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A comparison of telephone interview versus on-site completion of Lysholm knee score in patients who underwent arthroscopic ACL reconstruction: are the results equivalent?

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Abstract
Introduction The purpose of this study was to compare two different modes of administration (telephone versus face to face) for Lysholm knee score (LKS) to test their multi-mode equivalence and reliability.
Materials and methods Two LKSs were obtained in 100 patients who underwent ACL reconstruction surgery. First LKS was completed through telephone interview, and second LKS, which was at least 2 weeks later, was completed face-to-face interview at the hospital. To analyze the test–retest reliability, the relative level of agreement between the two modes of administration for LKS was calculated using interclass correlation coefficient (ICC) in 95 % confidence interval.
Results The mean LKS was 93.01 ± 9.12 (range 59–100) at telephone interview and 93.56 ± 7.93 (range 59–100) at face-to-face interview ($p = 0.130$). Both the total point and the each item's point were statistically similar ($p < 0.05$ for each item). The total score was same in 66 (66 %) subjects. The mean difference between two scoring was only 1.83 ± 3.14 points (range 0–15). However, eight (8 %) patients were assigned to different grading groups (excellent, good, fair, and poor). The overall LKS and the each item of the LKS had acceptable test–retest reliability [ICC = 0.954 (95 % CI 0.931–0.969)].
Conclusions LKS can be reliably completed through telephone interview, which would provide accurate data similar to face-to-face interview. Researchers can design studies using telephone interview as a mode of administration for LKS or use mix-mode designs.

Keywords Lysholm knee score · Telephone · Face to face · Interview · Mode of administration

Introduction

In order to obtain evidence-based medical knowledge and guide therapeutic choices, properly designed large-scale clinical trials are essential in health sciences. Objective outcome measurement is the most important part of clinical trials because the quality of the clinical research is directly related with the accuracy and reliability of the outcome measurement. Besides physician-oriented outcome measures, such as physical examination findings, imaging, and laboratory testing, patient-reported outcome measures (PROMs) through completion of specific questionnaires are also significantly valuable for the comprehensive assessment of clinical conditions. Over the years in progression of health care, PROMs have gained much importance, which evaluates functional status from the patient's perspective, experiences, and values [1, 2].

It is well known that data collection is prone to several biases, and previously, it has been shown that modes of questionnaire administration may have an influence on its results [3]. Therefore, it is necessary to know that the result of a particular questionnaire is reliable when administered via different of modes such as telephone interview or face-to-face interview [4].

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Lysholm knee score (LKS) is one of the most commonly used PROMs of knee function, which is intended to evaluate outcomes of knee ligament surgery, particularly symptoms of instability. It is a simple questionnaire which includes eight items about the knee function and symptoms in daily life [5, 6]. Original and revised scales were intended for in-person clinician administration but several subsequent studies used telephone interview for data collection [7–9]. On the other hand, currently there is no study that investigates whether telephone interview is also a reliable mode of administration for LKS in the relevant literature. The transfer of LKS from its original format to another mode of administration requires testing for multimode equivalence. The purpose of this study was to determine whether LKS is reliable when obtained via telephone interview.

Patients and methods

The institutional clinical database was retrospectively reviewed to identify all patients who underwent ACL reconstruction with at least 1-year follow-up during 2009 and 2013. Of these, 100 patients were randomly selected by random number generator software and included in this study. Initially, LKS was completed through telephone interview in all patients. If the patient declares that he did not understand a particular question or an answer, additional explanatory information was provided till the patient is adequately informed. All patients were invited to the hospital within the following 2–4 weeks after the telephone interview, and LKS was completed again in face-to-face interview. Only patients who were believed to be in a clinically stable state were asked to participate in the study. If there is a change in patient's postoperative condition, such as a new injury during the time interval, those patients were excluded from the study. Both telephone interview and face-to-face interview were performed by the same single investigator in a standard fashion, and a preformed telephone script was followed to maintain consistency in what was communicated between participants. During the face-to-face interview (second interview), both the investigator and the patient were blinded as to the results of telephone interview (first interview). This study was carried out in accordance with the ethical standards laid down in the Declaration of Helsinki 1964 and its later amendments.

The means and standard deviations of the two LKS scorings and its eight items (on-site and telephone) were calculated. In the first part of the analysis, all measurements were compared with paired sample t test. A p value <0.05 was considered significant. To analyze the test–retest reliability, the relative level of agreement between the two modes of administration for LKS was calculated using interclass correlation coefficient (ICC) in 95 % confidence interval. An interclass correlation coefficient of >0.70 was considered acceptable [10].

Results

This study was completed with 94 male and six female patients with a mean age of 31.7 ± 7.1 (range 18–46). The mean follow-up time was 33.4 ± 7.9 months (range 24–50). 38 (38 %) patients were primary school, 24 (24 %) were secondary school, 32 (32 %) were high school, and six (6 %) were university graduate. The mean time interval between the telephone and face-to-face interviews was 22.6 ± 4.7 days (range 14–33). The mean LKS was 93.01 ± 9.12 (range 59–100) at telephone interview and 93.56 ± 7.93 (range 59–100) at face-to-face interview. Both the total point and the each item's point were statistically similar (Table 1). The total score was same in 66 (66 %) subjects. The mean difference between two scorings was only 1.83 ± 3.14 points (range 0–15). However, eight (8 %) patients were assigned to different grading groups (excellent, good, fair, and poor). The overall Lysholm score and the each item of the Lysholm score had acceptable test–retest reliability (Table 2).

Discussion

This study has investigated whether completion of LKS through telephone interview is a reliable mode of data collection in patients who underwent ACL reconstruction. Results of our study showed that LKS had an acceptable test–retest reliability to justify its use via telephone interview. Therefore, it can be concluded that LKS can be reliably completed through telephone interview, which would provide accurate data similar to face-to-face interview. This information is particularly important for planning future clinical and epidemiological trials when Lysholm knee score is used as the major outcome measure.

Response rate, also known as completion rate, is defined as the number of patients who completed the survey divided by the number of patients in the sample. As the number of non-respondents increases (low response rate), validity of a clinical survey decreases and the resultant data do not properly represent the estimated population [3]. In order to increase the response rate, thus increase the generalizability of the survey results, researchers may need to use variety of data collection methods to reach more patients. Cellular phones have become an indispensible tool for communication in daily life during the last two decades;

Table 1 Comparison of telephone versus face-to-face interview

	Face to face		Telephone		Difference		*p* value
	Mean ± SD	Range	Mean ± SD	Range	ΔScore ± SD	Range	
Limp	4.88 ± 0.47	3–5	4.82 ± 0.57	3–5	0.24 ± 0.65	0–2	0.083
Support	5.00 ± 0.00	5–5	5.00 ± 0.00	5–5	0	0	[a]
Pain	22.60 ± 2.88	10–25	22.55 ± 3.58	10–25	1.25 ± 2.5	0–10	0.859
Instability	23.60 ± 3.18	15–25	23.50 ± 3.21	15–25	0.1 ± 0.7	0–5	0.158
Locking	14.25 ± 1.79	10–15	14.00 ± 2.01	10–15	0.35 ± 1.28	0–5	0.058
Swelling	9.60 ± 1.20	6–10	9.56 ± 1.25	6–10	0.04 ± 0.4	0–4	0.320
Stair climbing	8.92 ± 1.78	6–10	8.88 ± 1.80	6–10	0.04 ± 0.4	0–4	0.320
Squatting	4.71 ± 0.45	4–5	4.70 ± 0.46	4–5	0.05 ± 0.21	0–1	0.657
Total	93.56 ± 7.93	69–100	93.01 ± 9.12	59–100	1.83 ± 3.14	0–15	0.130

[a] No variance in item

p value is the result of paired sample *t* test

Table 2 Test–retest reliability

Component	Interclass correlation coefficient (95 % confidence interval)
Limp	0.882 (0.825–0.921)
Support	[a]
Pain	0.774 (0.664–0.848)
Instability	0.988 (0.982–0.992)
Locking	0.867 (0.802–0.911)
Swelling	0.973 (0.960–0.982)
Stair climbing	0.987 (0.981–0.992)
Squatting	0.936 (0.905–0.957)
Total	0.954 (0.931–0.969)

[a] No variance in item

thus, telephone interview may be an effective solution to obtain self-reported clinical data particularly in large-scale studies.

There is only one study which investigates the effect of mode of administration on LKS in the current literature. Höher et al. compared self-administered LKS with in-person clinician administration in 61 patients 1 year after ACL surgery at the same clinic visit. They reported that the mean score was significantly lower with self-administration, and almost one out three patients (31 %) were assigned to different categories. They advocated the use of self-administration over clinician administration due to evident presence of interview bias [11]. Face-to-face interview requires an interaction between the interviewer and the respondent. This may provide a chance to explain the actual purpose of the questions and clarify the respondent's mind; however, respondents have been shown to give more positive and socially desirable responses during a face-to-face interview particularly toward the treating clinician, which is also known as "*interview bias*" [4, 12]. In our study, although both telephone and face-to-face interviews were carried out by the same investigator in a standard fashion, we cannot totally exclude interview bias.

Messih et al. compared telephone and postal methods of administration of the Oxford Knee Score in patients undergoing total knee arthroplasty. They concluded that telephone and mail administration produced equivalent survey responses at a group level. However, they advocated using telephone interview over postal administration [13]. Telephone was more efficient, with less time wasted chasing up patients who did not return their surveys, and the scores were potentially more accurate as no data were missed and uncertainties clarified.

This study has some strengths and limitations. We have included patients who were in clinically stable condition to prevent any change in scoring between the first and second assessments. Moreover, patients were invited to the hospital at least 2 weeks after the telephone interview, so within the following 2–4 weeks to prevent recall bias. Finally, our results can only apply for patients who underwent ACL reconstruction surgery.

In conclusion, telephone interview is a reliable mode of administration for LKS. Researchers can design studies using telephone interview as a mode of administration for LKS or use mix-mode designs as both modes of administration end up with similar results.

Conflict of interest Authors have no conflict of interest to disclose.

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