

# Reliability of the Manchester respiratory activities of daily living questionnaire as a postal questionnaire

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## Abstract

**Background:** the Manchester Respiratory Activities of Daily Living Questionnaire is a new scale designed to assess respiratory disability in elderly outpatients with chronic obstructive pulmonary disease. However, it has not been examined for its reliability as a postal questionnaire.

**Objective:** to investigate test-retest reliability of the Manchester Respiratory Activities of Daily Living as a postal questionnaire and to compare face-to-face administration by a physiotherapist with postal completion.

**Design:** two single-blind studies were performed to investigate test-retest reliability of the Manchester Respiratory Activities of Daily Living Questionnaire in elderly patients with chronic obstructive pulmonary disease. Study 1 comprised 51 subjects (27 men) with chronic obstructive pulmonary disease, aged 61–87 (mean 74) years. They completed the Manchester Respiratory Activities of Daily Living Questionnaire twice mailed to them at home (second questionnaire after two weeks). Study 2 comprised a separate and previously unstudied group of 36 subjects with chronic obstructive pulmonary disease (24 men), aged 60–82 (mean 71) years who also completed the Manchester Respiratory Activities of Daily Living Questionnaire twice, first face-to-face by a physiotherapist and then two weeks later at home.

**Results:** Mean (SD) one second forced expiratory volume (FEV<sub>1</sub>) were: Study 1=0.93 (0.30) litres; Study 2=1.01 (0.43) litres. Mean [SEM] difference between two periods Manchester Respiratory Activities of Daily Living Questionnaire score (Study 1) was 0.07 [0.3] and (Study 2) was 0.17 [0.5]. The 95% limits of agreement were –0.69 to +0.54 and –1.21 to +0.87 and standard error of measurement of ‘repeatability’ square root 1.55 and 1.71 respectively for Manchester Respiratory Activities of Daily Living Questionnaire. Intraclass correlation coefficients were Study 1, ICC (1,1)=0.92, 95% confidence interval 0.87 to 0.95; Study 2, ICC (1,1)=0.86, 95% confidence interval (0.79 to 0.94).

**Conclusion:** The Manchester Respiratory Activities of Daily Living Questionnaire scale is acceptable and repeatable as a postal questionnaire in elderly patients with chronic obstructive pulmonary disease.

**Keywords:** elderly, chronic obstructive pulmonary disease, disability, activities of daily living

## Introduction

The purposes of pulmonary rehabilitation in elderly patients with chronic obstructive pulmonary disease (COPD) are to increase exercise tolerance, reduce symptoms of breathlessness, and to improve function in daily activities and quality of life.

In the assessment of other chronic diseases, for example, stroke patients’ functional abilities can be

monitored at home by using postal versions of Activities of Daily Living (ADL) scales specifically validated for this patient group, for example the Barthel ADL Index and Nottingham Extended ADL scale [1, 2]. This may be useful in clinical management and the planning of treatment strategies and clinical services. It also extends the value of the scale as a research tool. However, despite the existence of quality of life scales specific to chronic respiratory diseases, at

the time of the design of the present study there was no disease-specific ADL scale available as a postal questionnaire in elderly patients with COPD.

Recently we have designed and validated the Manchester Respiratory Activities of Daily Living Questionnaire (MRADL) as a physical disability scale in elderly patients with COPD [3]. MRADL is a self-completed scale and takes about 10 minutes to complete. It measures functional ability in four domains: mobility (seven items), kitchen (four items), domestic tasks (six items) and leisure activities (four items) [see Appendix]. It provides information that is specific to an individual and may be useful in designing care aimed at maintaining independent living at home. In our original description of the MRADL scale [3], we found it discriminated (between elderly COPD subjects and elderly normals) better than the Nottingham Extended ADL scale in terms of sensitivity and negative predictive value. Furthermore, in contrast to the Nottingham Extended ADL scale, the MRADL scale measured change with pulmonary rehabilitation. The MRADL also showed high internal consistency (Cronbach Alpha=0.91). However, it has not been examined for its reliability as a postal questionnaire.

The aims of the present study were to investigate test-retest reliability and acceptability (based on response rate of the subjects) of the MRADL as a postal questionnaire, and to assess these issues in a different population (i.e. rural Jersey versus inner city Manchester).

## Methods

We defined COPD as best 1 second forced expiratory volume (FEV<sub>1</sub>) less than 70% of predicted and rising by less than 15% after 5 mg nebulised salbutamol. Spirometry was performed using a compact Vitalograph C spirometer (Buckingham, UK) (Study 1) and a Sensor Medics Auto Box spirometer (Brighton, UK) (Study 2) ( $\pm 5\%$  FEV<sub>1</sub>) and were taken at 1 minute intervals with the best result recorded. Subjects were included if they were aged  $\geq 60$  years, clinically stable with no change in medication for one month, and had no hospital admission in the previous six weeks.

Exclusion criteria comprised acute/chronic cognitive impairment (Abbreviated Mental Test Score  $< 7/10$  [4]) terminal illness, uncontrolled cardiac failure and psychotic disease.

## Subject selection

### Study 1

We randomly selected subjects (about one third) from a previously recruited study [3] in Manchester. All subjects had completed the MRADL face-to-face for the previous study with a time interval between the two

studies of about 6 months. Subjects had no access to their previous results. We mailed 70 questionnaires with a covering letter explaining the nature of the study. Those who responded to the first mailing were sent the second questionnaire two weeks later again with a covering letter.

### Study 2

We recruited previously unstudied subjects consecutively and non-selectively from outpatient respiratory clinics from the General Hospital in Jersey. The purpose of the study was to investigate the reliability of the MRADL scale researcher administered completion, versus two weeks later postal completion at home, i.e. to exclude that the researcher (or clinician) inadvertently influences the subject during face-to-face completion. Subjects comprised 36 (24 men) outpatients with COPD. Their age range was 60–82 (mean 71) years.

## Statistical analysis

Statistical analysis was performed using the SPSS for Windows version 9.0. Normal distribution was assessed by the Kolmogorov-Smirnov goodness of fit test ( $P=0.99$ ). As the paired difference in the MRADL scores were normally distributed, comparison between means was by paired *t*-test. Inter-investigator variability was assessed by the 95% limits of agreement [5]. Repeatability of the MRADL was investigated by intra-class correlation coefficients (1.1) using a one-way analysis of variance (ANOVA) table (i.e. MRADL score by subject using the SPSS one way) [6]. The standard error of measurement (equivalent to a measure of repeatability as defined by Altman [7] being square root of the variance of the measurement errors) was estimated from the square root of the residual mean square from the ANOVA table. Significance was defined at the 5% level.

## Results

Mean (SD) one second forced expiratory volumes were: Study 1=0.93 (0.3) litres; Study 2=1.01 (0.43) litres.

## Response rate and acceptability

In Study 1, we sent out 70 questionnaires in the first mailing and 60 (86%) were returned. Of these, five questionnaires were excluded from the second mailing, as 4 subjects did not complete the questionnaire fully and 1 subject died and the questionnaire was returned uncompleted. Thus, two weeks later, 55 repeat questionnaires were mailed. Of these 51 (93% of 55 or 73% of the whole original group of 70) were returned fully completed. Only these 51 subjects were further analyzed. Access to data from our previously reported study [3]

enabled us to confirm that there was no significant difference in the baseline MRADL scores and demographic characteristic of responders versus non-responders in the current study.

In Study 2, 36 questionnaires were sent out after face-to-face completion by the researcher and all subjects (100%) returned the questionnaire fully completed.

### Repeatability

Mean [SEM] difference between two measurements MRADL score (Study 1) was 0.07 [0.3] and (Study 2) was 0.17 [0.5]. The 95% limits of agreements were  $-0.69$  to  $+0.54$  and  $-1.21$  to  $+0.87$ . Standard error of measurement (repeatability square root) for MRADL were: (Study 1) 1.55 and (Study 2) 1.71. Intraclass correlation coefficients were Study 1, ICC (1,1)=0.92, 95% confidence interval 0.87 to 0.95; Study 2, ICC (1,1)=0.86, 95% confidence interval (0.79 to 0.94).

### Discussion

The findings of this study suggest the postal version of the Manchester ADL scale is a repeatable and reliable scale with high-level agreement between test and retest over a two-week period. It seems that the multiple choice format of MRADL questions was acceptable to patients, judging from high response rate for postal study, and indeed the full response rate for researcher versus postal completion.

The self-reported MRADL postal questionnaire has potential to be used as a follow-up tool after pulmonary rehabilitation to monitor patients at home. However, we have not assessed the MRADL scale in patients unknown to us. This might have introduced sampling bias. Furthermore, the cross-sectional nature of the present study in this tightly defined outpatient population does not fully validate the MRADL scale for use in epidemiological or longitudinal surveys. Despite the potential disadvantage of a postal questionnaire in terms of uncertainty of who completed the questionnaire (whether it was completed by patients or carers), the MRADL scale seems to be a reliable scale. In both studies, as patients completed the questionnaire twice, potentially a learning effect could not be ruled out—though the initial results were not revealed to the subjects and also the questionnaires were sent after two weeks. In a similar vein, subjects in Study 1 had previously completed the questionnaire for the previously reported validation study [3], though this study had been completed 6 months earlier, making a learning effect unlikely. The fact that face-to-face completion (Study 1) and postal *versus* face-to-face completion (Study 2) had similar repeatabilities in the current investigation suggests the investigator did not unwittingly influence questionnaire completion during face-to-face evaluation.

The similar reproducibilities and results of Study 1 (in a deprived inner city population) and Study 2 (in a rural population) suggest that the MRADL may be widely applicable in differing populations of elderly COPD patients.

The St George's group have recently published a similar ADL scale, the London Chest Activity of Daily Living Scale (LCADL) [8]. The median age of the subjects in their study were 70 (i.e. slightly younger than in our studies. The LCADL has good internal validity, relates closely to quality of life and has moderately close relationships to walking distance and anxiety levels. In contrast however to the MRADL [3], the St George's group have not assessed the discriminative ability of the LCADL (i.e. its ability to discriminate between subjects with COPD and elderly normals) or its response to pulmonary rehabilitation. Its validity as a postal questionnaire remains to be determined.

The MRADL scale is a suitable and feasible scale for use both in clinical practice and follow-up of sub-populations of elderly COPD patients. Further studies are required to fully validate its use as a screening tool in the community.

### Key points

- The Manchester Respiratory ADL scale is acceptable and repeatable as a postal questionnaire.
- The Manchester Respiratory ADL is an appropriate tool for use both in hospital practice and follow-up of elderly patients with chronic obstructive airways disease in the community.

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## Appendix

### The Manchester Respiratory Activities of Daily Living Questionnaire

This questionnaire is designed to give us a better idea of how your breathing problems are affecting you in your daily life.

Please read each question carefully and tick the lines which best describe you.

|   | Not at all                 | With help                        | Alone with difficulty         | Alone easily                    |
|---|----------------------------|----------------------------------|-------------------------------|---------------------------------|
| <b>MOBILITY</b>   |                            |                                  |                               |                                 |
| Do you:   |                            |                                  |                               |                                 |
| Walk around outside?  | -----                      | -----                            | -----                         | -----                           |
| Climb stairs?   | -----                      | -----                            | -----                         | -----                           |
| Get in and out of the car?                                      | -----                      | -----                            | -----                         | -----                           |
| Walk over uneven ground?  | -----                      | -----                            | -----                         | -----                           |
| Cross roads?  | -----                      | -----                            | -----                         | -----                           |
| Travel on public transport?                                     | -----                      | -----                            | -----                         | -----                           |
| Bend over from standing?  | -----                      | -----                            | -----                         | -----                           |
| <b>IN THE KITCHEN</b>   |                            |                                  |                               |                                 |
| Do you:   |                            |                                  |                               |                                 |
| Lift something off a shelf which is above your shoulder height? | -----                      | -----                            | -----                         | -----                           |
| Take hot drinks from one room to another?                       | -----                      | -----                            | -----                         | -----                           |
| Do the washing up?  | -----                      | -----                            | -----                         | -----                           |
| Make yourself a hot snack?                                      | -----                      | -----                            | -----                         | -----                           |
| <b>DOMESTIC TASKS</b>   |                            |                                  |                               |                                 |
| Do you:   |                            |                                  |                               |                                 |
| Do general housework?   | -----                      | -----                            | -----                         | -----                           |
| Wash small items of clothing?                                   | -----                      | -----                            | -----                         | -----                           |
| Do you own shopping?  | -----                      | -----                            | -----                         | -----                           |
| Do a full clothes wash?   | -----                      | -----                            | -----                         | -----                           |
| Wash and dry yourself?  | -----                      | -----                            | -----                         | -----                           |
| Have a bath?  | -----                      | -----                            | -----                         | -----                           |
| <b>LEISURE ACTIVITIES</b>                                       |                            |                                  |                               |                                 |
| Do you:   |                            |                                  |                               |                                 |
| Go out socially?  | -----                      | -----                            | -----                         | -----                           |
| Manage your own garden?   | -----                      | -----                            | -----                         | -----                           |
| Do you have to eat more slowly than you would like? (*)         | Much more slowly<br>-----  | Quite a lot more slowly<br>----- | A little more slowly<br>----- | Not at all more slowly<br>----- |
| Does your breathing keep you awake at night? (*)                | Most of the night<br>----- | For 1–2 hours<br>-----           | For up to ½ hour<br>-----     | Not at all<br>-----             |

Scoring system:

Response categories: on my own; on my own with difficulty, with help, no Scoring: 0—with help, no (\*much more slowly; quite a lot more slowly; most of the night; for 1–2 hours).

1—on my own; on own with difficulty (\*a little more slowly; for ½ hour; not at all more slowly).