La recherche expérimentale Comment ça marche ?

Gregory Reychler

Service de pneumologie

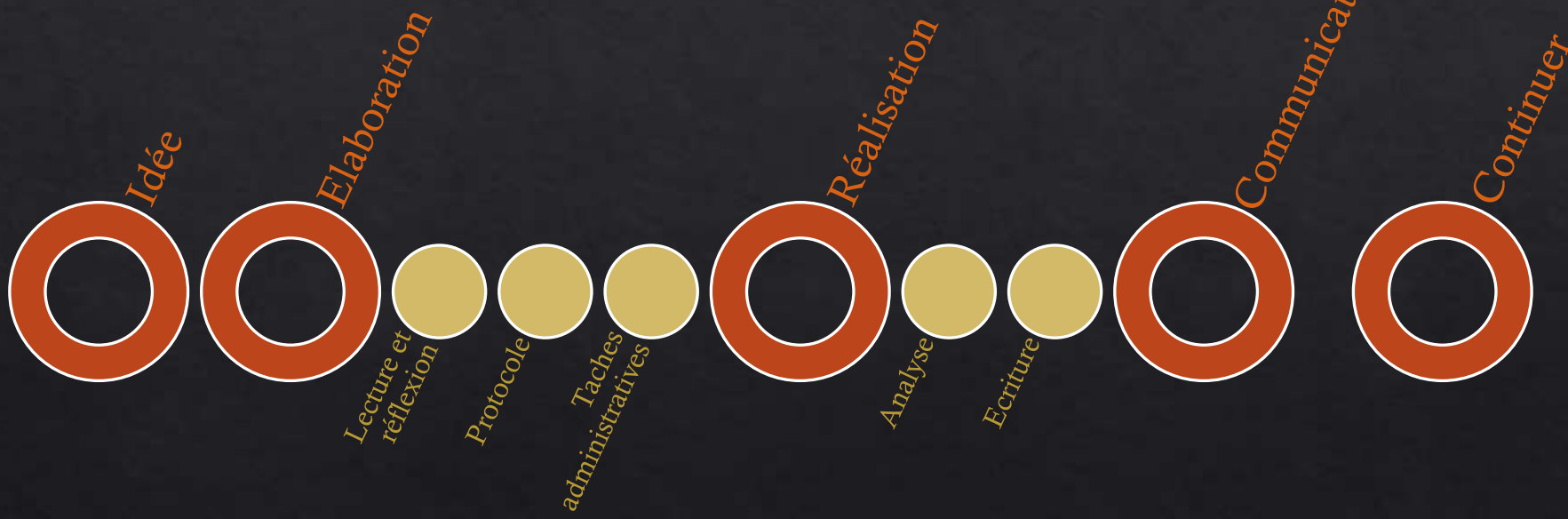
Cliniques universitaires Saint-Luc

Bruxelles

Conflits d’intérêt

- Diffusion technique française
- Aerogen

La vie est un long fleuve tranquille…mwouais


Idée
Elaboration
Lecture et réflexion
Protocole
Taches administratives
Réalisation
Analyse
Ecriture
Communication
Continuer

Comment éviter le piège?


for the
experience

Se poser LA bonne question

- A partir d'une situation clinique
- Sur base d'une revue exhaustive de ce qui est connu
  - Transformer la situation clinique en une question précise
  - Choisir les critères d'inclusion
  - Choisir les bases de données ou les méthodes et les outils d'évaluation (pour un protocole de recherche)

Archives de Pédiatrie

Volume 22, Issue 1, January 2015, Pages 98–103

Mise au point

Bronchiolite et kinésithérapie respiratoire : un dogme ébranlé

Acute bronchiolitis and chest physiotherapy: The end of a reign

B. Sterling, E. Bosdure, N. Stremler-Le Bel, B. Chabrol, J.-C. Dubus

Show more

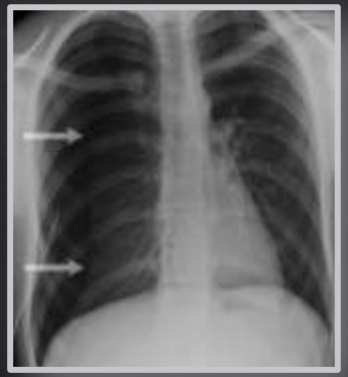
doi:10.1016/j.arcped.2014.09.021

Résumé

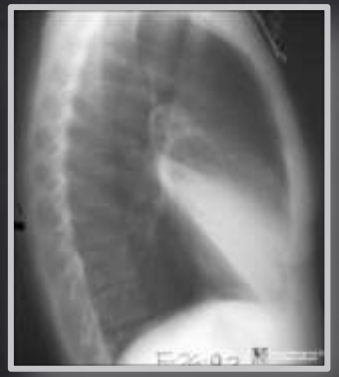
Chaque hiver, la bronchiolite aiguë du nourrisson est responsable d'un grand nombre d'hospitalisations. Son traitement est avant tout symptomatique et a été codifié lors d'une conférence de consensus de la Haute Autorité de santé (HAS) en 2000. La kinésithérapie respiratoire y avait été mise en avant pour lutter contre l'encombrement et l'obstruction bronchique. Même si les techniques diffèrent d'un pays à l'autre, elle est devenue quasi systématique dans la prise en charge de la bronchiolite aiguë du nourrisson. Mais qu'en est-il réellement de son efficacité ou de sa légitimité ? L'objectif de notre étude était de faire la revue de la littérature sur ce sujet. Peu d'études sont disponibles avec de faibles niveaux de preuve. Elles tendent à montrer que la kinésithérapie respiratoire n'aurait qu'un faible intérêt dans la prise en charge de la bronchiolite aiguë du nourrisson ne modifiant pas l'histoire naturelle de la maladie ou la durée d'hospitalisation. Au total, on ne peut recommander de manière systématique la kinésithérapie chez les nourrissons hospitalisés pour bronchiolite aiguë.

Connaissances anatomo-physiopathologiques

Sécrétions (localisation, texture)



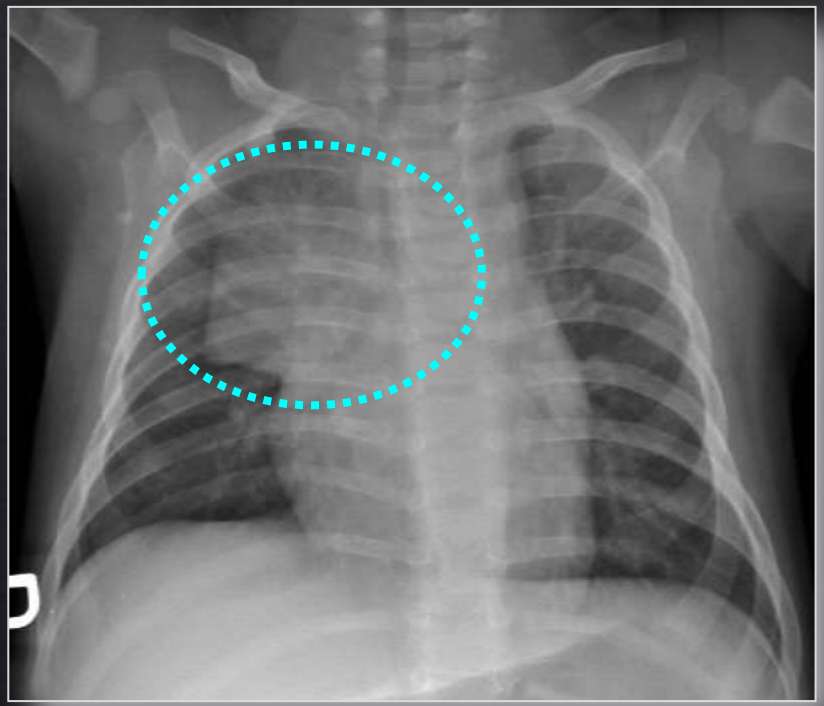
Pneumothorax



Atélectasies (causes)

Chirurgie (type, conséquences…)

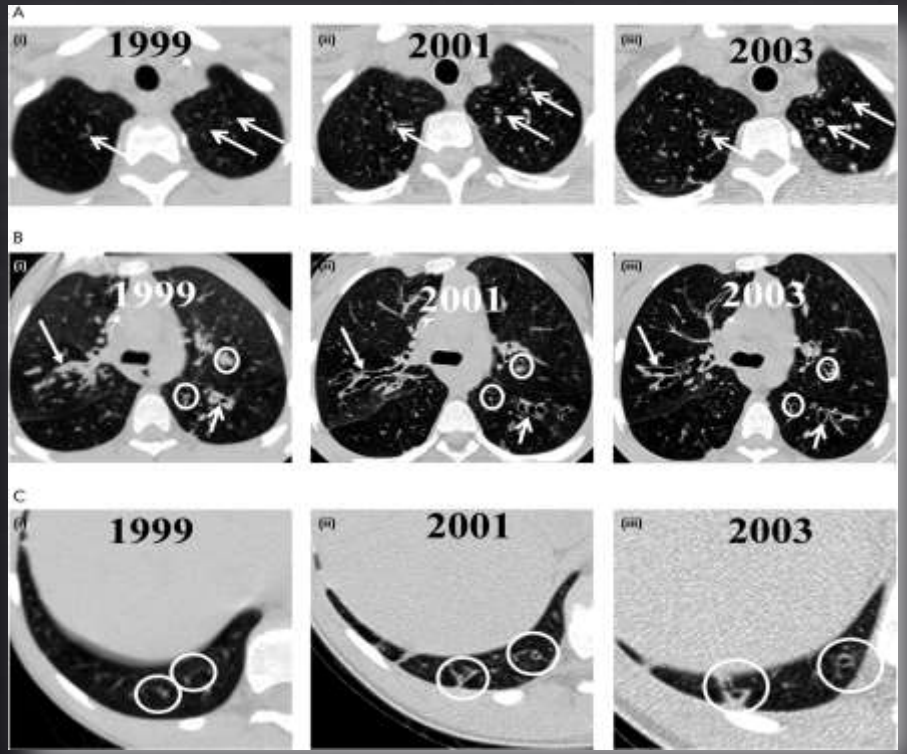
Connaissances anatomo-physiopathologiques



« …We see only what we look for, and we recognize only what we know… »

Dr Merrill Sosman, 1957

Connaissances anatomo-physiopathologiques

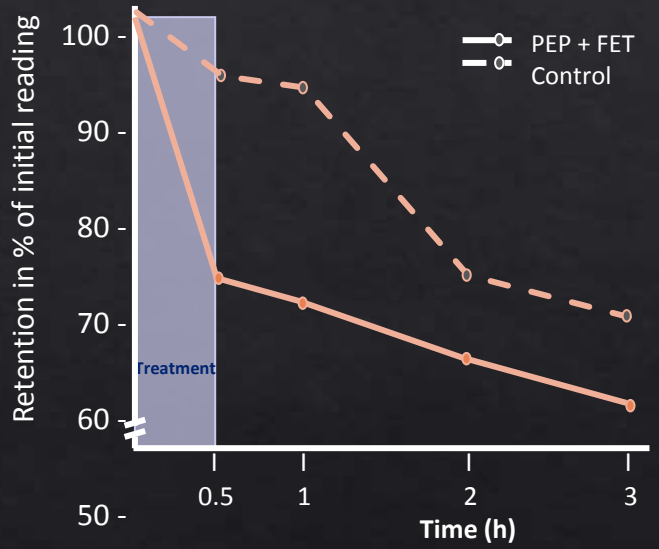


Même technique de désencombrement en 1999, 2001 et 2003?

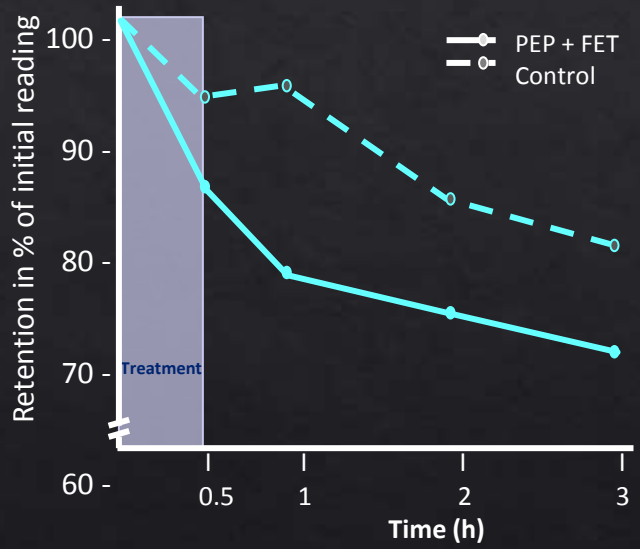
de Jong, Thorax 2006;61:80-85

Connaissances des techniques

… de leurs effets



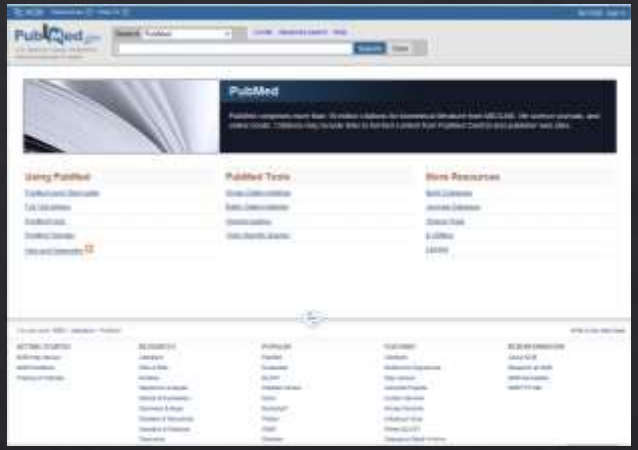
Whole lung

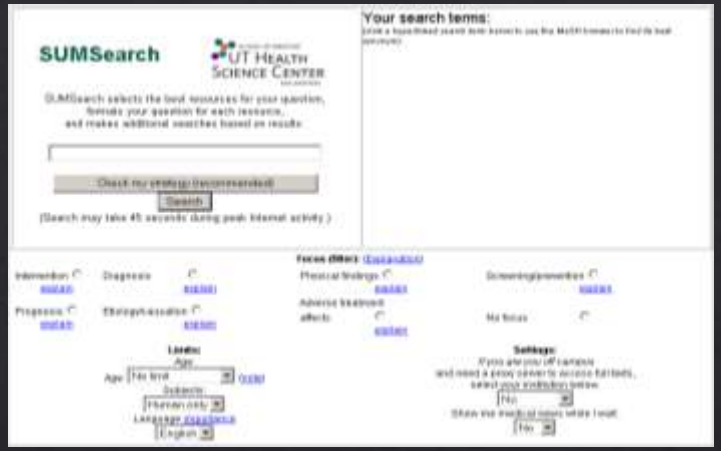


Peripheral lung

10 CF patients

Mortensen J, Chest 1991;100;1350-1357


PubMed


SUMSearch
UT Health Science Center
Your search terms:

Comment?


PEDro
Physiotherapy Evidence Database
search

Chest physiotherapy in cystic fibrosis: a comparative study of autogenic drainage and the active cycle of breathing techniques with postural drainage.

Miller S, Hall DO, Clayton CB, Nelson B.

Physiotherapy Department, Royal Victoria Infirmary, Newcastle upon Tyne, UK.

BACKGROUND--Autogenic drainage has been suggested as an alternative method of chest physiotherapy in patients with cystic fibrosis. In this study autogenic drainage was compared with the active cycle of breathing techniques (ACBT) together with postural drainage. METHODS--Eighteen patients with cystic fibrosis took part in a randomised two-day crossover trial. There were two sessions of one method of physiotherapy on each day, either autogenic drainage or ACBT. The study days were one week apart. On each day the patients were monitored for six hours. Mucus movement was quantified by a radioaerosol technique. Airway clearance was studied qualitatively using xenon-133 scintigraphic studies at the start and end of each day. Expectorated sputum was collected during and for one hour after each session of physiotherapy. Pulmonary functions tests were performed before and after each session. Oxygen saturation (SaO2) and heart rate were measured before, during, and after each session. RESULTS--Autogenic drainage cleared mucus from the lungs faster than ACBT over the whole day. Both methods improved ventilation, as assessed by the xenon-133 ventilation studies. No overall differences were found in the pulmonary function test results, but more patients had an improved forced expiratory flow from 25% to 75% with autogenic drainage, while more showed an improved forced vital capacity with ACBT. No differences were found in sputum weight and heart rate, nor in mean SaO2 over the series, but four patients desaturated during ACBT. CONCLUSIONS--Autogenic drainage was found to be as good as ACBT at clearing mucus in patients with cystic fibrosis and is therefore an effective method of home physiotherapy. Patients with cystic fibrosis should be assessed as to which method suits them best.

Thorax. 1995 Feb;50(2):165-9.

J Cardiopulm Rehabil. 2000 Jan-Feb;20(1):37-43.

A comparison of autogenic drainage and the active cycle of breathing techniques in patients with chronic obstructive pulmonary diseases.

Savci S, Ince DI, Arikan H.

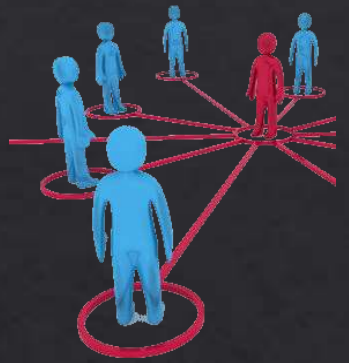
Hacettepe University, Physical Therapy and Rehabilitation School, Ankara, Turkey.

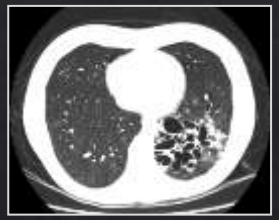
PURPOSE: The effects of a long-term treatment of autogenic drainage (AD) and the active cycle of breathing techniques (ACBT) were evaluated in patients with chronic obstructive pulmonary disease (COPD). METHODS: Thirty clinically stable male COPD patients were randomly assigned to AD or the ACBT treatment for a 20-day treatment period. Patients were assessed through pulmonary function tests, arterial blood gases, a 6-minute walking test, and a modified Borg Scale before, and immediately after the walking test. RESULTS: Autogenic drainage improved forced vital capacity, forced expiratory volume in 1 second, peak expiratory flow rate, forced expiratory volume from 25 to 75%, chronic hypercapnia, arterial oxygenation, exercise performance, and dyspnea perception during exercise. The ACBT increased forced vital capacity, peak expiratory flow rate, arterial oxygenation and exercise performance. Peak expiratory flow rate increased in AD more than in ACBT. In AD treatment, the increase in oxygen saturation was significantly higher than in ACBT treatment. Chronic hypercapnia improved significantly in AD treatment than in ACBT. No differences were found in other lung function parameters. CONCLUSIONS: Autogenic drainage is as effective as the ACBT in cleaning secretions and improving lung functions. These techniques can be used in stable COPD patients according to the patients' and the physiotherapists' preferences.

Eur Respir J 2009; 34: 1086–1092
DOI: 10.1183/09031936.00055509

A randomised crossover trial of chest physiotherapy in non-cystic fibrosis bronchiectasis

M.P. Murray*, J.L. Pentland# and A.T. Hill*





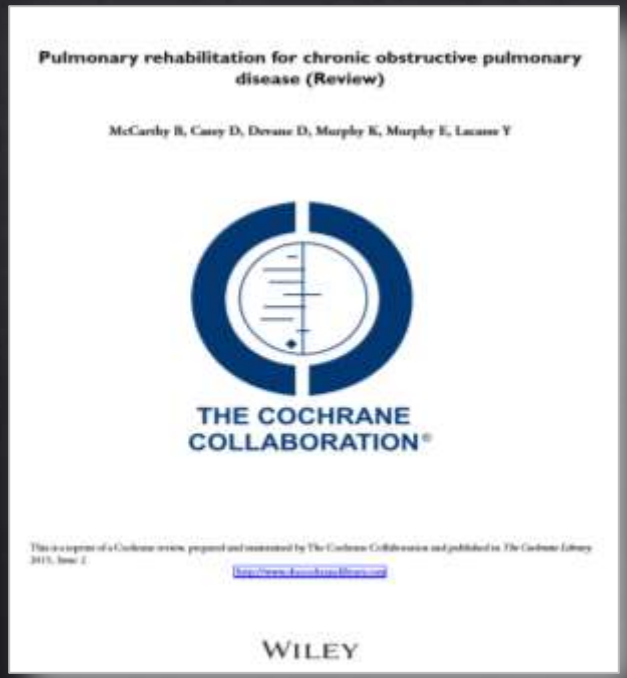
$$n = \left(\frac{Z_{\alpha/2} \times \sigma}{E} \right)^2$$

Outcome
Total LCQ score improvement
24-h sputum volume mL
FEV_1 L
FVC L
$FEF_{25-75\%}$ $L \cdot s^{-1}$
MIP cmH_2O
MEP cmH_2O
Exercise capacity m
Sputum bacterial load $cfu \cdot mL^{-1}$
Total SGRQ score improvement
Exacerbations n

Le rationnel… un prérequis en recherche!

Rationnel = raisonnement

Eviter le travail inutile …



… en répétant des études ou mesures déjà réalisées.

Rationnel = raisonnement

Eviter le travail inutile …

… en tentant de démontrer des faits ou situations évidents (*reductio ad absurdum).*

Potts M, *BMJ* 2006;333:701–3

Protocole

Description précise des différentes étapes de l'étude

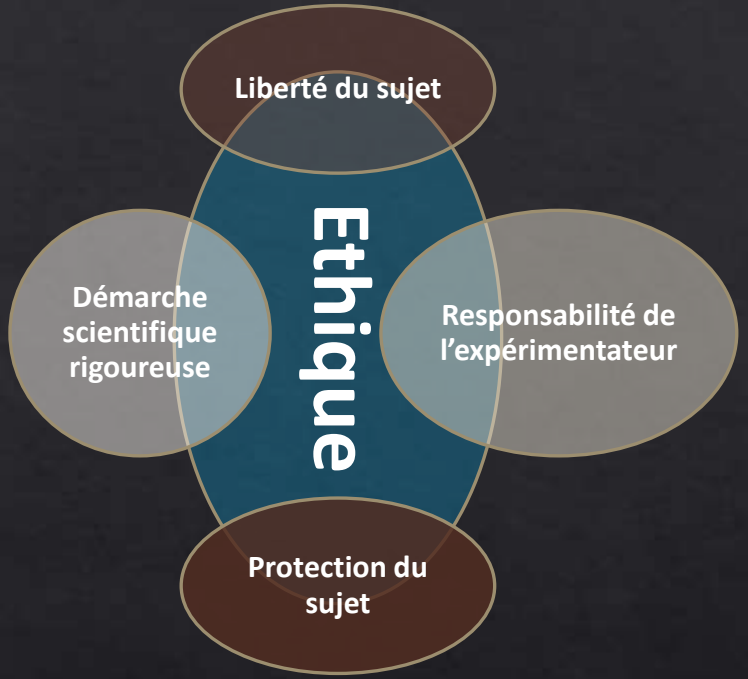
- Rédaction ECRITE du protocole (interdiction d'en dévier)

- TOUT DOIT Y ETRE

- Déterminer le but de l'étude et la faisabilité
- Evaluer le nombre de sujets nécessaires
- Rédaction précise de la méthode utilisée
- Préciser l'intérêt clinique


LAW


ASSURANCE


Liberté du sujet
Ethique
Démarche scientifique rigoureuse
Responsabilité de l'expérimentateur
Protection du sujet

Stanford Prison Experiment


Arrestation of student


Go to jail


Calling for volunteers


Created prison cells



Humiliation

Philip Zimbardo fut professeur à Stanford de 1968 jusqu'à sa retraite en 2003. Il mena cette étude en 1971…


Free to be guard


Rebellion


Visit of parents

Les sujets avaient été choisis pour leur stabilité. Ils se prirent au jeu. L'étude s'arrêta après 6j au lieu de 15j… Un seul sujet exigea de sortir de l'étude!!!

Etapes de la démarche éthique

- Conception du protocole
- Création des différents documents
- Envoi des documents au comité d'éthique
- Réception de la réponse et de la demande éventuelle de correction
- Envoi des corrections
- Approbation définitive

- But et la faisabilité
- Evaluer le nombre de sujets nécessaires
- Méthode utilisée et évaluation bénéfices-risque
- Préciser l'intérêt clinique

Etapes de la démarche éthique

- Conception du protocole
- Création des différents documents
- Envoi des documents au comité d'éthique
- Réception de la réponse et de la demande éventuelle de correction
- Envoi des corrections
- Approbation définitive

- Protocole complet
- Protocole court
- Formulaires d'information et de consentement (bilingue, deux parents)
- Formulaire de demande

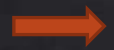
Etapes de la démarche éthique

- Conception du protocole
- Création des différents documents
- Envoi des documents au comité d'éthique
- Réception de la réponse et de la demande éventuelle de correction
- Envoi des corrections
- Approbation définitive

- Adjoindre l'assurance en RC
- Réunion des membres du comité d'éthique
- Personnes d'horizons divers

Etapes de la démarche éthique

- Conception du protocole
- Création des différents documents
- Envoi des documents au comité d'éthique
- Réception de la réponse et de la demande éventuelle de correction
- Envoi des corrections
- Approbation définitive



- Réponse envoyée
- Comprend des demandes d'amendement

Etapes de la démarche éthique

- Conception du protocole
- Création des différents documents
- Envoi des documents au comité d'éthique
- Réception de la réponse et de la demande éventuelle de correction
- Envoi des corrections
- Approbation définitive

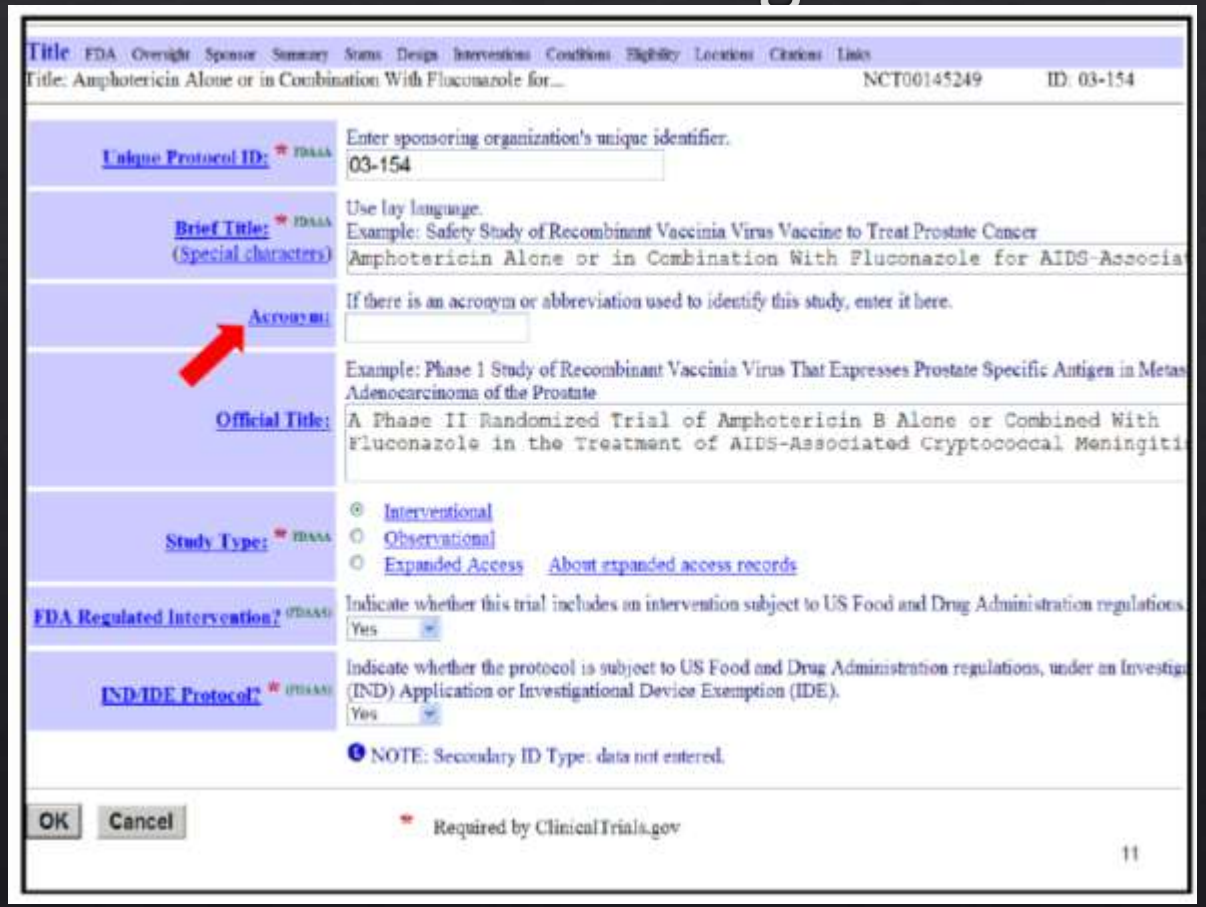
Etapes de la démarche éthique

- Conception du protocole
- Création des différents documents
- Envoi des documents au comité d'éthique
- Réception de la réponse et de la demande éventuelle de correction
- Envoi des corrections
- Approbation définitive

- **On y va!**

ClinicalTrials : enregistrement

ClinicalTrials : enregistrement



Title FDA Oversight Sponsor Summary Status Design Interventions Conditions Eligibility Locations Citations Links

Title: Amphotericin Alone or in Combination With Fluconazole for... NCT00145249 ID: 03-154

Unique Protocol ID: * FDAAA
Enter sponsoring organization's unique identifier.
03-154

Brief Title: * FDAAA
(Special characters)
Use lay language.
Example: Safety Study of Recombinant Vaccinia Virus Vaccine to Treat Prostate Cancer
Amphotericin Alone or in Combination With Fluconazole for AIDS-Associa

Acronym:
If there is an acronym or abbreviation used to identify this study, enter it here.

Official Title:
Example: Phase 1 Study of Recombinant Vaccinia Virus That Expresses Prostate Specific Antigen in Metas
Adenocarcinoma of the Prostate
A Phase II Randomized Trial of Amphotericin B Alone or Combined With Fluconazole in the Treatment of AIDS-Associated Cryptococcal Meningiti

Study Type: * FDAAA
- Interventional
- Observational
- Expanded Access About expanded access records

FDA Regulated Intervention? (FDAAA)
Indicate whether this trial includes an intervention subject to US Food and Drug Administration regulations.
Yes

IND/IDE Protocol? * (FDAAA)
Indicate whether the protocol is subject to US Food and Drug Administration regulations, under an Investig
(IND) Application or Investigational Device Exemption (IDE).
Yes

NOTE: Secondary ID Type: data not entered.

OK Cancel

* Required by ClinicalTrials.gov

11

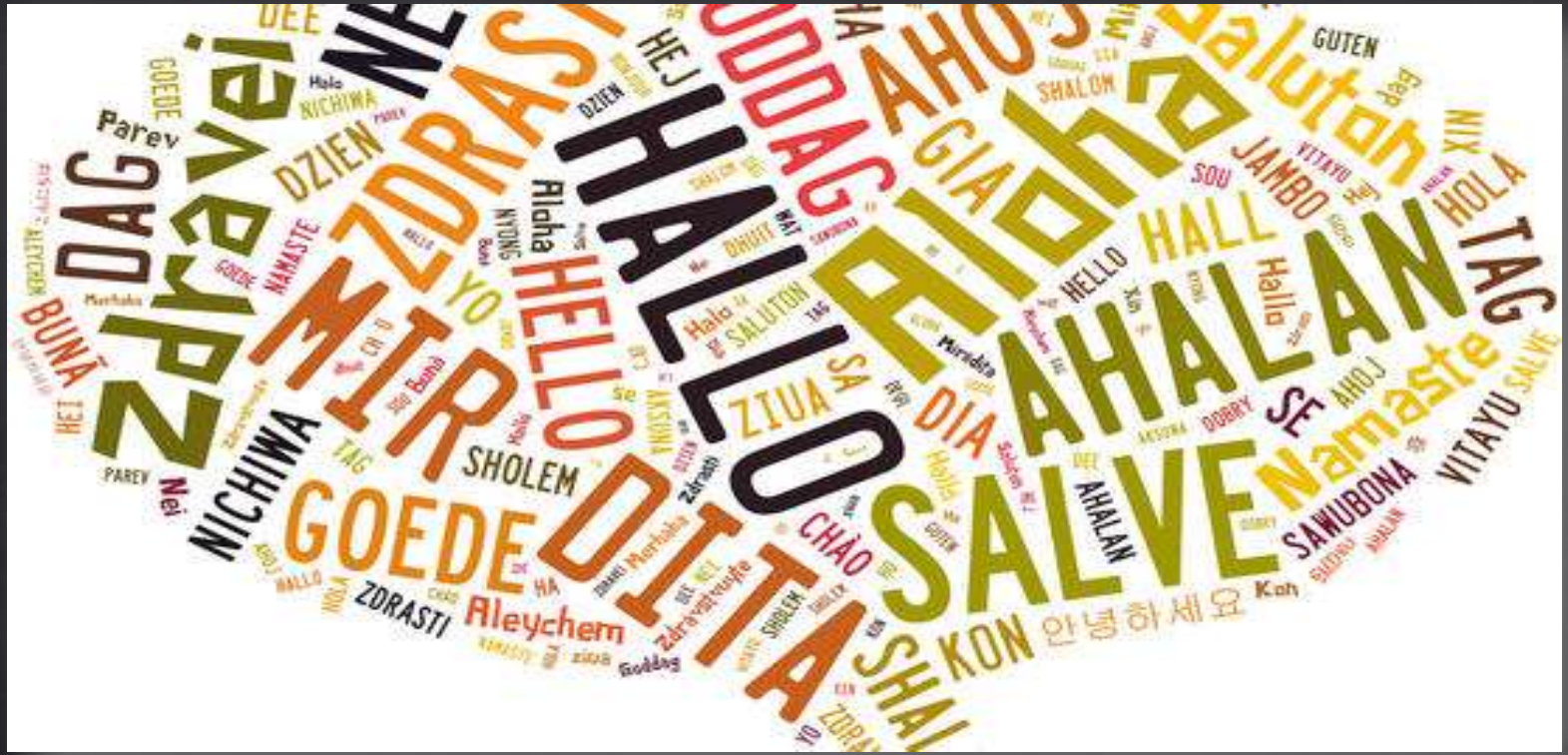
Il n’y a plus qu’à…

ANALYSE

Etapes

- Décrire tout ce qu'on a trouvé
  - Choisir la meilleur façon d'exprimer les résultats
- Réfléchir aux résultats qui permettent de répondre à la question
  - Choisir les tests statistiques
- Rechercher des données qui permettent d'éclairer les résultats
- Rechercher des résultats « annexes »

ECRIRE



Le langage scientifique est une langue comme une autre!!!

Structure classique

- Titre
- Auteurs et adresse(s)
- Abstract structuré
- Corps (Structure IMRaD)
  - Introduction
  - Matériel et méthode
  - Résultats
  - Discussion
  - Conclusion
- Bibliographie

Introduction

Inspiratory Muscle Strength and Endurance in Children and Adolescents with Cystic Fibrosis

Cystic fibrosis is a disease characterized by progressive loss of pulmonary function, with obstruction of the airways caused by abnormal production of mucus and by the presence of chronic inflammation and recurring infections.[1] Respiratory muscle strength has been much evaluated in these subjects, but studies are still contradictory.[2] Some authors report that strength may be within normality or even increased, suggesting a muscle training effect in response to airway obstruction and chronic coughing.[3,4] On the other hand, authors who demonstrate a diminished strength associate muscle weakness with hyperinflation and malnutrition,[5] suggesting that these subjects are not able to maintain muscle strength at advanced stages of the disease.[6]

Although measuring maximum static pressures supplies information about strength, it does not quantify inspiratory muscle endurance.[7] Evidence shows that the evaluation of muscle endurance may be more relevant than strength in subjects with chronic obstructive pulmonary disease,[8,9] since endurance is the capacity of a muscle or a muscle group to sustain a given task over time and is directly related to muscle fatigue.[10] However, few studies have evaluated inspiratory muscle endurance in subjects with cystic fibrosis, and these have shown contradictory results, just as for muscle strength. One previous study showed an apparent increase of endurance due to the adaptation of the muscles to the chronic stress of ventilating against a load generated by airway obstruction.[11] On the other hand, there is evidence that endurance may be diminished independent of nutritional status, the presence of airway obstruction, pulmonary hyperinflation, respiratory muscle strength, or maximum exercise capacity[8,12] and may be a major parameter to evaluate dyspnea in subjects with cystic fibrosis.[12] The individuals with cystic fibrosis who have a reduced capacity to contract the respiratory muscles become more susceptible to muscle fatigue with a limitation in the ability to carry out prolonged activities or tasks. However, the degree of inspiratory muscle endurance impairment and how that impairment is associated with important lung function parameters in children and adolescents with cystic fibrosis remain poorly understood.

Pseudomonas aeruginosa is the most common pathogen in cystic fibrosis lung disease and is associated with gradual decline of pulmonary status in children and young adults.[13] Once infection is established, there is an accelerated decline in lung function, quality of life, and survival.[14,15] Furthermore, chronic *P. aeruginosa* infection has been related to decreased maximum inspiratory pressure (P_{Imax}) and is probably an independent predictor of respiratory muscle compromise in cystic fibrosis,[16] although its relation to muscle endurance remains unclear.

The aim of our study was to evaluate muscle strength and inspiratory muscle endurance in children and adolescents with cystic fibrosis and to compare them with age–matched healthy controls. The role of *P. aeruginosa* and lung function compromise was assessed, and we further examined possible associations of strength and endurance with other pulmonary function parameters, such as FEV_1, total lung capacity, residual volume (RV), and airway resistance. A better understanding of inspiratory muscle strength and endurance could contribute to the development of earlier preventive measures and help in the therapeutic intervention processes in cystic fibrosis.

Généralité : CF = obstructive

Contradictions sur la force des patients CF

Endurance est meilleure que force dans les maladies respiratoires
Peu d'études dans CF même si la physiopathologie suggère une diminution

Ps a joue un rôle sur les EFR et force. Endurance?

But : mesurer force et endurance et évaluer infuence du Ps a chez CF

Respiratory Care 2016 vol. 61 no. 2 184-191

Objectifs de l'étude

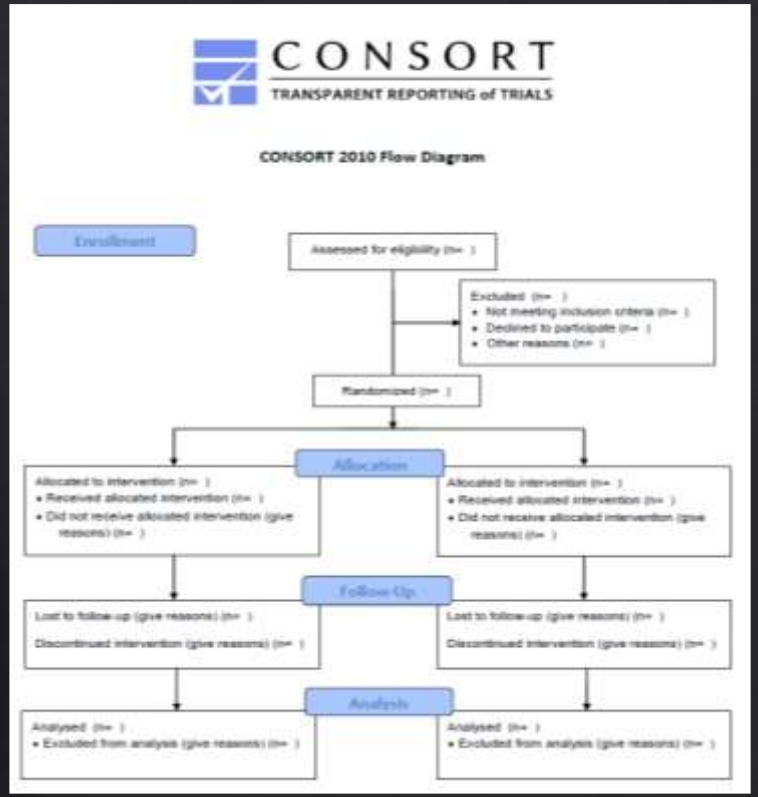
- Deux types
  - Objectif principal
    - Identifié sans ambiguïté
    - Le nombre de sujets nécessaires sera calculé pour répondre à l'objectif principal
    - La définition de l'objectif doit donner des précisions sur la forme clinique de la maladie évaluée et sur le critère utilisé pour mesurer l'objectif (critère de jugement).
  - Objectifs secondaires
    - Facultatifs
    - Clairement identifiés en tant que tels.

Méthode

- Sujets
  - Ethique OK
  - Où
  - Inclusion
  - Exclusion
- Design (RCT, cross-over…, timing...)
- Outcomes (Quoi et comment)
- Intervention (Quoi et comment)
- Statistiques (Quoi et pourquoi)

Résultats

- Uniquement des résultats!!!!
- Jamais de redondance
- Présentation simple et ordonnée en fonction des objectifs/méthode
- Premièrement, le recrutement. Ensuite la population. Enfin les effets



Exprimer correctement les résultats

Table 1 Demographic and clinical characteristics of study subjects

	SSc-ILD (n = 83)	
Male	17 (20)	
Mean (SD) age (years)	49.5 (11.5)	
White, n (%)	66 (80)	
Smoking status, n (%)		
Current	9 (11)	
Former	32 (39)	
Never	42 (50)	
Pulmonary physiology		
Rest FVC (%)	70.9 (21.4)	73 (52–89)
Rest T_{LCO} (%)	70.4 (23.7)	72 (41–89)
Surgical biopsy, n (%)	17 (20)	
UIP	6 (35)	
NSIP	4 (24)	
ESHL	4 (24)	
Other	3 (17)	
Exercise variables		
Oxygenation		
Baseline Spo_2	93.8 (2.6)	94 (93–96)
Baseline Sao_2	92.3 (2.5)	93 (91–94)
Baseline Pao_2	71.0 (9.9)	71 (64–78)
Max exercise Spo_2	91.4 (5.8)	93 (89–96)
Max exercise Sao_2	89.9 (6.0)	92 (87–94)
Max exercise Pao_2	70.2 (17.2)	69 (56–83)
Exercise capacity		
$\dot{V}o_2$max (l/min)	1.0 (0.4)	0.9 (0.7–1.3)
$\dot{V}o_2$max (%)	56.1 (17.2)	56 (44–65)
Work (Watts)	83.8 (34.2)	75 (60–100)
Work (%)	62.8 (19.2)	62 (38–72)

Data presented as n (%), mean (SD) or median (interquartile range).
FVC, percentage predicted forced vital capacity; ESHL, end stage honeycomb lung; NSIP, non-specific interstitial pneumonia; Pao_2, arterial oxygen tension; Spo_2, peripheral oxygen saturation; Sao_2, arterial blood saturation; SSc-ILD, fibrosing interstitial lung disease related to systemic sclerosis; T_{LCO}, percentage predicted lung carbon monoxide transfer factor; UIP, usual interstitial pneumonia; $\dot{V}o_2$max, maximum oxygen uptake.

Exprimer correctement les résultats

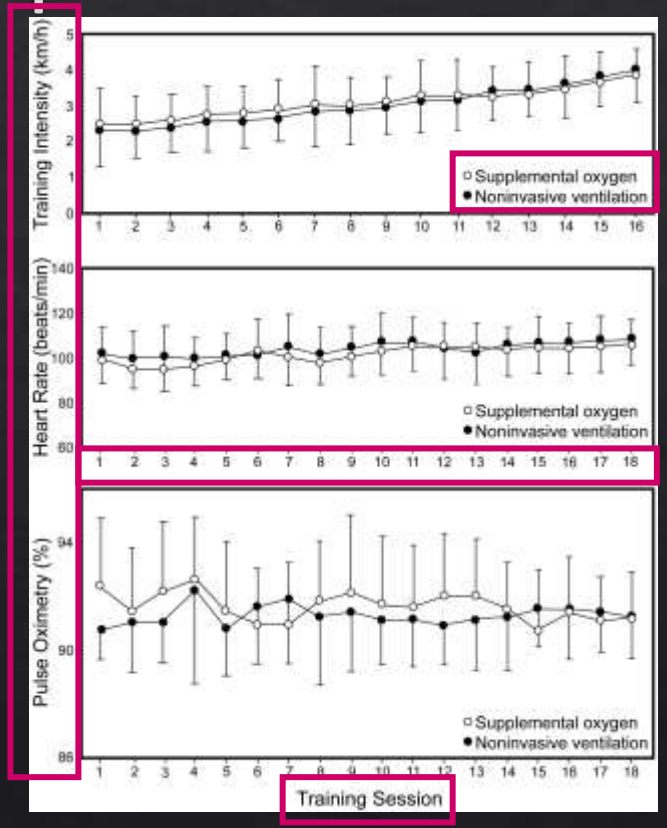


Fig. 2. Evolution of training intensity, heart rate, and pulse oximetry readings during the exercise training sessions. The values are as mean ± SD. There were no significant differences between the groups.

Borghi-Silva, Respir Care 2010;55(7):885– 894

Discussion

- Mise en avant des résultats principaux et ce qu'on en tire comme conclusion
- Observations précédentes étayant les différences/similitudes au niveau des résultats sur base de la littérature
- Implications cliniques
- Limitations
- Pistes pour le futur
- Conclusion générale

Signification
Statistique vs clinique

"Although it is tempting to equate statistical significance with clinical importance, critical readers should avoid this temptation. To be clinically important requires a substantial change in an outcome that matters. Statistically significant changes, however, can be observed with trivial outcomes. And because statistical significance is powerfully influenced by the number of observations, statistically significant changes can be observed with trivial (small) changes in important outcomes. Large studies can be significant without being clinically important and small studies may be important without being significant."

(Effective Clinical Practice, July/August 2001, ACP)

Bibliographie

- Référence (uniformité!!!) selon un style précis
  - Article

    Vega KJ, Pina I, Krevsky B. Heart transplantation is associated with an increased risk for pancreatobiliary disease. Ann Intern Med 1996;124(11): 980-3.
  - Book

    Ringsven MK, Bond D. Gerontology and leadership skills for nurses. 2nd ed. Albany (NY): Delmar Publishers; 1996.
  - Chapitre

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Titre

- **En dernier lieu!**

- *Cough Augmentation in Subjects With Duchenne Muscular Dystrophy: Comparison of Air Stacking via a Resuscitator Bag Versus Mechanical Ventilation*

- *Air Stacking via a Resuscitator Bag Versus Mechanical Ventilation Improves Cough in Subjects With Duchenne Muscular Dystrophy*

- *Comparison of Air Stacking via a Resuscitator Bag Versus Mechanical Ventilation in Subjects With Duchenne Muscular Dystrophy*

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Your Submission YRMED-D-16-00018

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Envoyé : dim. 24/01/2016 04:47
À : REYCHLER Grégory

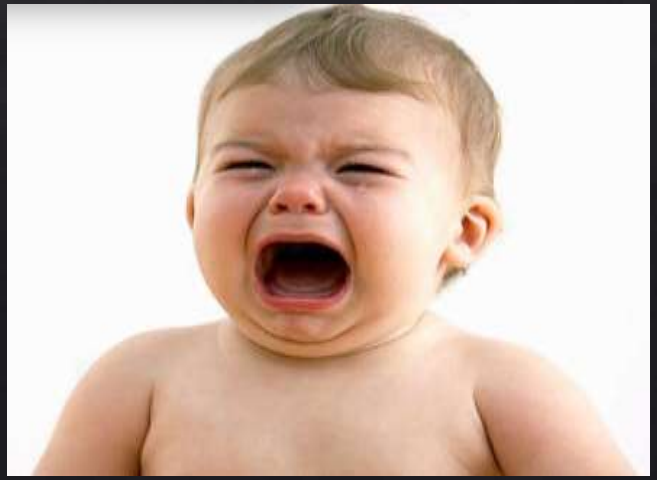
Manuscript Title: One minute sit-to-stand test as an alternative to 6MWT in COPD patients Respiratory Medicine

Dear Dr. Reychler,

Respiratory Medicine receives an increasing number of high quality papers for review. This forces us to make strict priorities regarding profile and content. Even though your paper contains some interesting data, I am sorry to tell you that your paper, after an initial editorial review, did not reach sufficient rating for to be recommended for publication. We would like to see this technique applied to a greater number and broader range of COPD patients.

Thank you for considering Respiratory Medicine as a forum for your work even though I had to turn this paper down.

Yours sincerely



Respiratory Care - Decision on Manuscript ID RC-04547

onbehalfof+dhess+aarc.org@manuscriptcentral.com de la part de dhess@aarc.org

Envoyé : dim. 22/11/2015 12:18
À : REYCHLER Grégory
Cc : sara.moore@aarc.org

Message | Respiratory-Care-Reference-Format.pdf (17 Ko)

22-Nov-2015

Dear Dr. Reychler:

Manuscript ID RC-04547 entitled "Reproducibility of the sputum color evaluation depends on the category of caregivers" has been evaluated by 3 external consultants, whose comments are included at the bottom of this letter.

The manuscript cannot be accepted for publication in its current form, but potentially could be if satisfactorily revised, dealing with the concerns raised by the reviewers. Can you address the reviewers' concerns in a revised manuscript?

As suggested by the reviewers, the Discussion section could be improved.

To revise your paper, click the link below and it will take you to the first page for creating your revised submission.

World Physical Therapy 2011

16th International WCPT Congress
20-23 June 2011 Amstercam Holland
www.wcpt.org/congress

World Confederation for Physical Therapy

SKR
Société de Kinésithérapie de Réanimation

CIFEP 2012
Programme scientifique
Rennes, 3 et 4 Février 2012

[...]

[Poster Board # LL] The Effect Of Different Exercise Modalities On Dyspnea And Leg Fatigue In Healthy Subjects. [Publication Page: A4048]

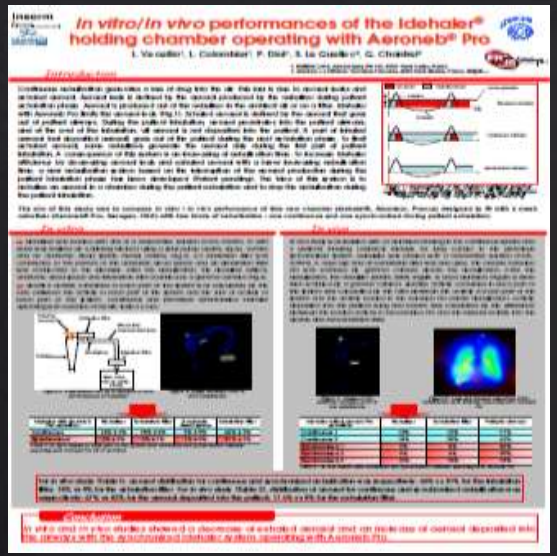
P. Sharma, M.Sc. Human Physiology, N.B. Morris, PhD, L. Adams, PhD
Gold Coast, QLD AU

Rationale: Dyspnea and leg fatigue are the principal symptoms limiting exercise in humans, becoming especially problematical in cardiorespiratory disease. These symptoms are regarded as arising respectively from the respiratory system and from peripheral muscles, and generally it is assumed that these sensations can be rated independently of one another during an exercise bout. This study examined the following hypotheses in healthy subjects: 1. at a given level of exercise-induced ventilation, ratings of dyspnea are independent of exercise modalities involving different patterns of leg muscle activation; 2. at a given level of oxygen consumption, ratings of leg fatigue are greater when a greater proportion of the work is being done by the leg muscles.

Methodology: Following familiarization, 13 healthy subjects (28.5±7.8 years; 8 males) performed six 5-min exercise tests on 3 separate days, randomized among: 2 steep slope treadmill tests (speed ~4kph; grade 25%), 2 flat speed treadmill tests (speed ~7kph; grade ~12%) and 2 bike tests. The two tests per day were separated by 30 min. Oxygen consumption ($\dot{V}O_2$; L/min), ventilation ($\dot{V}E$; L/min), and respiratory rate (RR) were measured breath by breath via a fleisch pneumotachometer (Cosmed). Heart rate (HR) was measured continuously as was either intensity of dyspnea or leg fatigue using a 0 to 10 numerical scale with 0.5 resolution.

Results: Data were averaged over 30-second intervals and analyzed using repeated measures ANOVA. Mean (SD) values for steep treadmill vs. flat treadmill vs. bike were: $\dot{V}O_2$ 2.18 (0.37) vs. 2.00 (0.39) vs. 2.00 (0.41); $\dot{V}E$/$\dot{V}O_2$ 1 (10.4) vs. 31.3 (10.8) vs. 30.8 (10.0); RR 140 (11) vs. 138 (14) vs. 139 (11); HR 24.4 (5.3) vs. 25.0 (5.8) vs. 24.3 (4.4); dyspnea 3.8 (1.3) vs. 3.3 (1.6) vs. 3.5 (1.8) and leg fatigue 3.4 (1.3) vs. 3.2 (1.4) vs. 3.5 (1.3) (see figure). All variables were not statistically significantly different among the three conditions ($p > 0.05$).

Conclusion: These findings support the hypothesis that in healthy subjects, at equivalent levels of cardiopulmonary stress, perceived dyspnea intensity reflects the level of respiratory drive independent of exercise modality. The findings do not support the hypothesis that for equivalent cardiorespiratory stress perceived leg fatigue reflects the intensity or pattern of leg muscle activation.




On a réussi!!!