Manual Assessment of Respiratory Movement (MARM): reliability

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Introduction

Manual assessment of respiratory movement (MARM) is a way to quantify breathing movement. Distribution of breathing movement across the whole (body) trunk is expressed in terms of **location** (lower abdominal, costo-abdominal, upper thoracic) and as **area** of involvement (small or large part of the trunk). Inter-observer reliability was assessed in 12 subjects performing 9 different events with respect to posture and breathing (sitting normal, slump and upright; breathing normal, abdominally and thoracically). Reliability appeared to be high (r=0.85) for parameters of location but was non significant for area of involvement (r=0.13). (1)

One reason may have been that the protocol did not include specific variation in area. In order to determine the reliability of **area**, a new protocol was developed that included specific instructions to breathe either with a small or with a large tidal volume, compared to normal breathing. This protocol reflected the variation in breathing pattern that is encountered in clinical practice more adequately. It required the ability to change breathing pattern voluntarily to a high degree, so we taught the protocol to experienced subjects. Since MARM functions in daily practice as a tool to evaluate changes in breathing pattern over time, the focus was on reliability of repeated assessments by the same assessor.

The purpose was to establish intra-observer reliability of assessment of MARM and in particular MARM 'area'.

Subjects and methods

A total of 20 practitioners and advanced students of breathing and relaxation therapy participated in the course, they were all women, aged 45 years (29-61). The course took six hours, in two sessions.

Examiners were informed that reliability depends on 1) neutral observation of the assessor, who forms a mental picture of the highest and lowest border where they perceive breathing movement, and 2) accuracy in performing the posture and breathing instructions both times the same.
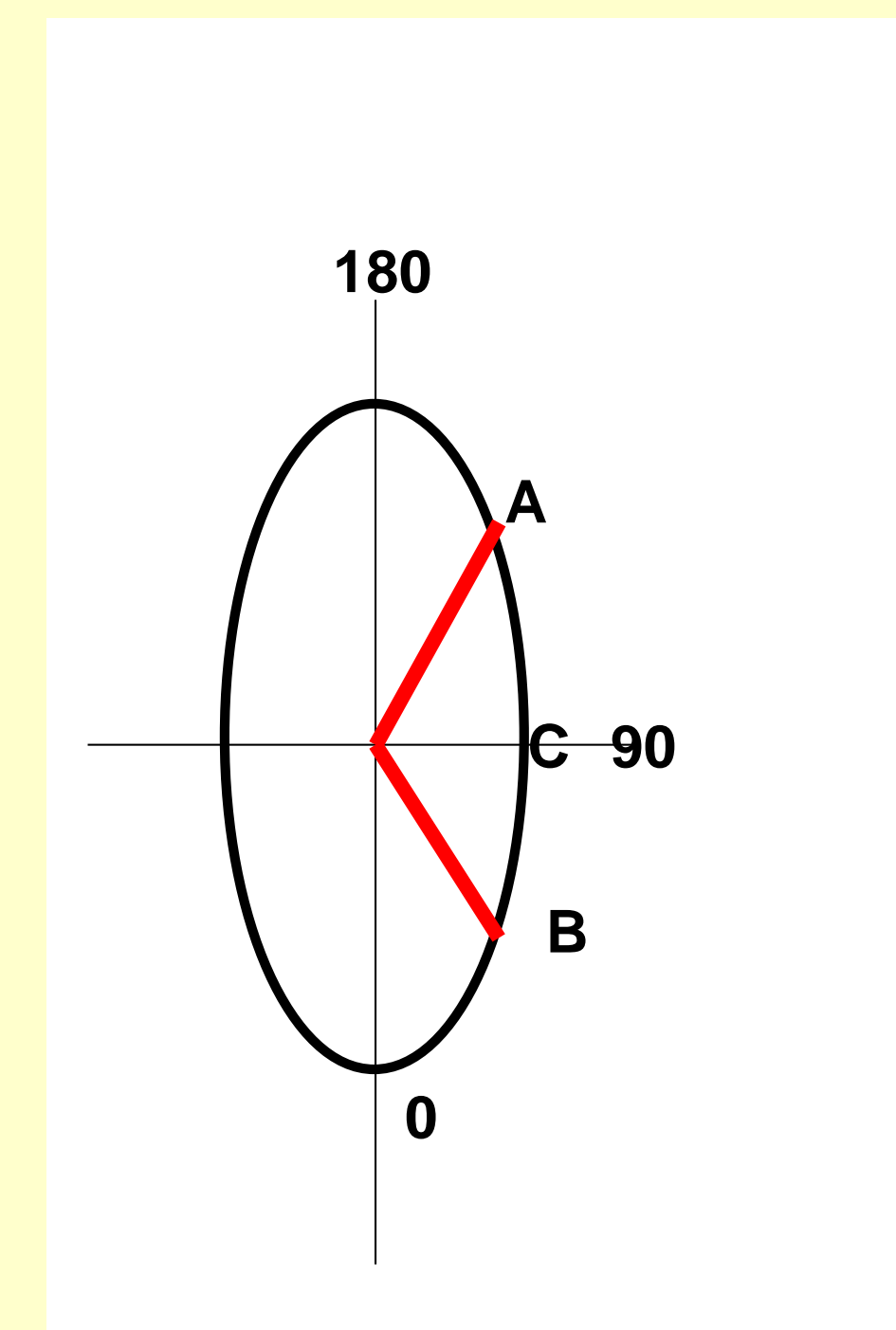
They followed the protocol in pairs, swapping position and noting first and second assessment on a separate sheet. Time interval was about 15 minutes. When the assessed performed the second round differently, posture and/or breathing was corrected, to reduce this source of variation.
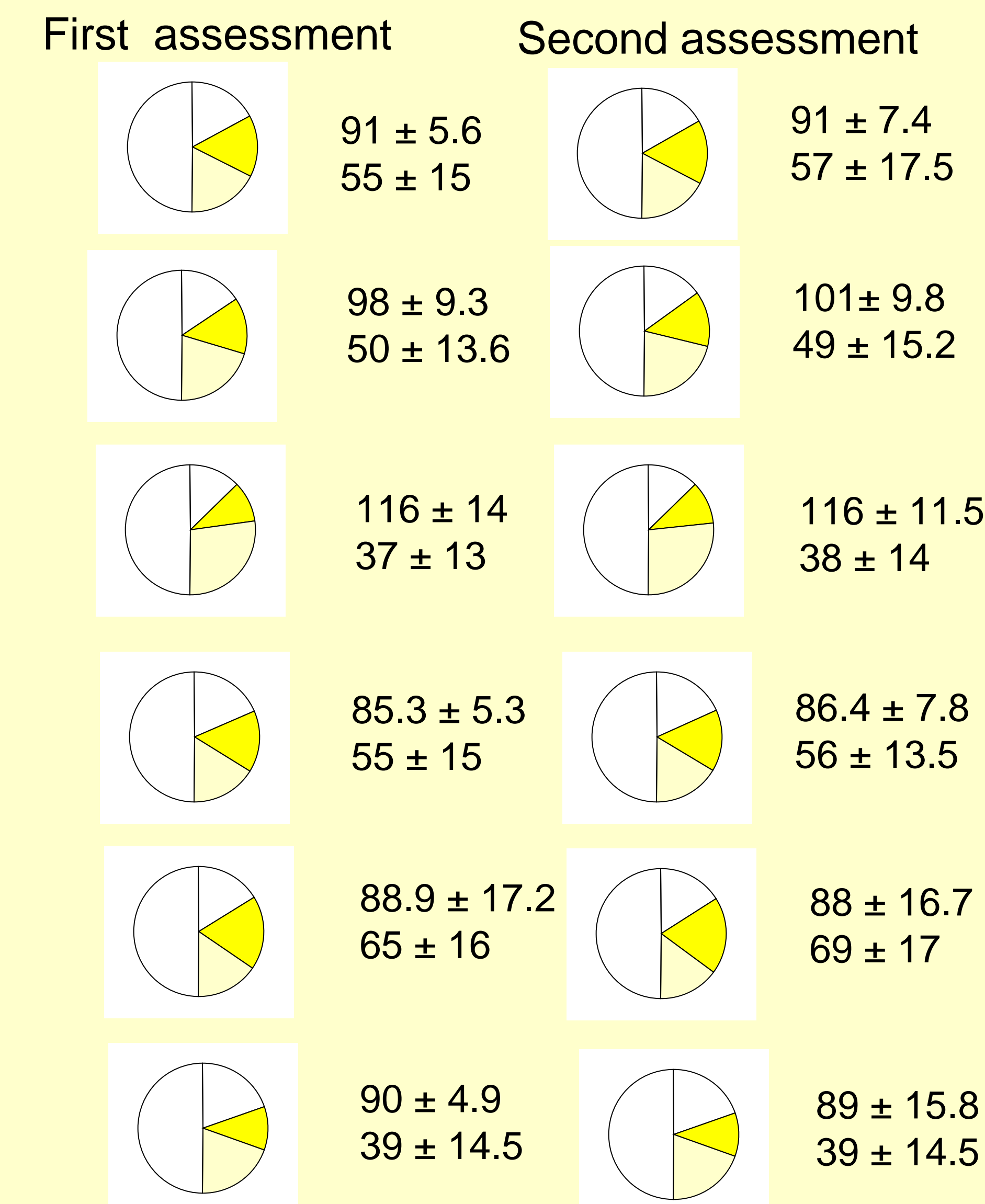
Protocol:

1. Sit easily: on top of sitting bones, slightly slump, feet flat, in front of knees, look straight ahead

2. Sit up straight, extend the back

3. Breathe short and high, in the chest, raise chestbone

4. Sit easily, a bit slump, pay attention to the hands in your back and the widening of the ribs with inhalation

5. Allow the hands in your back to press the ribs when exhaling. [do this 5-6 times, then do MARM]

6. Sit easily, feel sitting bones, look straight ahead, breathe normally

Measurement Variables MARM

Upper line: A
Lower line: B
Average value: A + C / 2
Area= angle AB

Results :

First assessment | Second assessment

First assessment:
- 91 ± 5.6 / 55 ± 15
- 98 ± 9.3 / 50 ± 13.6
- 116 ± 14 / 37 ± 13
- 85.3 ± 5.3 / 55 ± 15
- 88.9 ± 17.2 / 65 ± 16
- 90 ± 4.9 / 39 ± 14.5

Second assessment:
- 91 ± 7.4 / 57 ± 17.5
- 101± 9.8 / 49 ± 15.2
- 116 ± 11.5 / 38 ± 14
- 86.4 ± 7.8 / 56 ± 13.5
- 88 ± 16.7 / 69 ± 17
- 89 ± 15.8 / 39 ± 14.5

Intraclass correlation (2 way random effects model, absolute agreement). ICC, 95% CI, p value

Upper line:	0.83 (0.76-0.88), p< 0.001
Lower line:	0.89 (0.85-0.93), p<0.001
Average value A+C/2:	0.89 (0.84-0.89), p<0.001
Area= angle AB:	0.84 (0.78-0.89), p<0.001

scatterplots of first and second assessment across all steps of the protocol

average value | area
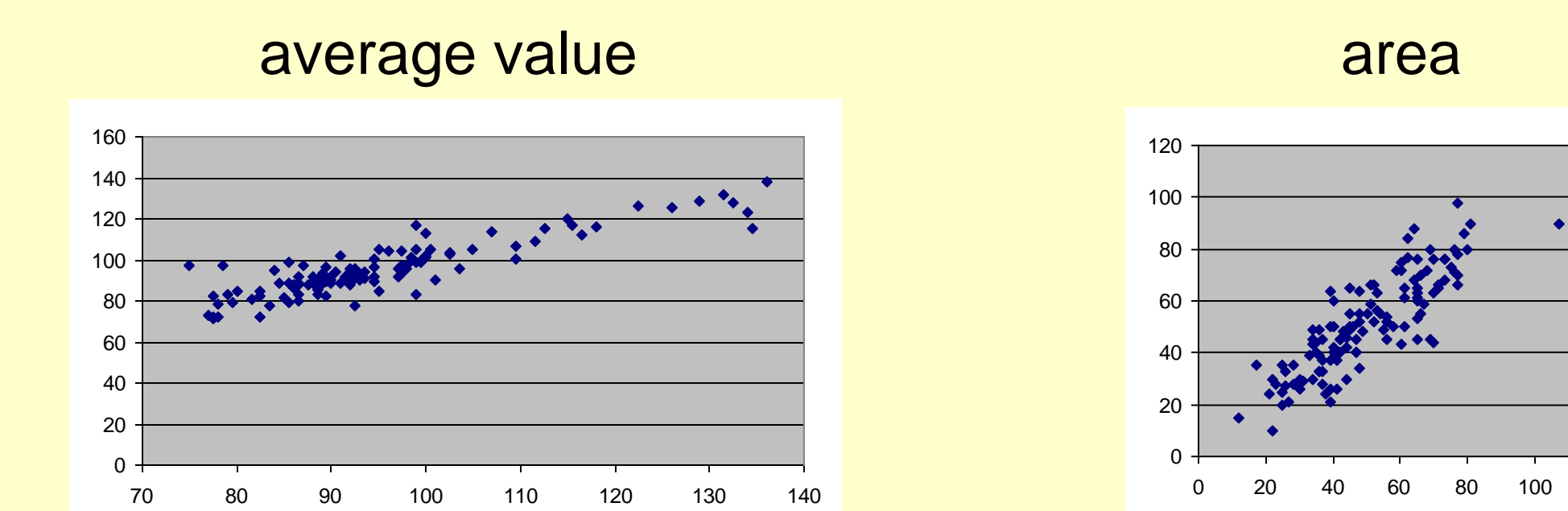
Discussion

MARM is 'the quantification of a subjective interpretation of the global distribution of breathing movement, based on sensory, palpable information from one place'. At first sight, the numbers resulting from such quantification seem rather arbitrary and unreliable. However, experience with the exact procedure to obtain the information shows that they do reflect reality, that is, breathing pattern of the assessed. In the first validation study inter-observer reliability of location of breathing was high and agreed with life-shirt measurements. In this study intra-observer reliability of both location and area was high.

The assessor needs to be experienced in processing palpatory information. Perception entails the construction of an experienced object, in case of MARM, an image of the area of involvement of the ribs in breathing. It is not the local sensory input that is quantified, but the image of the distribution of breathing. The upwards and sideways movement of the ribs and the outward push of the diaphragmatic descent gives an idea of this distribution. Its upper and lower border is indicated in a pie chart. The first study used osteopaths as assessors and Yoga teachers were assessed. A second preliminary study used physiotherapists who assessed each other. They obtained much lower reliabilities (0.30-0.49). This may have been due to less palpatory skills, but also to less ability to perform the postural and breathing instructions. This study used experienced breathing therapists, who were both used to palpate neutrally and to breathe in different postures and patterns.

The assessor may have 'guessed' the breathing pattern. For instance, extending the spine involves elevation of the chest, thus raising location of breathing. However, the degree that the upper border actually elevates varies greatly between individuals. It depends upon the flexibility of the ribcage. How much the pump-handle motion of the chest bone is actually present can not be guessed (or seen) from the back of the body, but requires information from changes in the ribcage. The assessors were at first rather skeptical. To all probability, they did not note the MARM graphs according to the desired outcome, but were interested to practice and obtain actual information on the accuracy of their perceptions. It was a surprise to them that area and location of breathing can be reflected reliably by palpating the ribcage in the back.

Conclusions:

When properly performed, MARM is a reliable tool to describe breathing pattern. It is useful within clinical practice as well as a research tool to evaluate tension patterns in breathing as a response to treatment and between clinical syndromes.

References:

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