Findings From the MATREX Study: A Treatment Protocol for the Delivery of Manual Chest Therapy in Respiratory Care

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BACKGROUND: One of the difficulties in comparing the numerous studies on manual chest therapy (MCT) is the wide variety of techniques used and terms employed to describe the intervention. This lack of consistency in therapeutic approach and the absence of defined tools for evaluation have led to a continued air of skepticism about its true value. This paper presents a treatment protocol used in a large randomized controlled trial examining the efficacy and cost effectiveness of MCT for patients hospitalized with exacerbations of COPD. METHODS: Consensus development meetings with key physical therapists were held to identify the essential elements of MCT, address potential areas of ambiguity, and provide a set of clear parameters within which treatment would be based and recorded. This iterative approach resulted in a treatment protocol that combined best clinical practice with the research evidence available to date. RESULTS: In the Management of Exacerbations of COPD (MATREX) trial, 658 sessions of MCT were delivered by physical therapists over a 3 year period. A high level of adherence to the treatment protocol was seen for all but one of the protocol elements. CONCLUSIONS: With respect to the essential elements of MCT, the treatment protocol used in the MATREX trial offers sufficient flexibility to the therapist, while being robust enough to maintain clinical trial integrity. The level of adherence by therapists indicates its professional acceptability with respect to delivering and evaluating this therapy. *Key words: clinical protocols; practice guidelines; physical therapy modalities; adult; lung; drainage; postural; COPD.* [Respir Care 2012;57(8):1263–1266. © 2012 Daedalus Enterprises]

Introduction

Respiratory care provided by therapists includes manual chest therapy (MCT) techniques designed to improve the mobilization of bronchial secretions,[1-8] match ventilation and perfusion rates,[9-13] and normalize functional residual capacity.[14-21] These outcomes are variously reported to be based on some combination of the effects of gravity, external manipulation of the thorax, turning, postural drainage, percussion, vibration, and spontaneous or assisted cough. The therapy is time consuming and labor intensive, requiring substantial skill and strength on the part of the therapist, and the mental and physical cooperation of the patient. However, indiscriminate use of MCT may disguise real benefit in certain circumstances, and this background fosters an air of skepticism about its true value.

One of the difficulties in comparing the numerous studies on MCT is the lack of homogeneity of the intervention.[22] There is also a potential conflict between clinical and research approaches to the evaluation of efficacy. Therapists may feel that standardizing treatment removes the flexibility of approach that is an inherent part of practice. The profession sets great store by being able to respond to a changing clinical situation, and there is concern that strict adherence to a research-led treatment protocol may increase the possibility of over-treatment and unwarranted respiratory distress. In contrast, researchers require preci-

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This research was partly supported by the United Kingdom's National Institute for Health Research Health Technology Assessment Programme.

The authors have disclosed no conflicts of interest.

Supplementary material related to this paper is available at http://www.rcjournal.com.

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DOI: 10.4187/respcare.01312

sion in the application of the MCT delivered if they are to undertake an objective evaluation of its efficacy.

Methods

This research was performed at the Norfolk and Norwich University Hospital, Norfolk; James Paget University Hospital, Norfolk; Queen Elizabeth Hospital, Norfolk; and Aintree University Hospital, Liverpool, United Kingdom.

Developing an MCT Treatment Protocol

In 2005, continued ambiguity regarding the value of MCT for particular patient groups led to the commissioning of a large multicenter, randomized controlled trial (MATREX) by the United Kingdom's Department of Health.[23] The trial examined the efficacy and cost effectiveness of MCT for patients hospitalized with exacerbations of COPD. The primary outcome measure used to assess efficacy was change in quality of life (St George's Respiratory Questionnaire) at 6 months post-randomization. The protocol was approved by a multicenter research ethics committee (reference 06/Q0101/140). We obtained written informed consent from all patients. This study is registered as ISRCTN 13825248.

One of the trial's first objectives was to establish an MCT treatment protocol that defined the precise nature of the intervention. This was achieved by consensus development meetings with key therapists involved in the study. They identified the essential elements of MCT, using the current research evidence, and identified potential areas of ambiguity; from this the consensus process developed a set of clear parameters within which treatment would be based.

This iterative approach resulted in a treatment protocol (see Appendix 1 in the supplementary materials at http://www.rcjournal.com) that combines best clinical practice with the research evidence available to date.[1-21,24-38] Prior to any treatment being given, the therapist was required to assess the patient's suitability for MCT, against a list of contraindications and risk factors (see Appendix 2 in the supplementary materials). With respect to positioning patients during MCT, a photographic list of the 6 most common treatment positions was provided, from which appropriate positions could be selected according to clinical need/precautions. If necessary, the physical therapist could select additional positions, provided these were described accordingly (see Appendix 3 in the supplementary materials). To prevent ambiguity, definitions for the various elements of MCT were provided, along with pictures of ideal hand positions to adopt when performing percussion and vibration techniques (see Appendix 4 in the supplementary materials).

QUICK LOOK

Current knowledge

Manual chest therapy is provided to a wide variety of patients to mobilize airway secretions, but this therapy is time consuming, labor intensive, and requires substantial skill, strength, and patient cooperation.

What this paper contributes to our knowledge

A standardized manual chest therapy protocol that included positioning, percussion, and vibration may improve adherence by therapists and aid in studying manual chest therapy in selected patient populations. The inconsistent results between previous studies of manual chest therapy may have been due to failure to use a consistent, acceptable manual chest therapy regimen.

Piloting the MCT Treatment Protocol

In order to assess the adequacy of the MCT treatment protocol, the trial commenced with a pilot phase for the first 6 months of recruitment. Scrutiny of early case report forms revealed the need to define the circumstances under which participants could switch from the control arm to receive MCT. Essentially, these constitute a working definition for respiratory failure[39,40] and comprised clinical evidence of sputum retention via auscultation or chest x-ray, arterial blood pH < 7.26, rising arterial blood CO_2, and that the subject was already receiving controlled oxygen therapy and/or other supportive treatment(s). If the physical therapist or attending physician became concerned that a subject's condition had deteriorated to the extent that MCT was warranted, all these criteria were required to switch trial arm. In addition, feedback from therapists revealed that while the protocol stipulated that subjects in the intervention arm were encouraged to cough, this was not listed as an explicit instruction in the control arm. Thus, when assessing the effect of MCT, "deliberate" coughing could act as a confounding variable. Therefore, to ensure parity between trial arms, the treatment protocol was amended to include this instruction for control arm subjects.

Results

Numbers Treated and Time Taken

In total, 257 participants in the MATREX study received 658 sessions of MCT over a 3 year period. The number of sessions administered to subjects varied considerably (range 1–25), with the majority receiving 2 or 3

sessions during their hospital admission. The length of time spent performing MCT varied between 1 and 41 min, with an average session length of 12 min. Of sessions lasting < 5 min ($n = 14$), 4 were at the request of the subject to stop percussion, and 6 concerned subjects who experienced an adverse event that necessitated treatment being truncated. Full details of immediate clinical measures observed during and after use of the treatment protocol are provided in the MATREX study report, alongside the full study outcomes.[23]

Adverse Events

In total, 15 adverse events were reported (2% of sessions). These comprised increased shortness of breath ($n = 5$), pain ($n = 5$), arrhythmia ($n = 3$), bronchospasm ($n = 1$), and thoracic hematoma ($n = 1$). Shortness of breath reported by subjects was accompanied by varying degrees of reduced oxygen saturation (−18% to 0%). Given their nature and frequency, these adverse events were not considered to present any important issues with respect to patient safety and continuation of the trial.

Treatment Positions

In the majority of sessions (61%) physical therapists selected 2 different positions in which to place the subject before performing percussion and vibration techniques. In 44 sessions (6%), therapists selected alternative treatment positions to those suggested by the protocol. These comprised 31 sitting upright, 10 leaning forward, and 3 flat supine. This is an important deviation from the protocol, and it must be acknowledged that subjects presented with unilateral symptoms on assessment. This had not been predicted in the protocol development phase, and with hindsight we would include these positions within the protocol. Movement between the trial's intervention and control arms was minimal ($n = 4$).

Protocol Adherence

In total, 258 deviations from the MCT treatment protocol were recorded (39%). Of these, 248 (96%) involved the physical therapist selecting a single treatment position, while the protocol stipulated 2. In the majority of cases ($n = 156$), a clinical rationale for not using a second treatment position was recorded (eg, clinical evidence of unilateral lung problem). On 41 occasions the therapist chose to treat the patient in a sitting position, as opposed to any of the 6 suggested in the protocol. However, for these subjects the therapist did perform percussion and vibration techniques on both sides of the chest. Other protocol violations comprised 6 occasions (< 1%) where oxygen saturation was not recorded and 4 occasions where the subject declined treatment (< 1%).

Conclusions

Findings from the MATREX trial signify good professional acceptance of the treatment protocol. The high level of adherence to all but one of the protocol elements (number of treatment positions selected) indicates that the main aim of defining and standardizing the intended intervention was achieved. Thus, we consider the treatment protocol presented here a useful generic tool for the delivery and evaluation of MCT.

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