoints in clinical trials and in patient management.

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