European Journal of Physical and Rehabilitation Medicine
EDIZIONI MINERVA MEDICA

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European Journal of Physical and Rehabilitation Medicine 2020 Oct 28
DOI: 10.23736/S1973-9087.20.06189-4

Article type: Original Article

Supplementary material available online at http://www.minervamedica.it
Article first published online: October 28, 2020
Manuscript accepted: October 22, 2020
Manuscript revised: August 25, 2020
Manuscript received: January 23, 2020

Development of a new patient-reported outcome measure assessing activities and participation in people with lumbar spinal stenosis: The Cochin Spinal Stenosis 19-item questionnaire

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ABSTRACT

BACKGROUND: Lumbar spinal stenosis (LSS) is the leading cause of spinal surgery in people over 65-years old. In people with LSS, generic self-administered questionnaires are the most commonly used PROs to assess health-related quality of life, global activity limitation, and low back pain-located activity limitation.

AIM: To develop of a new patient-reported outcome measure assessing activities and participation in people with LSS.

DESIGN: Observation, prospective and qualitative study.

SETTING: For the qualitative study, enrolled in- and outpatients with LSS from 2 French tertiary care centers (Department of PRM of Cochin Hospital and Department of Rheumatology of Limoges Hospital). For the Internet E-survey, screened the electronic medical records of the Department of PRM of Cochin Hospital.

POPULATION: Enrolled from February to April 2018, patients older than 50-years and symptomatic LSS.

METHODS: We used a 2 step approach. In a first step, we conducted a qualitative study using in-depth semi-structured interviews in 20 patients with LSS to collect meaningful concepts and to develop a provisional questionnaire. In a second step, using the provisional questionnaire, we conducted an Internet E-survey in an independent sample of 200 patients with LSS.

RESULTS: Concepts collected from patients generated a 48-item provisional questionnaire. Overall, 63/200 (31.5%) patients completed the provisional questionnaire. Item reduction resulted in a 19-item questionnaire, the Cochin Spinal Stenosis 19-item (CSS-19) questionnaire. Principal component analysis extracted 3 factors. In confirmatory analysis,

factor 1 influenced all items. We found convergent validity with low back pain, LSS-specific disability and divergent validity with mental health-related quality of life. Cronbach α coefficient (95% CI) was 0.96 (0.94;0.97). ICC was 0.90 (0.70;0.97). Bland and Altman analysis found no systematic trend for test-retest.

CONCLUSIONS: CSS-19 is a new patient-reported outcome measure assessing activities and participation in people with LSS. Its construction prioritized patients' perspectives at all stages. Its content and construct validities are good.

CLINICAL REHABILITATION IMPACT: Instruments able to capture specific needs of people with LSS in terms of activities and participation are lacking.

Key words: Lumbar spinal stenosis; activities; participation; disability; patient-reported outcome measure.

TEXT

Introduction

Lumbar spinal stenosis (LSS) is the leading cause of spinal surgery in people over 65 years old [1]. The most frequent symptom of LSS is neurogenic claudication characterized by radicular pain that appears when walking and regresses when sitting. In people with LSS, reduced walking distance can lead to specific activity limitations and participation restrictions [2, 3].

The International Classification of Functioning, Disability and Health is World Health Organization's conceptual framework for health and disability set in 2001. It is the conceptual basis for the definition, measurement and policy formulations for health and disability. In this framework, the term *functioning* refers to all body functions, activities and participation, while *disability* is similarly an umbrella term for impairments, activity limitations and participation restrictions. Therefore, *functioning*, as defined by the World Health Organization, is key in any population.

To assess the dimensions of functioning affected by a condition, many tools have been developed. Among these, patient-reported outcomes (PROs) have raised intense interest [4], because they allow a direct assessment of people’s views and needs about their health and functioning, without going through the interpretation of physicians and care providers [5]. PROs usually rely on self-administered questionnaires and include both generic and specific questionnaires. Generic tools are less sensitive to change than specific tools [6].

In people with Lumbar spinal stenosis (LSS) , generic self-administered questionnaires are the most commonly used PROs to assess health-related quality of life [7], global activity limitation [8] and low back pain-located activity limitation [9-11]. However, most instruments were not originally designed for people with Lumbar spinal stenosis, and

therefore fail to fully capture activities and participation that matter the most to them. Few specific self-administered questionnaires have been specifically designed for people with LSS. They include the Zurich Claudication Questionnaire (ZCQ) [12] and the Fukushima LSS Scale 25 (FLS-25) [13]. However, the construction of these questionnaires did not follow current guidelines for the development of PROs because it did not involve patients at the earliest steps. Moreover, the ZCQ and the FLS-25 focus on impairment and activities and do not assess participation [14].

To bridge this gap, we aimed to develop a new patient-reported outcome measure assessing activities and participation in people with LSS. In order to optimize its content validity, we prioritized patients' perspectives at all stages of its construction.

Materials and methods

Design overview. The construct of our questionnaire is activities and participation that are components of functioning as defined in the International Classification of Functioning, Disability and Health published by the World Health Organization in 2001. We used a two step approach. In a first step, we conducted a qualitative study using in-depth semi-structured interviews in 20 patients with Lumber spinal stenosis from September 20, 2016 to January 4, 2017 to collect meaningful concepts and to develop a provisional questionnaire. In a second step, using the provisional questionnaire, we conducted an Internet E-survey in an independent sample of 200 patients with LSS from May 30, 2018 to July 5, 2018 to reduce the number of items and to assess the psychometric properties of the questionnaire. The qualitative study is reported in accordance with the consolidated criteria for reporting qualitative research statement **(E-component 1)** [15]. The Internet E-survey is reported in accordance with the checklist for reporting results of Internet E-surveys **(E-component 2)**

[16]. With regards to activities and participation, that are patient-centered aspects of functioning, as defined by the World Health Organization, we have chosen to prioritize patients' perspectives over experts at all stages of our instrument development and have not prespecified an additional level of expert input.

Settings and participants. For the qualitative study, one investigator (JJ) consecutively and prospectively enrolled participants among people with Lumbar spinal stenosis from 2 French tertiary care centers (Department of Physical Medicine and Rehabilitation of Cochin Hospital and Department of Rheumatology of Limoges Hospital). For the Internet E-survey, one investigator (CM) screened the electronic medical records of the Department of Physical Medicine and Rehabilitation (PRM) of Cochin Hospital, using the keyword "spinal stenosis lumbar". In addition, in- and outpatients referred to the Department of PRM of Cochin Hospital were consecutively screened from February to April 2018. For both the qualitative study and the Internet E-survey, inclusion criteria were patients older than 50 years and symptomatic LSS recorded in the medical file. Patients were diagnosed with lumbar spinal stenosis on the basis of an expert opinion rather than following strict diagnostic criteria. In the absence of a "gold standard" for the diagnosis of lumbar spinal stenosis, our diagnosis of lumbar spinal stenosis was pragmatic and relied on the presence of neurogenic claudication and of lumbar spinal stenosis on an MRI or a CT scans. Weakened or absent tendon reflexes, presence of the root sedimentation sign on the MR scan or nerve conduction abnormalities could be present, but were not necessary to the diagnosis. Exclusion criteria were history of lumbar spinal surgery, cognitive impairment and inability to speak and/or understand French. For the Internet E-survey, participants must also have a valid e-mail. To improve the completion rates of the Internet E-survey, the investigator contacted all patients by e-mail every week until the questionnaire was completed. If the patient did not complete the

questionnaire after a total of 4 emails, the investigator contacted him once by phone. If the patient did not complete the questionnaire within 10 days after phone contact or if the investigator failed to reach him, the patient was considered as « non-respondent ».

Provisional questionnaire. In-depth semi-structured interviews were conducted by one investigator (JJ), a resident in PRM, who received a specific training on qualitative re-search prior to the study delivered by a senior investigator (CN), who has an experience in conducting qualitative research. All interviews were conducted during individual face-to-face visits, organized in a consultation room within the Department of PRM of Cochin Hospital and the Department of Rheumatology of Limoges Hospital. These interviews followed a framework prespecified by the junior (JJ) and 2 senior investigators (SP, CN). They aimed to capture activity limitations and participation restriction in people with LSS. A first version of the interview chart was elaborated by the junior investigator, then reviewed by the 2 senior investigators and modified accordingly. The final interview chart consisted of open-ended questions **(E-component 3)**. If a patient was unable to develop his answers spontaneously, the investigator could ask additional questions selected from the prespecified interview chart. The mean duration for each interview was 30 min. Each interview was audio recorded and transcribed with the interviewees' agreement. The number of patients was determined by convenience based on the number of eligible patients on the specified period of time. This convenient sample allowed reaching data saturation. The transcripts were decomposed into key themes, themselves divided into meaningful concepts by 2 independent investigators with experience in qualitative research (GC, CN), using the framework of thematic content analysis. Participants were not asked to provide any feedbacks on the findings. No specific software was used to manage the data. The individual interview guide

during the study was not refined during the study and literature did not influence the extracted themes.

Psychometric properties of the questionnaire. Eligible patients were invited by email to complete an Internet E-survey including the provisional questionnaire, the ZCQ self-administered physical function subscale (5, no limitation, 20 maximal limitation) [12, 17], the FLS-25 (0, no symptoms, 100 maximal symptoms) [13], a lumbar pain self-administered numeric rating scale (NRS) (0, no pain, 10, maximal pain) [18, 19], a radicular pain self-administered NRS (0, no pain, 10, maximal pain) [18, 19], the Oswestry Disability Index (ODI) self-administered questionnaire (0, no limitation, 100 maximal limitation) [9, 20], the physical component score of the self-administered 12-Item Short Form Health Survey (SF-12, 9.95, worse quality of life, 70.02, best quality of life) [7, 21], and the mental component score of the self-administered SF-12 (5.89, worse quality of life, 71.97, best quality of life) [7, 21].

Reduction of items. To avoid non response bias and irrelevant items, items with a response rate ≤ 94 % were removed [22]. To avoid a floor or a ceiling effect, items with more than 50% of the respondents which had the minimal or maximal score (respectively 0/10 or 10/10) were removed [23]. To avoid redundancy, items with an inter-item Spearman correlation coefficient > 0.8 were removed, and only the most relevant item was left in the questionnaire, after consensus between 3 investigators (CM, GC, CN) [24]. For items for which investigators failed to reach consensus, an independent sample of 4 patients with LSS fulfilling eligibility criteria was interviewed **(E-component 4)**. An item was removed if at least 2 out of 4 patients found it irrelevant. If an item was found irrelevant by 1 patient only, we then checked from the in-depth interviews how many times this item was cited. If the

item was cited only once, then it was removed. For items cited at least 2 times, they were left in the final questionnaire.

Dimensional structure of the questionnaire. To assess whether the new questionnaire was uni- or multidimensional, we carried out principal component analysis. Factors with an eigenvalue > 1 were retained [25, 26].

External validity. We hypothesized that our questionnaire would be highly correlated with questionnaires assessing radicular pain intensity, LSS-specific disability (ZCQ and FLS-25) and physical component of health-related quality of life (physical component score of the SF-12) and weakly correlated to questionnaires assessing low back pain intensity, low back pain-specific disability (ODI) and mental component of health-related quality of life (physical component score of the SF-12). The Spearman correlation coefficient (ρ) was calculated. Correlation was considered weak if $\rho < 0.35$, moderate if $0.35 \leq \rho < 0.5$ and high if $\rho \geq 0.50$ [27].

Internal consistency. To verify that items of the new questionnaire measured the same concept and were correlated with each other, we calculated the Cronbach α coefficient and assessed its 95% CI by Feldt's Method [28]. A Cronbach α coefficient was considered acceptable if > 0.7.

Test-retest reliability and agreement. An independent sample of 40 patients with LSS fulfilling eligibility criteria, who were "non-respondents" when first contacted, were invited to complete the new questionnaire twice with at least a 1-week interval. An additional independent sample of 10 consecutive in- and outpatients patients with LSS referred to the Department of PRM of Cochin Hospital was invited from August to October 2018. Overall, 50 patients with LSS were invited to complete the new questionnaire. The new questionnaire was self-administered using its online or printed versions depending on the mode of

recruitment. To assess reliability, we used ICC [29] and Bland and Altman analysis [30]. ICC was considered acceptable if > 0.6 [31].

Translation. The original version of the questionnaire was developed and validated in French. The French version was translated into English by an English native speaker.

Statistical analysis. Quantitative variables were described with means (SD) and qualitative variables with absolute frequencies (%). We used MEDCALC version 18.10.2 software for the test-retest and SYSTAT 13 for Windows No. 13.00.05 software for other statistical analyses.

Ethical consideration and funding source. Our study protocol was approved by our Institutional Review Board (Comité de Protection des Personnes Île-de-France VII). Participants received written information about the purpose of study through an invitation letter sent by e-mail. Information given to the participant and absence of participant's opposition was recorded in his/her medical file. The study was not funded.

Results

Participants. For the semi-structured interviews, demographics and characteristics of the 20 participants are presented in **E-component 5**. For the Internet E-survey, 865 records were retrieved from October 2015 to October 2016. In addition, 80 in- and outpatients referred to the Department of PRM of Cochin Hospital were consecutively screened, yielding a total of 945 patients screened. Among these, 200 patients were eligible **(Figure 1)**. Overall, 63/200 (31.5%) patients completed the Internet E-survey: 35/63 (55.6%) were women, mean (SD) age was 66.3 (11.3) years, mean symptom duration was 13.4 (1.4) years, mean lumbar pain

intensity was 5.7 (2.2), mean radicular pain intensity was 5.4 (2.2) and 36/63 (57.1%) patients reported maximum walking distance less than 100 m **(Table I)**.

Provisional questionnaire. Patients' interviews generated 57 items: 9 items were related to global health status and 48 items were related to activities and participation. These latter were translated into understandable questions and served to construct a provisional 48 item questionnaire **(E-component 6).** Acceptability and understandability of the provisional questionnaire was tested and consolidated in 10 patients with LSS.

Reduction of items. Overall, 23/48 (47.9%) items had a completion rate < 94% (of which 2 had a floor effect and 0 had a ceiling effect) leaving 25/48 (52.1%) items in the questionnaire **(E-component 7)**. 6/25 items were redundant with an inter-item Spearman correlation coefficient ≥ 0.8 and were removed **(E-component 8).**

Cochin Spinal Stenosis 19-item questionnaire. The final questionnaire included 19 items and was named Cochin Spinal Stenosis 19-item (CSS-19) questionnaire **(Table II)**. Each item is scored from 0 (no limitation) to 10 (maximal limitation).The total score for the CSF-19 was defined as the sum of the score for each completed item divided by the number of completed items and multiplied by 10 resulting in a score ranging from 0 (no activity limita-tion and/or participation restriction) to 100 (maximal activity limitation and/or participation restriction).

Dimensional structure of the questionnaire. PCA extracted 3 factors with eigenvalues of 11.68, 1.55 and 1.01 explaining 61.49 %, 8.16% and 5.33 % of the variance, respectively. All items have a large loading on factor 1 **(Table III)**.

External validity. The Cochin Spinal Stenosis 19-item (CSS-19) showed high correlation with ODI (ρ=0.69), FLS-25 (ρ=0.63), ZCQ (ρ=0.58), lumbar pain NRS (ρ=0.53), moderate correlation with radicular pain NRS (ρ=0.42) and physical component of the SF-12 (ρ=-0.46) and weak correlation with mental component of the SF-12 (ρ=-0.28) **(Table IV)**.

Internal consistency. Cronbach's α coefficient (95% CI) was 0.96 (0.94;0.97). Correlation between each item and the CSS-19 total score ranged from 0.55 to 0.90 **(Table V)**.

Test-retest reliability. Overall, 20/50 (40.0%) patients completed the test and 13/20 (65.0%) completed the retest **(E-component 9).** The mean time elapsed between the test and the retest was 6.8 (2.7) days. ICC was 0.90 (0.70;0.97) and the Bland and Altman analysis found no systematic trend for the test-retest (mean difference [IC 95%] 1.6 [-3.9;7.1] between retest and test) **(Figure 2)**.

English version of the Cochin Spinal Stenosis 19-item CSS-19. The CSS-19 was originally developed in French. The English version of the CSS-19 is presented in **Table II.**

Discussion

The Cochin Spinal Stenosis 19-item (CSS-19) is a new PRO assessing activities and participation in people with Lumbar spinal stenosis. Its construction prioritized patients' perspectives at all stages. Its content and construct validities are good.

The construction of our questionnaire followed current recommendations for the development of PROs. It involved patients in the earliest steps of the questionnaire construction, but not experts or literature. Therefore, the Cochin Spinal Stenosis 19-item

(CSS-19) includes concepts generated by patients only, contrary to currently available LSS-specific questionnaires, namely the ZCQ and the FLS-25, which concepts were generated by literature and experts. For example, the items of the ZCQ were chosen using a judgmental approach based on a literature review and consensus of an expert panel. For the FLS-25, on the basis of past reports, experts developed constructs (domains) and items that would be appropriate for measuring the severity of LSS symptoms. Patients were involved in later stages only.

The Cochin Spinal Stenosis 19-item (CSS-19) is a short self-administered questionnaire. Items retained in the questionnaire are related to both activities of daily living (e.g. items 3, 4, 14) and participation in social life (e.g. items 9, 16, 17) and interpersonal relationships (e.g. items 17, 18, 19). Dimensions of functioning assessed by the Cochin Spinal Stenosis 19-item (CSS-19) are broader than those assessed by other Lumbar spinal stenosis specific questionnaires. For example, the ZCQ consists in 3 subscales assessing impairment (severity of symptoms), walking-related activity limitation and patient's satisfaction after treatment. Similarly, the FLS-25 assesses symptoms that occur in specific situations or associated with certain postures and activities, rather than activities and participation. We expected that the item "walking" would remain in the final version of questionnaire. However, only the item "take a walk" was retained. We believe this item is more inclusive than "walking". Because the patients have comorbidities, it might also be difficult for them to attribute their walking difficulties solely to LSS.

As expected, we found a high correlation with Lumbar spinal stenosis specific questionnaires. We hypothesized that activities limited by Lumbar spinal stenosis would mainly be related to walking and we did not expect the high correlation with lumbar pain and low back pain-specific activity limitation. These results might be explained by the higher intensity for low back pain than radicular pain in our population. The correlation with

lumbar pain and questionnaire of low-back pain specific activity limitation is both a limitation and strength of the Cochin Spinal Stenosis 19-item (CSS-19). Items were generated by patients only and were not reviewed by experts. Because some items may be more related to patients' experience of having a spinal condition than specific to LSS, the Cochin Spinal Stenosis 19-item (CSS-19) apparently includes questions not specific to LSS. However, it is also important that a patient-reported outcome broadly covers the dimensions of functioning that matter the most for patients, even though some might appear less specific to a given condition, because only in this way can an individual's functioning be assessed in its globality. We believe our tool covers some important aspects of the experience of people with lumbar spinal stenosis, which complement existing PRO.

Our study has limitations. In the present study, we developed the first steps of CSS-19 construction and validation. Further validation in an independent sample of people with lumbar spinal stenosis is needed. We faced a high dropout rate and recruited a smaller sample than expected despite implementation of specific measures to enhance the completion rates. Even though the "pen and paper" online technology is cheap, it is burdensome to older people. The completion rate of the Internet E-survey was low. Many participants had difficulties to complete the online questionnaire, which may have induced a selection bias. Indeed, we may have selected participants based on their computer skills.

CSS-19 multidimensionality may have some effects on the measurement. However, we believe that the CSS-19 unidimensionality loss had no consequences because activities and participation are intrinsically multidimensional constructs. Because we did not prospectively assess the CSS-19 sensitivity to change in the present study, we cannot discuss its advantages with respect to the other in terms of responsiveness to treatment or disease progression. We did not calculate the maximum number of missing items that can be tolerated without weakening or distorting the measure and did not run simulations yet. We

are planning to test this in an independent sample. A high Cronbach α value can suggest that item redundancy is still present. The sample used was not large enough and was not representative of the full LSS population. Participants were recruited from two tertiary centers and may have had more severe activity limitations and participation restriction than other French patients with LSS. Finally, we have not assessed the validity and reliability of the LSS diagnosis performed by the clinicians.

Conclusions

In summary, the Cochin Spinal Stenosis 19-item (CSS-19) is a new patient-reported outcome designed to assess Lumbar spinal stenosis specific activity limitation and participation restriction. Its construction prioritized patients' perspectives at all stages as recommended and allowed optimizing its content validity. Its psychometric properties are good. Assessing its sensitivity to change and validating it in other languages are needed before its full implementation in clinical practice and research. We now have planned to carry out a prospective study to further validate the CSS-19.

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NOTES

Conflicts of interest.

We have no Conflict of Interest.

Funding.

None

Authors' contributions.

Conception and design of the study.

JENNIFER JOUFFRIAULT, SERGE POIRAUDEAU, CHRISTELLE NGUYEN

Drafting of the original protocol.

JENNIFER JOUFFRIAULT, SERGE POIRAUDEAU, CHRISTELLE NGUYEN

Coordination of the study.

GAELLE COURAUD, CHRISTELLE NGUYEN

Design of the statistical analysis plan.

CAMILLE DASTE, CHRISTELLE NGUYEN

Acquisition of data.

CHIARA MASI, GAELLE COURAUD, JENNIFER JOUFFRIAULT, MARIE-MARTINE LEFÈVRE-COLAU, FRANCOIS RANNOU,

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Interpretation and analysis of data.

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Congresses.

34 ème Congrès de la Société Francaise de Médecine Physique et de Réadptation (SOFMER)

TABLES

Table I. Participants' demographics and characteristics at inclusion.

Age (years), mean (SD)	66.3 (11.3)
Male, n/N (%)	28/63 (44.4)
Body mass index (kg/m²), mean (SD)	27.6 (4.9)
Full or part-time employed, n/N (%)	11/63 (17.4)
Higher education, n/N (%)	27/62 (43.5)
Duration of symptoms (years), mean (SD)	13.4 (1.4)
Lumbar pain in the previous month, NRS (0-10), mean (SD)	5.7 (2.2)
Radicular pain in the previous month NRS (0-10), mean (SD)	5.4 (2.2)
Self-reported maximum walking distance (m), mean (SD)	800.0 (438.7)
< 100 m, n/N (%)	36/63 (57.1)
100-600 m, n/N (%)	3/63 (4.7)
600-1000 m, n/N (%)	1/63 (1.5)
> 1000 m, n/N (%)	23/63 (36.5)
Zurich Claudication Questionnaire physical function subscale (5-20), mean (SD)	10.6 (2.8)
Fukushima Lumbar Spinal Stenosis Scale 25 (0-100), mean (SD)	45.7 (19.4)
Oswestry Disability Index (0-100), mean (SD)	16.7 (8.0)
12-Item Short Form Health Survey physical component score (9.95-70.02), mean (SD)	37.3 (7.3)
12-Item Short Form Health Survey score mental component score (5.89-71.97), mean (SD)	43.2 (9.0)

SD: standard deviation; NRS: numeric rating scale.

Table II. English version of the Cochin Spinal Stenosis 19-item questionnaire (CSS-19).

Sir or Madam,

Your lumbar spinal stenosis is responsible for pain in the lower back and/or lower limbs, which appear and increase when walking and regress when sitting and/or leaning forward. Below is a list of activities of everyday life that may be limited by symptoms related to your lumbar spinal stenosis. For each of them, please tell us how much your lumbar spinal stenosis is currently limiting these activities. We ask you to assess your limitation between 0 and 10 with 0 corresponding to "no limitation" and 10 to "maximal limitation". If an item is not relevant to your situation, please tick the box “not applicable”.

Because of your lumbar spinal stenosis, do you feel limited in doing the following activities of your daily life?

1	Moving
2	Moving an object or picking up an object on the ground or catching an object in height
3	Cooking
4	Shopping
5	Taking care of yourself (shaving, brushing your teeth)
6	Gardening
7	Dressing the upper part of your body (shirts, t-shirts, sweaters)
8	Dressing the lower part of your body (socks, pants, leggings)
9	Going up or down the stairs
10	Getting in or out of your car
11	Sitting a long time
12	Standing or trampling
13	Bending down or getting up
14	Taking a shower or a bath
15	Kneeling
16	Taking a walk
17	Going out
18	Seeing your friends (visiting or receiving them)
19	Travelling

Items were originally formulated in French. Each item is scored on an 11-class numeric rating scale from 0 = no limitation to 10 = maximal limitation. An item not relevant to the patient can be scored “not applicable”. The total score for the CSF-19 is the sum of the score for each completed item divided by the number of completed items and multiplied by 10 resulting in a score ranging from 0 (no activity limitation and/or participation restriction) to 100 (maximal activity limitation and/or participation restriction)

Table III. Items' loading on factors.

Items	Factor 1	Factor 2	Factor 3
1	0.72	-0.28	0.12
2	0.84	-0.23	-0.04
3	0.85	-0.27	0.01
4	0.77	-0.41	0.19
5	0.77	0.40	0.38
6	0.74	-0.19	-0.47
7	0.68	0.49	0.13
8	0.77	0.25	-0.36
9	0.74	-0.30	0.47
10	0.78	0.28	0.02
11	0.74	0.42	-0.02
12	0.82	-0.30	-0.17
13	0.82	0.03	0.04
14	0.87	0.31	0.01
15	0.74	0.17	-0.15
16	0.83	-0.25	0.25
17	0.76	-0.20	-0.32
18	0.84	0.04	-0.10
19	0.77	0.14	0.05

Table IV. CSS-19 convergent and divergent validities.

	ρ	p-value	N
Convergent validity: | ρ | 0.50			
Oswestry Disability Index	0.69	<0.0001	61
Fukushima Lumbar Spinal Stenosis Scale 25	0.63	<0.0001	61
Zurich Claudication Questionnaire physical function subscale	0.58	<0.0001	61
Low back pain numeric rating scale	0.53	<0.0001*	61
12-Item Short Form Health Survey physical component score	0.46	<0.0001	61
Radicular pain numeric rating scale	0.42	<0.0001*	61
Divergent validity: | ρ | < 0.50			
12-Item Short Form Health Survey mental component score	-0.28	0.02	61

*Unexpected convergent validity.

Table V. CSS-19 internal consistency.

Items		Correlation
Cronbach α (95% CI) = 0.96 (0.94;0.97)		**ρ**
1	Moving	0.63
2	Moving an object or picking up an object on the ground or catching an object in height	0.70
3	Cooking	0.73
4	Shopping	0.64
5	Making your toilet (shaving, brushing your teeth)	0.81
6	Gardening	0.55
7	Dressing the upper part of your body (shirts, t-shirts, sweaters)	0.70
8	Dressing the lower part of your body (socks, pants, leggings)	0.77
9	Going up or down the stairs	0.67
10	Getting in or out of your car	0.82
11	Sitting a long time	0.75
12	Standing or trampling	0.73
13	Bending down or getting up	0.80
14	Taking a shower or a bath	0.90
15	Kneeling	0.65
16	Taking a walk	0.79
17	Going out	0.79
18	Seeing your friends (visiting or receiving them)	0.85
19	Travelling	0.70

ρ = correlation of each item with the CSS-19 total score.

TITLES OF FIGURES

Figure 1. Flow diagram for the Internet E-survey.

Figure 2. Bland-Altman plots (n=13).

E-COMPONENTS

E-component 1. Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist.

E-component 2. Checklist for reporting results of Internet E-surveys (CHERRIES).

E-component 3. Final interview chart used to conduct semi-structured interviews.

E-component 4. Demographics and characteristics of 4 patients interviewed for the reduction of items.

E-component 5. Demographics and characteristics at inclusion of 20 patients interviewed to construct the provisional questionnaire.

E-component 6. Original French version of the 48-item provisional questionnaire.

E-component 7. Characteristics of the 48-item provisional questionnaire.

E-component 8. Redundancy between the 25 remaining items (*indicates items with redundancy).

E-component 9. Demographics and characteristics of the 13 patients surveyed for the test-retest.

Figure 1. Flow diagram for the Internet E-survey.

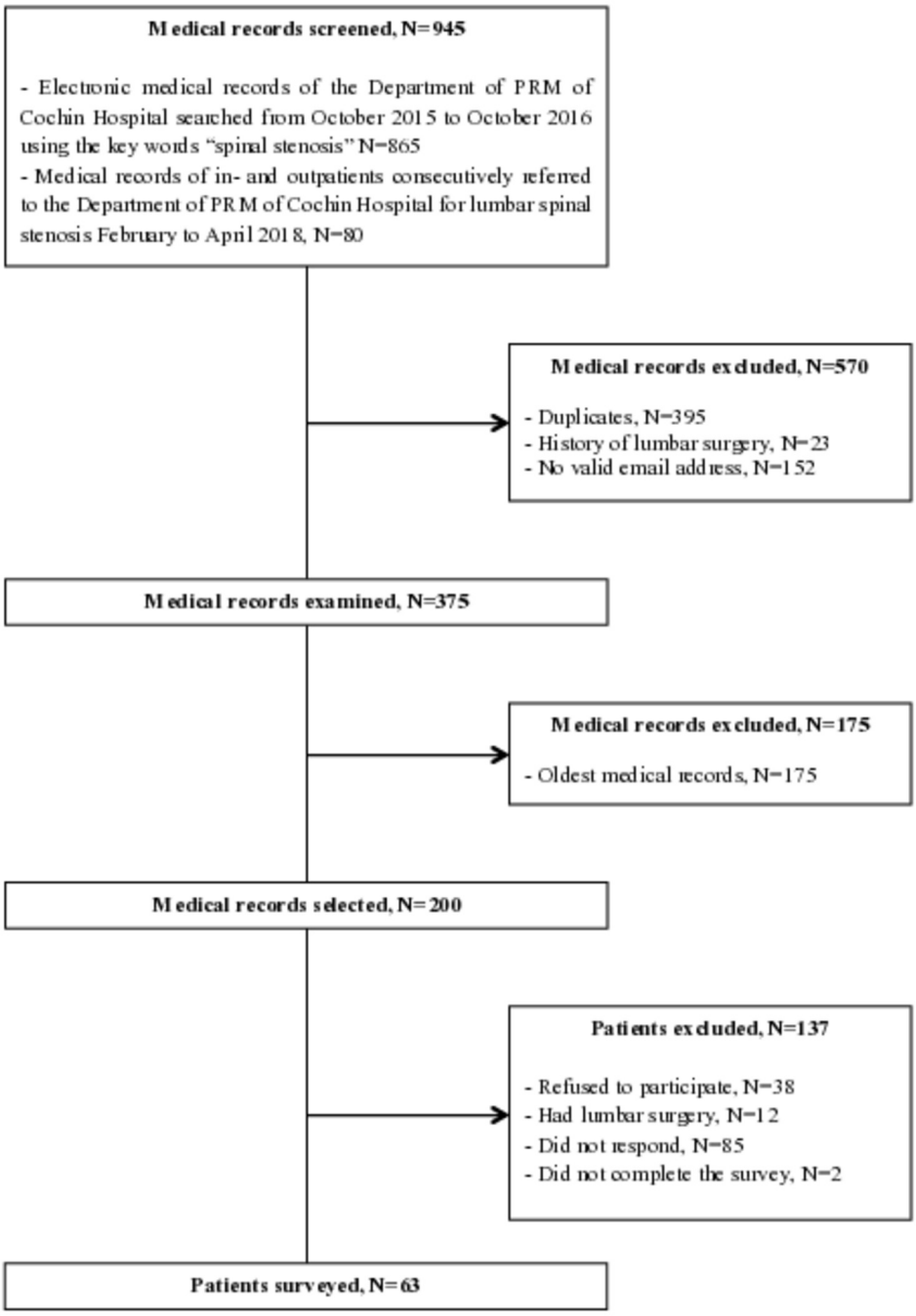
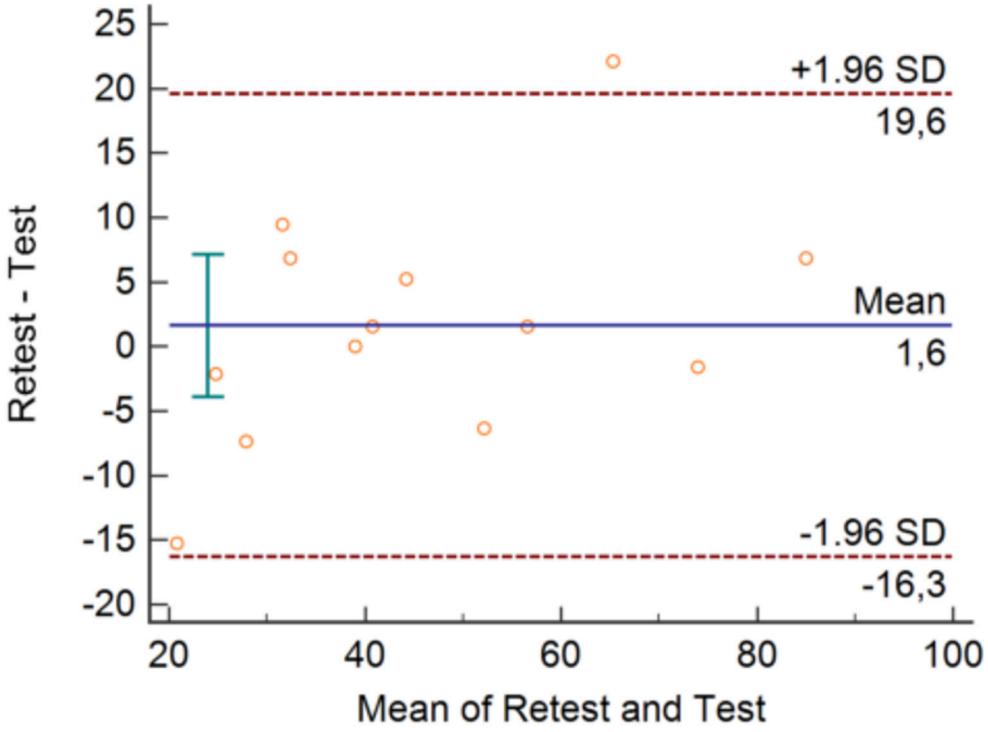


Figure 2. Bland-Altman plots (n=13).



Supplementary Digital Material

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