Development of a Theory-Based Intervention to Increase Prescription of Inspiratory Muscle Training by Health Professionals in the Management of People with Chronic Obstructive Pulmonary Disease

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ABSTRACT

Purpose: The purpose of this paper is twofold: (1) to provide an overview of the literature on barriers to evidence-based practice (EBP) and the effectiveness of implementation interventions in health care; and (2) to outline the development of an implementation intervention for improving the prescription of inspiratory muscle training (IMT) by physical therapists and other health professionals for people with chronic obstructive pulmonary disease (COPD).

Summary of Key Points: Individuals, organizations, and the research itself present barriers to EBP in physical therapy. Despite the evidence supporting the use of IMT, this treatment continues to be under-used in managing COPD. Current health services research shows that traditional information-based approaches to implementation, such as didactic lectures, do not adequately address the challenges health professionals face when trying to make changes in practice. We propose the development of a theory-based intervention to improve health professionals' use of IMT in the management of COPD. It is postulated that a behavioural intervention, based on the theory of planned behaviour (TPB), may be more effective than an information-based strategy in increasing the prescription of IMT by health professionals.

Conclusion: TPB may be used to understand the antecedents of health professionals' behaviour and to guide the development of implementation interventions. Further research is needed to evaluate the effectiveness of this proposed intervention in the management of people with COPD.

Key Words: evidence-based practice, inspiratory muscle training, knowledge translation, physical therapist, theory of planned behaviour

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RÉSUMÉ

Objectif : L'objectif de cet article comporte deux volets : 1) offrir un survol de la documentation relative aux obstacles à la pratique fondée sur les faits scientifiques et qui traite de l'efficacité des interventions de mise en œuvre dans les soins de santé; et 2) donner un aperçu de l'élaboration d'une intervention de mise en œuvre pour améliorer la prescription d'entraînement des muscles inspiratoires (IMT) par les physiothérapeutes et autres professionnels de la santé pour les patients aux prises avec une maladie pulmonaire obstructive chronique (MPOC).

Résumé des principaux points : Les individus, les organismes et la recherche elle-même comportent des obstacles à la pratique fondée sur les preuves scientifiques en physiothérapie. Malgré des preuves qui appuient le recours à l'IMT, cette forme de traitement continue d'être sous-utilisée dans la gestion des MPOC. Les recherches actuelles en services de santé démontrent que les approches traditionnelles de mise en œuvre, fondées sur l'information, telles que les exposés didactiques, ne parviennent pas à relever adéquatement les défis auxquels font face les professionnels de la santé lorsqu'ils tentent d'apporter des changements à la pratique. Nous proposons l'élaboration d'une intervention fondée sur la théorie en vue d'accroître le recours à l'IMT par les professionnels de la santé dans la gestion des MPOC. Il est concevable qu'une intervention de nature comportementale, en fonction de la théorie du comportement planifié (TCP), puisse être plus qu'une stratégie fondée sur l'information pour accroître la prescription d'IMT par les professionnels de la santé.

Conclusion : La TCP peut être utilisée pour comprendre les antécédents dans les comportements des professionnels de la santé et pour encadrer la conception d'interventions de mise en œuvre. D'autres recherches seront nécessaires pour évaluer l'efficacité de cette intervention proposée pour la gestion des patients aux prises avec une MPOC.

Mots clés : entraînement des muscles inspiratoires, physiothérapeute, pratique fondée sur les preuves scientifiques, théorie du comportement planifié, transmission des connaissances

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INTRODUCTION

The switch from opinion-based practice to evidence-based practice (EBP) gained momentum in the early 1990s. For nearly two decades, clinicians have been encouraged to embrace EBP, in which treatment decisions are made by integrating the best available evidence with clinical expertise and patient preference.¹

Studies from Australia,^{2,3} England,³ Sweden,⁴ the United States,^{5,6} and Canada⁷ have shown that physical therapists have a positive attitude toward EBP, but this attitude does not always translate into practice. For example, a variety of studies^{8–10} have provided evidence supporting the use of inspiratory muscle training (IMT) for some people with chronic obstructive pulmonary disease (COPD), such as those who are unable to participate fully in whole-body exercise training because of comorbid conditions or those who have intractable dyspnea despite whole-body exercise. However, a survey of Canadian acute-care hospitals and pulmonary rehabilitation programmes found that less than 5% of physiotherapists prescribe IMT for COPD rehabilitation.¹¹

To our knowledge, information about IMT has traditionally been disseminated to physiotherapists through didactic lectures and journal articles, with the goal of improving clinicians' knowledge of the treatment. However, these dissemination methods are limited in their ability to address other known barriers to using IMT, such as physiotherapists' uncertainties about the appropriateness of the treatment for their clients, a lack of equipment, and a perceived lack of reliable evidence about IMT.¹¹

Implementation interventions in health care focus on the application or uptake of research.¹² A number of interventions that aim to change practice behaviours—for example, the use of reminders, audit and feedback, and opinion leaders—have been evaluated in the management of different conditions; they produced a median improvement of between 7% and 14% in patient outcomes.^{13–15} Furthermore, there is no clear pattern of findings favouring one particular method or one particular context in which the intervention is effective.¹³ Research has suggested that this may be due to the lack of a theoretical basis for most interventions that are developed to improve practice behaviours.^{16,17} Proponents of this view argue that psychological theories offer a generalizable framework to understand and predict practice behaviours^{18–20} and that, therefore, they can be used to guide the development of interventions for improving clinical practice, such as using IMT in the management of COPD.

The purpose of this paper is twofold. First, we provide an overview of the literature on the barriers to EBP and the effectiveness of implementation interventions in health care. A secondary purpose is to outline the development of a theory-based intervention to improve health professionals' prescription of IMT in the management of

COPD, based on the literature review. We have chosen IMT to illustrate how a theory-based intervention can be designed to increase prescription of a specific muscle training programme for two reasons: (1) IMT is inexpensive, easy to apply, and low risk; and (2) the evidence supporting IMT is strong, especially with respect to outcomes of maximal inspiratory pressure, an indicator of inspiratory muscle strength that is specific to IMT and not to exercise training of the extremities. The main target audience of this theory-based intervention is physiotherapists, but we anticipate that the discussion will also be relevant to other health professionals in the cardiorespiratory field.

BACKGROUND

Barriers to Evidence-Based Practice in Physical Therapy

Evidence-based practice involves several steps: defining the clinical question; acquiring the best available evidence; evaluating the strength of the evidence; applying the evidence, integrating clinical expertise and patient values; and assessing the effectiveness of the process.^{2,21,22} The literature^{2–5,22–27} suggests that the existing gaps between evidence and practice are indeed the result of a combination of barriers related to the individual, the practice environment, and the clarity of the messages about the effectiveness of a treatment.

Individual Factors

Most physiotherapists have a positive attitude toward EBP,^{2,4,5,7} but the literature reveals a number of barriers. Although 97% of physiotherapists from Canada⁷ and 89% of physiotherapists from the United States⁵ have reported being interested in research, therapists report barriers to finding and evaluating current research findings and implementing them in practice. The percentage of physiotherapists who performed fewer than two database searches in a typical month was 65% in the United States⁵ and 62% in Canada;²⁸ it would appear that some Canadian physiotherapists delegated the searching task to others.²⁹ In the United Kingdom, although 95% of physiotherapists were interested in research findings, almost 40% indicated that locating and reading research evidence was a low priority in their daily practice.²⁴ In the United States⁵ and Canada,²⁸ 17% and 27% of physiotherapists, respectively, read fewer than two articles per month. The vast majority (90%) of Canadian physiotherapists studied agreed that they needed to increase the use of evidence in their daily practice.⁷ These findings suggest that some physiotherapists may rely on colleagues, textbooks, and/or techniques learned from their initial training to inform their clinical practice, rather than reading scientific journals.^{3,5,23,25,26}

Another barrier to EBP is the lack of skills and resources to access current and relevant research.^{2,5} In fact, skills in accessing online information, rather than

the size and location of the workplace, are related to research use.²³ Furthermore, physiotherapists who are not affiliated with a university or teaching hospital may not have free and ready access to some scientific journals.

Therapists' level of knowledge and skill in understanding research is also correlated with their use of research evidence in clinical practice. For example, a study by Pain et al.²³ found that although most physiotherapists in Canada had some training in research, few were confident in their ability to understand research design and statistics and to interpret research findings. Similarly, in a later survey of Canadian physiotherapists by Salbach et al.,⁷ the average self-efficacy ratings for the items *critically appraising the strengths and weaknesses of different study designs* and *interpreting statistical procedures like t-tests and chi-square tests* were 52% and 31% respectively.

The limited ability of some physiotherapists to critically appraise research evidence may contribute to a failure to recognize an effective treatment despite evidence of its effectiveness, as in the case of IMT.

Organizational Factors

Time constraints, often resulting from high workload, are frequently cited as a barrier to acquiring, evaluating, and applying evidence in clinical practice.^{2,4,5,7,24–26} Interestingly, in contrast to habitual practice, therapists tend to rely on research information when changing an overall pattern of treatment for a specific group of patients.²³ The underlying factor, which requires further study, may be whether or not organizations provide additional or protected time to gather information that is relevant to programme alterations. Other organizational barriers identified in previous research include inadequate facilities,²⁴ isolation from colleagues,²⁴ a lack of support for the new practice from physicians,²⁴ limited resources for the necessary equipment,²⁶ and cumbersome administrative rules for approving new procedures.²⁶ Finally, for those working in a multidisciplinary team, reluctance to use a particular technique on the part of colleagues and/or other members of the health care team can also represent a barrier to changing clinical practice.²⁶

These findings suggest that the availability of learning resources (e.g., time at work, funding, and opportunities), proper equipment, and a supportive practice environment are essential for facilitating the adoption of IMT in clinical practice.

Research-Related Factors

The quality of research and the presentation of information may present a barrier to EBP. Some commonly noted problems are conflicting results²⁴ and methodological constraints or flaws in the published research.^{5,7,24,27}

Furthermore, published studies may provide insufficient details about the characteristics of the target population and the treatment, making it difficult for clinicians to replicate or adapt the treatment in their own practice.²⁷ In the case of IMT in COPD management, findings on the effectiveness of IMT from earlier studies are contradictory, but several of these studies had methodological issues; for example, some studies using inspiratory resistance trainers with holes of varying diameters did not control the pattern of breathing during the IMT or provide a target for flow, and in these studies the training protocol was likely sub-optimal.^{30–32} These papers were nevertheless included in the first published systematic review, which concluded that IMT was ineffective for people with COPD.³³ This conclusion, however, was refuted by several later systematic reviews.^{8–10} For example, Geddes et al.⁸ accounted for studies with methodological differences by examining threshold and targeted trainers separately from inspiratory resistive trainers with no target, and concluded that normocapneic hyperventilation, targeted inspiratory resistive, or threshold IMT significantly increased inspiratory muscle strength and endurance compared to sham IMT (see Table 1). The conflicting messages from the literature may have contributed to the confusion among physiotherapists with respect to this intervention (see Table 1). Furthermore, gaps between the evidence for effectiveness of IMT and prioritized therapies outlined in practice guidelines for COPD management^{34–36} may be an additional barrier to physiotherapists' use of IMT in clinical practice (see Table 1). Another factor relates to the applicability of the research findings to a physiotherapist's patient population. In Canada, COPD affects more women (5%) than men (4%),³⁷ whereas Geddes et al.³⁸ noted that most of the studies reviewed recruited men and that confirmation of the effectiveness of IMT in both genders is needed.

Physical therapists frequently complain that the literature contains insufficient treatment details,²⁷ but this is not the case for the use of IMT in COPD. Though the optimal IMT prescription to maximize outcomes for people with COPD is not yet known,¹⁰ two systematic reviews^{38,39} include training guidelines on mode, frequency, intensity, and duration of IMT, and several other papers^{40–43} describe the equipment, training protocols, and clinically relevant outcome measures.

Summary

Barriers to evidence-based physical therapy practice may exist at the research, organizational, and individual levels, and some of these barriers may be associated with the poor uptake of IMT in COPD. To develop an intervention to address barriers in the use of IMT, we reviewed the research on the effectiveness of dissemination and implementation strategies.

Table 1 Evolution of Systematic Reviews and Practice Guidelines on the Use of Inspiratory Muscle Training in Chronic Obstructive Pulmonary Disease

<i>Dates</i>	<i>Report</i>	<i>Conclusions</i>
1992	Meta-analysis ³³	IMT is not effective in COPD.
2002	Meta-analysis, ⁹ based on 15 studies dating from 1988 to 1998	IMT alone significantly improved inspiratory muscle strength and endurance and dyspnea at rest and during exercise. Findings support including IMT as a part of pulmonary rehabilitation for some people with COPD.
2003	Canadian Thoracic Society guidelines ³⁵	There is insufficient evidence to support the use of IMT in COPD. Further study is recommended.
2005	Systematic review and meta-analysis ³⁹ of studies published between 1984 and 2002	Significant improvements in inspiratory muscle strength and endurance and in the dyspnea scale on a quality-of-life measure were found in participants in the IMT group relative to the education group.
2005	Systematic review ³⁸	Targeted resistive or threshold IMT was associated with significant improvements in exercise capacity, dyspnea, and inspiratory muscle strength and endurance relative to sham IMT.
2006	Statement on pulmonary rehabilitation from the American Thoracic Society and the European Respiratory Society ³⁶	IMT should be considered as a potential therapy, especially in patients who show signs of respiratory muscle weakness.
2007	Updated Canadian Thoracic Society guidelines ³⁴	Guidelines include no mention of IMT.
2008	Updated systematic review ⁸	Normocapneic hyperventilation, targeted inspiratory resistive, or threshold IMT significantly increased inspiratory muscle strength and endurance compared to sham IMT; it also improved outcomes of exercise capacity and a measure of quality of life and reduced dyspnea in adults with stable COPD. The clinical importance of the findings is unclear.
2008	Updated systematic review ¹⁰	Significant improvements in inspiratory muscle strength and an outcome of exercise tolerance (maximum exercise tidal volume) favoured combined IMT and exercise over exercise alone.

IMT = inspiratory muscle training; COPD = chronic obstructive pulmonary disease

FROM KNOWLEDGE TO ACTION

In the last 15 years, a number of interventions have been developed to change professional behaviours based on research evidence, but most were developed and tested in the medical profession.^{13–15,44} Furthermore, there is no consensus on which interventions are the most effective. A recent Cochrane review on educational meetings concluded that while didactic education can change practice (median adjusted risk difference = 7%), meetings that are partially or largely interactive are more effective (median adjusted risk difference = 14%).⁴⁴ The best design for educational meetings (with respect to group sizes, length of sessions, opportunity to practise the new skills, or involving learners in the design of the intervention) remains uncertain.^{44,45} Strategies that increase attendance at meetings and educational sessions that focus on issues perceived as serious may increase the effectiveness of educational meetings.⁴⁴

Studies on single-guideline dissemination/implementation interventions have also shown improvement in clinicians' practice behaviours, with an average effect size of about 10%, and revealed that multifaceted interventions that address the same attributes (e.g., knowledge and skills of the practitioner) do not necessarily improve clinical outcomes.¹³ The finding of similar

effects for multifaceted and single interventions is consistent with the results of other studies.^{44,46} A systematic review reported that active multi-component knowledge-translation interventions were effective in improving knowledge or changing practice behaviours of physiotherapists; however, very few studies were available to include in this review.⁴⁷

Among implementation interventions, printed educational materials, education outreach visits, and the use of opinion leaders have attracted attention in the clinical community. A Cochrane review concluded that compared to no intervention, printed educational materials alone may have a beneficial effect on process outcomes (e.g., x-ray requests) but do not affect patient outcomes.⁴⁸ How effective printed educational materials are compared to other interventions and how to optimize educational materials remain uncertain.⁴⁸ A review of educational outreach visits, also referred to as "university-based educational detailing," "academic detailing," or "educational visiting," concluded that these visits, either alone or combined with other interventions, produced changes in clinical practice (median adjusted risk difference in compliance desired practice was 6%).¹⁴ Flodgren et al.¹⁵ concluded that interventions using opinion leaders reduced non-compliance with desired practice in health professionals (10% absolute decrease), although little is

known about the factors associated with the success of this intervention.

A recent review reported that interventions tailored to address prospectively identified barriers to change are more likely to improve professional practice than either no intervention or dissemination of guidelines or educational materials alone. Whether this approach is more effective than other interventions with demonstrated effects, such as opinion leaders, remains undetermined.⁴⁹ Many unanswered questions about interventions that target barriers and their effectiveness relative to other strategies, or in varied clinical situations, require further study.⁴⁹

In summary, research in implementation interventions has shown promise for improving clinical practice, but the mechanism of these interventions is not always clear; it is challenging to judge their generalizability to other health professional groups and settings. Because some of the factors that affect individual behaviours (e.g., attitude, knowledge) also affect professional behaviours, some argue in favour of using well-developed behavioural theories to inform the development of implementation interventions.^{13,16,17,50}

USING THEORY TO INFORM THE DEVELOPMENT OF IMPLEMENTATION INTERVENTIONS

A number of theories formulated to explain why people change their behaviour have been used in developing implementation interventions to modify health care practice.¹⁸ It has been suggested that behavioural theories are relevant for developing health care interventions directed at both individuals and teams.^{13,51} Few studies, however, have performed head-to-head comparisons of different theoretical approaches,^{13,18} and so it is not clear whether any one approach should be given primacy in the design of an implementation intervention.⁵² One of the more commonly used theories that underpin implementation strategies is the *theory of planned behaviour* (TPB). Investigators report that theories such as TPB are useful to guide the selection of variables for study, to aid in the formation of hypotheses, to direct development of behaviour-change elements, to interpret findings, and to generalize findings across contexts.^{13,17,50,53} However, the advantage of behavioural-based implementation interventions compared to common sense derived interventions is a contentious issue⁵⁰ because of the lack of head-to-head comparisons.

The Theory of Planned Behaviour

TPB, an extension of the theory of reasoned action developed by Fishbein and Ajzen, outlines the factors that determine a person's decision to adopt a particular behaviour.⁵⁴ According to TPB (see Figure 1⁵⁵), an indi-

Figure 1 The theory of planned behaviour (adapted from Ajzen's TPB model⁵⁵)

vidual's intention to perform a behaviour is determined by his or her (1) overall positive or negative evaluation of the behaviour and the outcome of the evaluation (*attitude*); (2) beliefs about whether significant others value the behaviour and motivation to comply with the significant other(s) (*subjective norm*); and (3) perception of whether performing the behaviour is easy or difficult, based on the availability of resources, opportunities, and specialized skills (*perceived behavioural control*).⁵⁴ Actual control over the behaviour and strong intention create a greater probability that the action of the behaviour (e.g., prescribing IMT for some people with COPD) will occur.

TPB has widespread applicability and utility in understanding behaviour change,⁵⁴ and meta-analyses have demonstrated that TPB is useful in predicting behaviour change related to health.⁵⁴ For example, TPB-based health-behaviour interventions found that attitude, subjective norm, and perceived behavioural control explain 34% of variance in intention, while intention and perceived behavioural control explain 26% of variance in behaviour.⁵⁴ With respect to health professionals' behaviours, the predictive power of studies using TPB was significantly better than that of studies using another behavioural theory, the operant learning theory; TPB explained 59% and 31% of variance in health professionals' clinical intention and behaviours, respectively.¹⁸ Given TPB's ability to predict intention and behaviour, we believe that it may provide a strong model to inform the development of an implementation intervention to improve health professional practice.

Development of a Theory-Based Intervention for IMT in COPD

TPB is not simply a predictive model but also provides a framework for developing strategies to change behaviour.⁵⁶ One should first carefully define the behaviour under study.⁵⁷ As recommended by Francis et al.,⁵⁷ we defined the behaviour of interest in terms of target, action, context, and time, such that the aim of our intervention is to target health care professionals in their pre-

Table 2 The Theory of Planned Behaviour Applied to Health Professionals' Prescription of Inspiratory Muscle Training for People with Chronic Obstructive Pulmonary Disease

<i>Barriers Related to Lack of IMT Use</i>	<i>Related TPB Construct</i>	<i>Type of Intervention Selected to Modify or Introduce Beliefs</i>	<i>How the Intervention Addresses the Construct</i>
Perceived deficiency of the evidence supporting IMT ¹¹	Attitude	Summary of recent IMT research evidence, with reasons for past discrepancies in the literature highlighted	Highlights the value of IMT
Physical therapists' uncertainties about the appropriateness of the treatment for their clients ¹¹		Patient selection criteria, testing protocols, training parameters, safety precautions, and outcome measures for IMT for people with COPD	Highlights the attributes of people with COPD who benefit from IMT
Gaps in evolving literature and practice guidelines (see Table 1)		Specific skill practice sessions: testing maximal inspiratory pressure, setting intensity on the Threshold trainer (Philips Respironics, Murrysville, PA), and instructing others on using the devices	Provides information regarding behaviour or outcome; feedback may influence "beliefs about consequences" ¹⁴ (i.e., anticipated outcomes/attitude)
Lack of support for a new practice from physicians ²⁴	Subjective norm	Referenced, one-page handout summarizing the evidence for use of IMT in COPD	Handout may be used to solicit support from physicians or co-workers
Reluctance to use a technique on the part of colleagues and/or other members of a multidisciplinary health care team ²⁶		Interactive workshop directed at the multidisciplinary group of health professionals who deliver PR	Individual group members may perceive that one should prescribe IMT for some people with COPD
Lack of time ^{2,4,5,7,24-26} to acquire and evaluate evidence	Perceived behavioural control	Summary of recent IMT research evidence, patient selection criteria, etc., and specific skill practice sessions as above	Address internal control factors by facilitating knowledge and skills acquisition
Limited ability to critically appraise research evidence ^{7,23}		Provision of equipment (each hospital will receive an electronic inspiratory force meter as well as two cases of Threshold trainers)	Increase confidence in the ability to safely and appropriately prescribe IMT through personal mastery experience
Limited access to equipment ^{11,26}		Semi-structured problem-solving session (see Table 3) addressing impediments to practice, whether personal deficiencies, skills, abilities, or other barriers	Address external control factors by providing the required equipment and evidence Offer social processes of encouragement, support, and feedback that may influence "beliefs about capabilities" ⁵³ (i.e., self-efficacy)

TPB = theory of planned behaviour; IMT = inspiratory muscle training; COPD = chronic obstructive pulmonary disease; PR = pulmonary rehabilitation

scribing of IMT to people with COPD in the context and time frame of outpatient pulmonary rehabilitation (PR) programmes. It is also important to determine which variables should be targeted.⁵⁴ Beliefs identified through the current literature review about barriers to EBP, and barriers specific to IMT use, were categorized as *behavioural*, *normative*, and/or *control* beliefs. For example, a perceived lack of equipment was classified as relating to control beliefs, whereas perceived lack of support for the new practice from physicians fell under the category of normative beliefs. Based on this review and on previous TPB studies of health behaviour, we determined the primary cognitive targets⁵⁴ to be *attitude* (via behavioural beliefs) and *perceived behavioural control* (via control beliefs; see Table 2); *subjective norm* (via normative beliefs) was deemed a minor construct.

Cognition can be changed by identifying new beliefs or by changing existing beliefs; there is no set way to accomplish this task.⁵⁴ Ajzen, the social psychologist who developed the TPB model, has suggested that the intervention should be informed by the investigators' experience and creativity and may include persuasive communication, face-to-face discussions, observational modelling, and/or other methods.⁵⁸ Moreover, Michie et al.,^{17,53} through expert consensus, identified techniques that may be effective in targeting 11 domains of behaviour change, including *beliefs about consequences* and *beliefs about capabilities*, which respectively include the TPB constructs of attitude and perceived behavioural control. We will employ a number of techniques to influence attitude, subjective norm, and perceived behavioural control. Table 2 outlines the main barriers to

Table 3 Probing Questions for Interactive Workshop Session 2—Problem-Solving Session

<i>Topic Area</i>	<i>Questions for Discussion with the Health Care Professionals</i>	<i>Estimated Time</i>
Evidence	Any questions about the research evidence presented?	10 minutes
Individual	What is working well for you in implementing inspiratory muscle training (IMT)? What challenges are you finding in implementing IMT? Do you require clarification on any the following: <ul style="list-style-type: none"> • Selection of appropriate individuals for IMT • Testing respiratory muscle strength or endurance <ul style="list-style-type: none"> • Testing maximal inspiratory pressure • Threshold endurance test • Pulmonary function lab providing measures • Using the inspiratory force meter or pressure manometer with multiple individuals <ul style="list-style-type: none"> • Obtaining spare or disposable parts • Sterilizing the device • Establishing the initial IMT prescription • Teaching an individual to use the Threshold trainer • Keeping the Threshold training device clean • Monitoring vitals and IMT tolerance • Progression of frequency, intensity, or time • Outcome measures for IMT 	20 minutes
Other	Are there any organizational challenges in implementing IMT that you would like to discuss? <ul style="list-style-type: none"> • Time pressures • Availability of resources • Soliciting support from physicians, management, or co-workers 	10 minutes

the uptake of IMT, the TPB constructs related to said barriers, the types of interventions we would select to modify or introduce beliefs, and the rationale for the choice of intervention.

Implementation will be informed by experience and creativity, as suggested by Ajzen,⁵⁸ but also by the aforementioned reviews of continuing medical education⁴⁵ and guideline dissemination and implementation.^{13–15} Given that multifaceted guideline-dissemination interventions perform no better than a single intervention in terms of outcomes,¹³ the latter would be chosen in order to minimize costs. Specifically, an expert on IMT in COPD (a researcher who has published in peer-reviewed journals on this topic) will deliver an interactive workshop to a small group of health professionals (<25) in two 45-minute sessions. The first session will include an oral presentation supplemented by slides and printed materials, as well as time for skill practice with feedback. The second session, as outlined in Table 3, will be a semi-structured problem-solving session. An interactive workshop was chosen because this format has been found to be effective in previous research.⁴⁴ It is our belief that a small group facilitate development of skills and beliefs about capabilities. The group will be multi-disciplinary and will receive a referenced, 1-page summary of evidence for use of IMT in COPD, which may be used to solicit support physicians or co-workers; these two elements may address barriers related to subjective norm. Furthermore, given that the optimal continuing education session is still debated,⁴⁴ relatively short sessions will be chosen, to reflect the time constraints that are frequently cited as a barrier to EBP.^{2,4,5,7,24–26} An

expert, as a credible source for arguments in favour of the behaviour,⁵³ was chosen over a local opinion leader because the identification of opinion leaders is problematic and often labour intensive.¹⁵ Furthermore, more studies are required to identify which variables, such as personal and professional attributes, training, and educational methods, are associated with the effectiveness of opinion leaders.¹⁵

In summary, a number of behaviour-change techniques will be delivered to influence important predictors of health professional behaviour—attitude, subjective norm, and perceived behavioural control—in order to increase prescription of IMT to people with COPD by health professionals in PR programmes. According to TPB, changing these predictors may increase the likelihood that a health professional will intend to prescribe IMT in COPD rehabilitation, and thereby increase the likelihood of his or her actually performing this behaviour change.

A limitation of this theory-informed design is that we used the literature on the barriers to EBP, and specifically IMT, to inform the selection of target variables rather than using a TPB questionnaire. To avoid assumptions about the behavioural-change processes responsible for any observed change, Ajzen,⁵⁸ Francis et al.,⁵⁷ and others advocate the use of a structured questionnaire to identify barrier variables that need to be addressed by the intervention. In order to advance implementation science, a TPB questionnaire should be developed and administered alongside a large, definitive randomized controlled trial to determine not only which beliefs to target with respect to use of IMT in COPD but also

whether the targeted beliefs changed as a result of the implementation intervention.

CONCLUSION

We have reviewed the barriers to evidence-based physical therapy practice and discussed them in the context of using IMT in the management of COPD. We have presented the evidence on current guideline-dissemination strategies and contended that the theory of planned behaviour provides a strong foundation to inform the development of an intervention aimed at improving the use of IMT in clinical practice. Further research is needed to evaluate both the feasibility of this intervention (whether it can be delivered as intended) and its effectiveness.

KEY MESSAGES

What Is Already Known on This Topic

Many barriers related to practitioners, organizations, and research limit the ability to apply evidence-based practice to daily treatments. Current health services research has shown that an information-based approach to continuing education and implementation interventions does not result in changes in daily practice. The literature suggests that IMT, alone or in addition to whole-body exercise, may be of benefit for some people with COPD, but physiotherapists rarely use this modality.

What This Study Adds

A behaviourally based implementation intervention, underpinned by the theory of planned behaviour, may facilitate health professionals' prescription of IMT for people with COPD participating in pulmonary rehabilitation who are unable to participate fully in whole-body exercise training because of comorbid conditions or for those who have intractable dyspnea despite completing whole-body exercise, thereby expediting changes toward evidence-based practice with this client population.

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