Nursing

Year in Review

ATS 2021

conference.thoracic.org

ATS 2021

Nursing Year in Review Bibliography

MODERATORS

Nina E. Bracken, ACNPC, MSN
University of Illinois at Chicago
Chicago, IL

Lea Ann Matura, PhD, RN
University of Pennsylvania
Philadelphia, PA

Rebecca Disler, PhD, MSc, BSc, BN, RN
University of Melbourne
Melbourne, Australia

TABLE OF CONTENTS

COPD COMORBIDITIES: GREATER THAN THE SUM OF THE PARTS

This session and the International Conference are supported by an independent medical educational grant from **AstraZeneca LP.**

THE MANAGEMENT OF BOTH COPD AND DYSPNEA

Paula M. Meek, PhD, RN, ATSF
University of Utah
College of Nursing
Salt Lake City, UT

COPD AND DYSPNEA WITH INCREASED CARE MANAGEMENT (INTEGRATED CARE)

Meijer E, van Eeden AE, Kruis AL, Boland MRS, Assendelft WJJ, Tsiachristas A, Rutten-van Mölken M, Kasteleyn MJ, Chavannes NH. **Exploring characteristics of COPD patients with clinical improvement after integrated disease management or usual care: post-hoc analysis of the RECODE study.** *BMC Pulm Med 2020; 20: 176.*

Summary

This study is a second look at the randomized controlled trial on the cost-effectiveness of integrated chronic obstructive pulmonary disease (COPD) management in primary care (RECODE). The original study showed that integrated disease management in primary care (IDMpc) did not affect the quality of life (QOL) in COPD patients compared with usual care. The purpose of this secondary analysis was to examine which patients benefit from IDMpc and if some patient characteristics might predict clinical improvement over time. Logistic regression analyses conducted with baseline characteristics planned to predict improvement in QOL measured with Clinical COPD Questionnaire (CCQ) at 12 and 24 months. Irrespective of the treatment group, moderate to severe dyspnea (MRC >2) was the most important predictor of clinically improved QOL at 12 and 24 months. Clinical improvement with IDMpc was associated with female (12-months) and younger (24-months) participants. In this exploratory post hoc analysis of the RECODE study, moderate to severe dyspnea was a crucial predictor of COPD patients' improvement in QOL over 24 months.

Comments

1. The premise of this study examined that a likely response to IDMpc may differ based on patient characteristic such as symptoms, physical activity and previous exacerbations.
2. It is important to note that the authors did not examine differences in the MRC levels of 3, 4, and 5. This implies that those with dyspnea with activity (MRC) levels of 3 or greater have the greatest potential to clinically improve in QOL with increased attention either through usual care or IDMpc.
3. It is unlikely that this improvement is sustained across all dyspnea with activity (MRC) levels but level 3 might be used as a point of focus.

COPD AND DYSPNEA WITH INCREASED CARE MANAGEMENT (INTEGRATED CARE AND REMOTE MONITORING)

Koff PB, Min SJ, Freitag TJ, Diaz DLP, James SS, Voelkel NF, Linderman DJ, Diaz Del Valle F, Zakrajsek JK, Albert RK, Bull TM, Beck A, Stelzner TJ, Ritzwoller DP, Kveton CM, Carwin S, Ghosh M, Keith RL, Westfall JM, Vandivier RW. **Impact of Proactive Integrated Care on Chronic Obstructive Pulmonary Disease**. *Chronic Obstr Pulm Dis 2021; 8.*

Summary

The researchers report on a "quasi-randomized" clinical trial designed to test Proactive iCare (proactive, integrated care with remote monitoring), a health care delivery model in 511 participants with advanced COPD or a recent COPD exacerbation. Quasi-randomization was used as the funding agency restricted complete randomization. A total of 511 participants were allocated to Proactive iCare (n=352) or Usual Care (=159). Measures included St George's Respiratory Questionnaire (SGRQ), Modified medical Research Council dyspnea scale (mMRC), BODE (body mass index, obstruction [FEV1], dyspnea [mMRC], and exercise capacity [6MWD]), 6 min-walk, and health care utilization. Participants were followed for 9-months with measures at 3, 6, and 9 months. The Proactive iCare group had clinically important improvement in SGRQ symptoms, activity, and impact at all time points compared with Usual Care. The Proactive iCare group significantly (<0.001) increased in 6 min-walk distance by 40 m, minimal change in mMRC (Mn change = -0.21, p<0.02), and improvement in the BODE (p<0.05). There was a significant (p<0.0001) reduction in annual COPD-related urgent office visits by 76 visits per 100 participants in the Proactive iCare group. In this study linking integrated care with remote monitoring did improve quality of life and some symptoms in individuals with advanced COPD.

Comments

1. Dyspnea as measured by mMRC did improve, but it is not clear that this was clinically meaningful despite the SGRQ symptom subscale improving by 9 points. This raises questions about the mMRC sensitivity to changes in dyspnea.
2. The addition of remote monitoring potentially improved the ability of integrated care to improve care and the lives of COPD patients.
3. The Proactive iCare delivery model is a very intensive care model that may not be able to be applied broadly.

COPD AND DYSPNEA MANAGEMENT WITH NONPHARMACOLOGICAL INTERVENTIONS

van 't Hul AJ, Koolen EH, Antons JC, de Man M, Djamin RS, In 't Veen J, Simons SO, van den Heuvel M, van den Borst B, Spruit MA. **Treatable traits qualifying for nonpharmacological interventions in COPD patients upon first referral to a pulmonologist: the COPD sTRAITosphere**. *ERJ Open Res 2020; 6.*

Summary

This investigation assessed the prevalence of nine treatable traits (TTs) with a focus on nonpharmacological interventions for individuals with COPD first seen by a pulmonologist. A total of 402 COPD patients were in the initial sample, with a second sample of 381 patients with COPD used to validate the findings in the initial sample. The nine TTs included: current smoking status, activity-related dyspnea, frequent exacerbations <12 months, severe fatigue, depressed mood, poor physical capacity, low physical activity, poor nutritional status, and a low level of self-management activation. Logistic regression was used to determine the odds ratio (OR) of having a severe health status impairment for each TT. The results demonstrated that individuals averaged 3.9±2.0 TT and were reasonably independent of each other with 151 unique combinations identified. A significant positive correlation ($r=0.58$; $p<0.001$) was found between the Clinical COPD Questionnaire (CCQ) total score and the number of TTs. The two TTs with the greatest OR of a poor CCQ were severe fatigue (OR: 8.8) and severe activity-related dyspnea (OR: 5.8), which was validated in the second sample. Upon first referral to a pulmonologist, COPD patients have multiple TTs, many of which require nonpharmacological interventions.

Comments

1. This is a unique study that looked at first presentation to specialty care and can help inform the care all providers give.
2. The authors stress that of the 151 TT combinations, 60% were unique combinations and that addressing only one of the TT has a high likelihood of bringing about clinically relevant improvements in quality of life.
3. Results of this research emphasize the need for a comprehensive assessment and personalized clinical management that addresses these TTs. Particularly severe fatigue and activity related dyspnea.

COPD AND DYSPNEA MANAGEMENT WITH PHARMACOLOGICAL INTERVENTIONS

Nici L, Mammen MJ, Charbek E, Alexander PE, Au DH, Boyd CM, Criner GJ, Donaldson GC, Dreher M, Fan VS, Gershon AS, Han MK, Krishnan JA, Martinez FJ, Meek PM, Morgan M, Polkey MI, Puhan MA, Sadatsafavi M, Sin DD, Washko GR, Wedzicha JA, Aaron SD. **Pharmacologic Management of Chronic Obstructive Pulmonary Disease. An Official American Thoracic Society Clinical Practice Guideline**. *Am J Respir Crit Care Med 2020; 201: e56-e69.*

Summary

This guideline provides clinical recommendations for the pharmacologic treatment of chronic obstructive pulmonary disease (COPD) based on an American Thoracic Society task force review of currently available evidence. A synthesis of the evidence was reviewed, rated, and graded, with recommendations formulated using the Grading of Recommendations, Assessment, Development, and Evaluation approach. Given the quality of evidence and balancing the desirable and undesirable effects, the panel made six recommendations. Three specific recommendations for management of COPD and dyspnea are reviewed. First, in patients with COPD who complain of dyspnea or exercise intolerance, a strong recommendation for "long-acting b2-agonist (LABA)/ long-acting muscarinic antagonist (LAMA) combination therapy over LABA or LAMA monotherapy." Second, "a conditional recommendation for the use of triple therapy with inhaled corticosteroids (ICS)/LABA/LAMA over dual therapy with LABA/LAMA in those patients who complain of dyspnea or exercise intolerance with a history of one or more exacerbations in the past year requiring antibiotics or oral steroids or hospitalization"; Last, in individuals with COPD who experience advanced refractory dyspnea despite otherwise optimal therapy, the taskforce "suggests that opioid-based therapy be considered for dyspnea management, within a personalized shared decision-making approach." The guideline concludes with a call for additional research in populations that are underrepresented in clinical trials.

Comments

1. This guideline provides recommendations based on evidence for the appropriate use of mono, dual and triple combination therapy for individuals with COPD who complain of dyspnea or exercise intolerance.
2. The first two guidelines are made with moderate certainty given the currently available evidence.
3. All guidelines must be reviewed regularly to reappraise the current evidence.
4. Additional research is needed focusing on underrepresented groups.

OTHER ARTICLES OF INTEREST

Ferreira DH, Kochovska S, Honson A, Phillips JL, Currow DC. **Two faces of the same coin: a qualitative study of patients' and carers' coexistence with chronic breathlessness associated with chronic obstructive pulmonary disease (COPD)**. *BMC Palliat Care 2020; 19: 64.*

Helvaci A, Gok Metin Z. **The effects of nurse-driven self-management programs on chronic obstructive pulmonary disease: A systematic review and meta-analysis**. *J Adv Nurs 2020; 76: 2849-2871*.

Johnson MJ, Currow DC. **Opioids for breathlessness: a narrative review**. *BMJ Support Palliat Care 2020; 10: 287-295*.

Sun WY, Zhang C, Synn AJ, Nurhussien L, Coull BA, Rice MB. **Change in Inhaler Use, Lung Function, and Oxygenation in Association with Symptoms in COPD**. *Chronic Obstr Pulm Dis 2020; 7: 404-412*.

Schrijver J, Effing TW, Brusse-Keizer M, van der Palen J, van der Valk P, Lenferink A. **Predictors of patient adherence to COPD self-management exacerbation action plans**. *Patient Educ Couns 2021; 104: 163-170*.

TARGETING OBESITY IN COPD

Janet L. Larson, PhD, RN, FAAN
University of Michigan
Health Behavior and Biological Sciences, School of Nursing
Ann Arbor, MI

COMORBIDITIES

Verberne LDM, et al. **Overweight in patients with chronic obstructive pulmonary disease needs more attention: a cross-sectional study in general practice**. *NPJ Prim Care Respir Med. 2017. 27(1): p. 63*.

Summary
This cross-sectional study describes the prevalence rate of comorbid conditions and prescribed medication for obstructive airways disease in overweight and obese subjects with mild to moderate COPD. This was a secondary analysis of the NIVEL Primary Care Database which was constructed from electronic health records of Dutch general practices. The sample for this study included 1,735 with mild COPD and 3,203 with moderate COPD; 31% normal weight, 45% overweight and 24% obese. Overweight and obese subjects had significantly greater odds of diabetes, hypertension and osteoarthritis and obese subjects also had greater odds of heart failure compared to normal weight subjects. Overweight and obese subjects had lower odds of osteoporosis and obese subjects also had lower odds of an anxiety disorder. Being overweight or obese was not associated with sleep disturbance, coronary heart disease, stroke, depression or pneumonia. Overweight and obese subjects were more likely to be prescribed medication for obstructive airway disease compared to normal weight subjects. Overweight or obese subjects with mild to moderate COPD had a higher prevalence of hypertension, osteoarthritis, diabetes and obese people also had a higher prevalence of heart failure. A greater proportion of overweight and obese people required medication to treat airflow obstruction.

Comments

1. This research included a thorough study of multiple comorbid conditions.
2. Results highlight the potential for multiple, complex, comorbid conditions in the early stages of COPD for people who are overweight or obese.
3. The data came from primary care practices, so results can only be generalized to patients in the earlier stages of COPD who are being cared for in the primary care setting.

.

AEROBIC EXERCISE TRAINING

Ercin DOZ, et al. **Interval Versus Continuous Aerobic Exercise Training in Overweight and Obese Patients With Chronic Obstructive Pulmonary Disease: A RANDOMIZED CONTROLLED STUDY**. *J Cardiopulm Rehabil Prev. 2020. 40(4): p. 268-275*.

Summary
The purpose of this RCT was to compare the effects of supervised pulmonary rehabilitation (PR) consisting of either interval-type (IT) or continuous-type (CT) aerobic exercise on a cycle ergometer to home-based PR in overweight and obese patients with mild to moderate COPD. Patients trained for 30 min./session, 3 times/wk. for 8 weeks. IT and CT groups also received the home-based PR program. Sixty-nine patients completed the study, 10 overweight, 51 obese and 8 morbidly obese. Outcomes included a graded cardiopulmonary exercise test, 6 min. walk distance, St. Georges Respiratory Questionnaire Activity Total, and Hospital Anxiety and Disease – Anxiety and Depression. All three groups demonstrated significant improvements on outcomes, the IT and CT groups demonstrated significantly greater improvements than the home-based PR and the improvements observed in the IT and CT groups were not significantly different from each other. Substantial improvements were retained at three months for most outcomes. The Borg dyspnea and leg fatigue during training was lower for the IT group compared to the CT group ($P < .001$). IT and CT plus PR demonstrated similar improvements and they both exceeded the improvement observed for home-based PR. The IT program produced less dyspnea and fatigue.

Comments

1. A comprehensive set of measures were taken to assess the outcomes of IT, CT and home-based PR.
2. Researchers hypothesized that IT would be more tolerable and produce less dyspnea and leg fatigue than CT and this was supported, but additional qualitative data would have provided a more comprehensive evaluation of the two approaches to aerobic training.
3. The observed effects of IT and CT in overweight and obese people with COPD are consistent with findings from other studies of people with COPD.

OUTCOMES AFTER HOSPITALIZATION FOR COPD

DeLapp DA, et al. **Patients with Obesity Have Better Long-Term Outcomes after Hospitalization for COPD Exacerbation**. *COPD. 2020. 17(4): p. 373-377*.

Summary

This study compared short and long-term outcomes of hospitalization for COPD patients with and without obesity. This was a secondary analysis of data from the Rapid Empiric Treatment with Oseltamivir Study, a prospective, randomized unblinded clinical trial. Oseltamivir is used to treat and prevent flu. A total of 301 patients were included, 179 non-obese and 122 obese. BMI was 36 and 24 for patients with and without obesity respectively. Obese patients had higher rates of comorbidities. There were no significant differences between the groups for median time to clinical stability (2 vs 3 days) and median length of stay (3.5 vs 4 days). Mortality for obese patients was 1% at discharge, 3% at 30 days, 7% at six months and 8% at one year. Mortality for non-obese patients was <1% at discharge, 3% at 30 days, 18% at six months and 28% at one year. Obese patients had reduced odds of dying at one year (P=.004) and at six months (P=.031). The one-year mortality was still significantly lower after removing patients with BMI <21 (P=.031). Obesity was associated with decreased long-term mortality.

Comments

1. Severity of illness was similar for both groups and less than 10% of patients in each group required admission to the intensive care unit.
2. Analysis controlled for demographic data, multiple comorbid conditions and whether or not the subject received Oseltamivir, thereby strengthening confidence in the results.
3. Strengths of the study included the use of clinical data collected prospectively.
4. Limitations included the diagnosis of COPD was not based on spirometry and the sample size was too small to conduct subgroup analysis.

BODY IMAGE

Freire A, et al. **Body image in COPD and its relation with physical activity levels, lung function and body composition: An observational study.** *Clin Respir J. 2020. 14(12): p. 1182-1190*.

Summary

Alterations in body image can be associated with feelings of self-worth and lead to compromise in functional abilities, and this could be a bigger problem in people with COPD because of the multiple health issues associated with COPD. This observational study assessed body image and self-reported physical activity in people with and without COPD. Ninety-two subjects were studied, 44 (28 males) with COPD and 48 (13 males) without COPD. The two groups were similar with respect to age, weight, BMI and body composition (bioelectrical impedance analysis). Fifty-seven percent of COPD subjects and 72% of control subjects were overweight or obese. Both groups showed similar levels of dissatisfaction with body image perception (silhouette scale) and both desired a lower BMI and weight. Obese subjects presented significantly higher dissatisfaction with body image then eutrophic subjects in both groups. Measures of body composition (body fat mass, % body fat and visceral fat area) were positively associated with greater body dissatisfaction (P<.001) for both groups. Measures of body dissatisfaction were not correlated with spirometry or with self-reported physical activity for people with COPD. People with and without COPD reported similar levels of dissatisfaction with body image and dissatisfaction with body image was not related to self-reported physical activity.

Comments

1. This is one of the first studies to examine body image in people with COPD.
2. The hypothesized link between body image and physical activity was based on evidence that older people exercise for appearance-related reasons, an interesting finding from the literature that may not be generalizable.
3. Stronger measures of physical activity and body composition are needed to reduce measurement error and identify a relationship if it exists.
4. This is a reminder that obese people with COPD face some of the same issues faced by obese people without COPD.

HYPOXIA AND THE TRIALS AND TRIBULATIONS OF USING SUPPLEMENTAL OXYGEN IN COPD

Susan S. Jacobs, RN, MS
Stanford University
Pulmonary, Allergy, and Critical Care Medicine
Stanford, CA

CLINICAL PRACTICE GUIDELINES FOR HOME OXYGEN THERAPY

Jacobs SS, Krishnan JA, Lederer DL, Ghazipura M, et al. **Home Oxygen Therapy for Adults with Chronic Lung Disease: An Official American Thoracic Society Clinical Practice Guideline**. *Am J Respir Crit Care Med 2020; 202: 1345-1359*

Summary

A multidisciplinary panel addressed six clinical practice questions related to the prescription of long term oxygen therapy for patients with interstitial lung disease (ILD) and COPD. A systematic literature review used the Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach to formulate clinical guidance. Available evidence varied in quality and availability and limited the strength of some recommendations. The panel made a strong recommendation for long-term oxygen use in patients with COPD or ILD with severe chronic resting hypoxemia, a conditional recommendation against long-term oxygen use in patients with COPD with moderate chronic resting hypoxemia, a conditional recommendation for ambulatory oxygen use in patients with COPD or ILD with severe exertional hypoxemia, a conditional recommendation for liquid oxygen use in patients who are mobile outside the home and require >3 L/min of continuous-flow oxygen during exertion, and a recommendation that patients and their caregivers receive education on oxygen equipment and safety (best practice statement). This article provides the existing evidence for current use of home oxygen in patients with COPD and ILD, and highlights needs of future research, particularly around ambulatory oxygen use.

Comment

1. This article highlights the challenges in performing an evidence-based review when the available studies often used different definitions and thresholds for resting and exertional, and mild, moderate, and severe hypoxemia, as well as different durations, comparators, and blinding techniques.
2. The evidence for oxygen use for at least 15 hrs./day to decrease mortality in patients with COPD is strong, but could use additional data to identify risk factors, such as markers of pulmonary hypertension, that might support earlier oxygen initiation to improve mortality, activity level or quality of life.
3. We lack evidence to recommend LTOT for patients with COPD who have resting room air saturations from 89%-93%; only one study addressed this question and included a mixed sample of patients with resting hypoxemia plus those with exertion-only hypoxemia, with no demonstrated benefit in time to death.
4. The practice of prescribing ambulatory oxygen for patients with severe exertional hypoxemia (SpO2 <89%) is common in the United States, but there is a need to gather higher quality evidence based on daily life activity instead of lab-based data (six minute walk, cycle ergometry) to more realistically document patient benefit in quality of life, dyspnea, fatigue, daily activity level, and survival.
5. The recommendation for liquid oxygen for high-flow active patients, along with a best practice statement to provide education and training to patients and caregivers, is critical to support ongoing advocacy and lobbying efforts to improve oxygen services for patients and their caregivers.

HIGH FLOW OXYGEN FOR EXERCISE TRAINING

Vitacca M, Paneroni M, Zampogna E, Visca D, Carlucci A, Cirio S, Banfi P, Pappacoda G, Trianni L, Brogneri A, Belli S, Paracchini E, Aliani M, Spinelli V, Gigliotti F, Lanini B, Lazzeri M, Clini EM, Malovini A, Ambrosino N. **High-Flow Oxygen Therapy During Exercise Training in Patients With Chronic Obstructive Pulmonary Disease and Chronic Hypoxemia: A Multicenter Randomized Controlled Trial**. *Physical Therapy 2020;100:1249-59.*

Summary

This randomized study tested the use of high flow oxygen therapy (HFOT) in patients with COPD who were already receiving long term oxygen therapy. HFOT or V-masks at the same FiO2 were used during cycle ergometry exercise training in 8 different rehabilitation hospitals in Italy. 171 participants with chronic hypoxemia underwent twenty 30 minute supervised sessions (5/week) with half of the sample using HFOT and the other half usual oxygen therapy via a venture mask (V-mask). Outcome measures were pre and post training endurance time, 6 minute walk distance (6MWD), respiratory and limb muscle strength, ABGs, dyspnea, (BORG and Barthel Index), health status (COPD Assessment Test), HRQOL (Mugeri Respiratory Failure questionnaire), and patient satisfaction. While improvements in cycle ergometry endurance time were not statistically significant between groups, the

6MWD improved by a mean difference of 17m between groups with 69% of the HFOT group reaching the MCID compared to 51% in the V-mask group (P=.039). The authors concluded that the use of HFOT for exercise training was not more effective than a V-mask in terms of improving their primary outcome of endurance time, but that use of HFOT during training was effective in improving 6MWD.

Comments

1. The use of HFOT is a novel adjunct to exercise training that generates positive pressure in the upper airways, decreases work of breathing and respiratory muscle load, increases expiratory time and allows for more complete lung emptying.
2. The fact that the use of HFOT during lab-based training resulted in a significant improvement in distance walked in 6 minutes may be more transferrable to participants' daily lives, but this was not assessed.
3. The addition of wearable actigraphy or some type of objective activity monitoring might more importantly document if these gains in exercise capacity translate to increased activity levels in daily life.
4. Both groups demonstrated improvements in exercise capacity, dyspnea and HRQL, reaffirming the benefits of exercise training for patients with COPD, despite the modality of oxygen used.
5. Participants were not blinded to the oxygen modality which may have affected results.

NOCTURNAL OXYGEN USE IN PATIENTS WITH COPD

Lacasse Y, Series F, Corbeil F, Baltzan M, Paradis B, Simao P, Fernandez AA, Esteban C, Guimaraes M, Bourbeau J, Aaron SD, Bernard S, Maltais F, INOX Trial Group. **Randomized Trial of Nocturnal Oxygen in Chronic Obstructive Pulmonary Disease**. *NEJM 2020; 383:1129-38*.

Summary

This double-blind, placebo-controlled, randomized trial investigated benefits of the provision of nocturnal oxygen for 3-4 years to patients with COPD who did not otherwise require supplemental oxygen or qualify for long-term oxygen. Patients with COPD who desaturated below 90% for >30% of the time of recorded oximetry during sleep were randomly assigned 1:1 to receive either blinded oxygen or ambient air from a stationary concentrator. The study's primary composite outcome was death from any cause or a requirement for long-term oxygen therapy as defined in the Nocturnal Oxygen Therapy Trial (NOTT); secondary outcomes were rates of exacerbation and hospitalization. The trial's enrollment goal was not met and the trial was stopped early after 243 participants were randomized out of the planned 600. At the time of study end, there was no significant difference in primary or secondary outcomes between groups: 39% of the 124 patients in the treatment group, and 42% of 119 patients in the placebo group, met the NOTT-defined endpoints of either needing long-term oxygen therapy or death. Lack of adherence to oxygen therapy further limited results.

Comments

1. This well designed, rigorous study highlights the pervasive challenge of recruitment, retention, and adherence in long-term treatment trials.
2. The authors meta-analyzed their intention-to-treat population with two other published trials investigating the benefit of nocturnal oxygen in patients with COPD and isolated nocturnal oxygen use and found no survival benefit, or benefit using a composite outcome of death or progression to LTOT.
3. Results, although underpowered, may reflect that patients were excluded who had sleep apnea, and other comorbidities including hallmarks of potentially needing LTOT such as any evidence of cor pulmonale.
4. The authors point out that oxygen is the most expensive treatment in the care of COPD patients, plus others have documented the burden it places on patients and families, both factors supporting the critical need for studies such as this.
5. Identifying the barriers to adherence in participants in this study, and others using oxygen as an intervention, would provide information to develop tools to improve adherence when developing future study designs.

TELEMONITORING OF HOME OXYGEN THERAPY

Burioka, Naoto. **Telemonitoring of Home Oxygen Therapy: A Review of the State of the Art and Introduction of a New Cloud-based System**. *Yonago Acta Medica 2020;63:239-245.*

Summary

This article reviewed available evidence for the timely topic of telemonitoring of home oxygen therapy (HOT), including a review of their proposed cloud-based system for use in Japan, where monitoring HOT is currently reimbursed. The authors reviewed 5 studies that specifically investigated the use of home oxygen telemonitoring; 2 were randomized controlled trials (RCT), 3 were non-RCTs. The review also cited previous publications that have documented HRQOL benefits of telemonitoring for patients with COPD (not all on oxygen) including home spirometry, SpO2 levels, oxygen concentrator usage, and pulse rates. In contrast, other studies reviewed did not find a benefit in quality of life for COPD patients. Studies varied in whether or not they included an intervention associated with the monitoring, as well as in the biologic variables that were tracked. The available data on telemonitoring to prevent acute exacerbations and healthcare utilization was inconsistent. The authors present their cloud-based system that allows clinicians to use their own computers to sign on

to a server to receive ongoing information on hours of oxygen concentrator use, pulse rates, SpO2. Their system includes the development of an internet-friendly oxygen concentrator that stores clinical data on a dedicated server. This model of HOT telemonitoring allows remote clinician review of concentrator use/adherence, flow rates used, and saturations at specific flow rates.

Comments

1. This is a timely topic as the need for remote monitoring options has dramatically increased over the past year.
2. The author's model allows for closer monitoring but, as stated, does not replace instruction and intervention, for example on using different flow rates for rest, exertion, and sleep.
3. Their model does not continuously monitor patients with alerts for example with worsening; the clinician needs to sign on to review the data at intervals.
4. There is clearly a need for this type of remote assessment allowing earlier interventions and also addressing barriers to adherence.
5. Remote monitoring provides an excellent opportunity for education and reinforcement in a real-time manner, instead of waiting for in-person visits.

INTERVENTIONS TO PROMOTE PHYSICAL ACTIVITY IN PATIENTS WITH COPD

Burge AT, Cox NS Abramson MJ, Holland AE. **Interventions for promoting physical activity in people with chronic obstructive pulmonary disease (COPD)**. *Cochrane Database of Systematic Reviews 2020;4:1-498*.

Summary

This Cochrane review of 76 studies addressed intervention success for improving low activity levels in patients with COPD. To assess effectiveness of various interventions, the authors performed a review of studies that tested interventions that objectively increased physical activity levels in this population. Only randomized controlled trials of interventions were included. Study treatments included pulmonary rehabilitation/exercise training, physical activity counselling, self-management, pharmacological, nutritional supplementation, supplemental oxygen, and other. Their results showed that some strategies including exercise training, physical activity counseling, and COPD medications, improved physical activity; very few followed participants long-term to confirm ongoing effectiveness. Other conclusions were difficult to make due to small sample sizes and unclear methods. Only three studies were included that used oxygen as the intervention; two that investigated use of an oxygen vs sham device in pulmonary rehabilitation setting, and one that compared a lightweight device to an E-cylinder. No studies evaluated use of oxygen vs no oxygen. There was no significant benefit on physical activity of supplemental oxygen vs air in the two studies done in a pulmonary rehabilitation setting.

Comments

1. This review points out the difficulty in objectively quantifying short and long-term increases in physical activity despite studies investigating a variety of interventions.
2. The largest gains were documented in longer-term (6 months) studies that combined interventions of physical activity counseling with pulmonary rehabilitation.
3. The authors recommend that future research include long-term follow up, and a more unified agreement on physical activity variables (i.e. step counts) to be tracked, along with use of validated devices, perhaps in a registry format to allow design consistency and the combination of results.
4. In this review, the singular role of oxygen to improve physical activity levels was not supported by the 3 studies included.
5. Increasing physical activity is complex and involves multiple factors including motivation, readiness, and clinical compliance with COPD care guidelines.

OTHER ARTICLES OF INTEREST

Leung RWM, Alison JA, Jenkins SC, Holland AE, Hill K, Morris NR, Spencer LM, Hill CJ, Lee AL, Seale HE, Cecins NM, McDonald CF, McKeough ZJ. **Use of supplemental oxygen during exercise testing and training for people with chronic obstructive pulmonary disease: a survey of Australian pulmonary rehabilitation programs**. *Braz J Phys Ther 2021;25:97-102*

Tan AM, Vines DL, Krishnan JA, Prieto-Centurion V, Kallstrom TJ. **Home Oxygen Evaluation by Respiratory Therapists in Patients Hospitalized for COPD Exacerbations: The RIsOTTO Study.** *Respir Care 2021;66:183-90.*

Spece LJ, Epler EM, Duan K, Donovan LM, Griffith MF, LaBedz S, Thakur N, Wiener RS, Krishnan JA, Au DA, Feemster LC. **Reassessment of Home Oxygen Prescription after Hospitalization for Chronic Obstructive Pulmonary Disease. A Potential Target for Deimplementation**. *Ann Am Thorac Soc 2021;18:426-32*.

CONSEQUENCES AND CLINICAL MANIFESTATIONS OF DE-CONDITIONING IN COPD

Eileen G. Collins, PhD, RN, ATSF
University of Illinois at Chicago
Biobehavioral Nursing Science
Chicago, IL

SEX DIFFERENCES IN MUSCLE DYSFUNCTION

Sharanya A, Ciano M, Withana S, Kemp PR, Polkey MI, Sathyapala A. **Sex differences in COPD-related quadriceps muscle dysfunction and fibre abnormalities**. *Chronic Respiratory Disease 2019; 16:1-13*

Summary

Quadriceps muscle dysfunction and fibre abnormalities were studied in 76 males and 38 females with COPD. Controlling for normal sex differences, females with COPD had lower quadriceps muscle strength and peak workload on a maximal incremental cycle ergometry protocol compared to males with COPD. Females with COPD had smaller type II fibre cross-sectional area compared to males with COPD. Females also had higher levels of pro-inflammatory cytokines but not lower levels of physical activity or arterial oxygenation when compared to males with COPD.

Comments

1. Data suggest that females with COPD have a greater prevalence of muscle wasting and weakness when compared to males with COPD.

CHANGES IN LOWER LIMB MUSCLE FUNCTION FOLLOWING EXERCISE INTERVENTIONS

DeBrandt J, Spruit MA, Hansen D, Franssen FME, Derave W, Sillen MJH, Burtin C. **Changes in lower limb muscle function and muscle mass following exercise-based interventions in patients with chronic obstructive pulmonary disease: A review of the English-language literature**. *Chron Respir Dis. 2018 May; 15(2): 182–219.*

Summary

Exercise-based training has the potential to improve muscle function and mass. Seventy studies that implemented an exercise-based intervention and reported muscle strength, endurance or mass in clinically stable patients with COPD were reviewed. Interventions such as aerobic and/or resistance training, high-intensity interval training, electrical or magnetic muscle stimulation whole-body vibration, and water-based training were investigated. Muscle strength increased in 78%, muscle endurance in 92%, and muscle mass in 88% of the cases where that outcome was measured. There was great heterogeneity in the interventions and outcome measures used.

Comments

1. Most exercise trials showed improvements in muscle strength, endurance or mass.
2. It still remains unknown which specific interventions are best for which specific groups of patients.

MUSCLE DYSFUNCTION AND SMOKING

Fonseca J, Nellessen AG, Pitta F. **Muscle dysfunction in smokers and patients with mild COPD: A systematic review**. *Journal of Cardiopulmonary Rehabilitation and Prevention 2019; 39(4): 241-252*.

Summary

The literature concerning muscle function and the association between smoking and muscle function in smokers and patients with mild chronic obstructive pulmonary disease (COPD) were reviewed. Eighteen studies were identified. Results were mixed. Some studies found lower muscle strength in smokers compared to non-smokers. When comparing patients with COPD classified as GOLD 1 with smokers, patients with COPD showed lower muscle strength. Two studies found no differences in muscle cross-sectional area between smokers and non-smoking control patients. Preliminary evidence shows that patients with COPD classified as GOLD 1 had lower muscle cross-sectional area when compared with smokers.

Comments

1. There is preliminary evidence that patients with COPD classified as GOLD 1 has lower muscle cross-sectional area that healthy smokers.

INTERVAL EXERCISE VS CONSTANT LOAD EXERCISE

Louvaris Z, Chynkiamis N, Spetsioti S, Asimakos A, Zakynthinos S, Wagner P, Vogiatzis I. **Greater exercise tolerance in COPD during acute interval, compared to equivalent constant-load, cycle exercise: physiological mechanisms**. *J Physiol 2020 Sep: 498(17):3613-3629*.

Summary

Ventilation, cardiac output, dynamic hyperinflation, local muscle oxygenation, blood lactate and time to exhaustion during interval exercise (30 s at 100% peak work rate alternating with 30 s at 50%) and constant-load exercise (75% peak work rate) was measured in 12 patients with COPD. Exercise time was longer and dynamic hyperinflation was less with interval training versus constant load training. Level of exhaustion was similar in the two exercise modalities. At exhaustion in both protocols, the vastus lateralis and intercostal muscle oxygen saturation were higher during interval exercise than constant-load exercise. Results suggest that exercise tolerance with COPD is limited by dynamic hyperinflation and cyclically lower effort intervals in interval exercise help to preserve muscle oxygenation and reduce metabolic acidosis compared to constant-load exercise at the same average work rate.

Comments

1. Interval training may be better tolerated than constant-load training in patients with COPD.
2. These physiologic findings should be compared in a future randomized trial using these different modalities of training.

RESISTANCE EXERCISE

Nyberg A, Martin M, Saey D, Milad N, Patoine D, Morissette MC, Auger D, Stal P, Maltais F. **Effects of low-load/high-repetition resistance training on exercise capacity, health status, and limb muscle adaptation in patients with severe COPD: A randomized controlled trial.** *Chest. 2020 Dec 13;S0012-3692(20)35357-5. Online ahead of print*.

Summary

The purpose of this study was to test if single-limb low-load/high repetition resistance training (LLHR-RT) compared to two-limb LLHR-RT on exercise capacity, health status, and muscle function. Thirty-three patients with moderate-severe COPD were randomized to 8 weeks of single-or two-limb LLHR-RT. Single-limb LLHR-RT did not further enhance 6MWD when compared to two-limb LLHR-RT. However, 73% in the single-limb group exceeded the known minimal clinically important difference of 30 m compared with 25% in the two-limb group (p=0.02). Health status and muscle function improved to a similar extent in both groups. During training, single limb LLHR-RT resulted in less dyspnea during training compared to dyspnea in the two-limb training group. In conclusion, single-limb LLHR-RT did not further increase mean 6MWD compared to two-limb LLHR-RT, but it reduced exertional dyspnea and enabled more people to reach clinically relevant improvements in 6MWD.

Comments

1. In patients with moderate-severe COPD, single-limb LLHR-RT may be beneficial.

OXYGEN UPDATE AND AEROBIC EXERCISE TRAINING IN COPD

Ward TJC, Plumptre CD, Dolmage TE, Jones AV, Trethewey R, Divall P, Singh SJ, Lindley MR, Steiner MC, Evans RA. **Change in VO2 peak in response to aerobic exercise training and the relationship with exercise prescription in people with COPD: A systematic review and meta-analysis**. *Chest. 2020 Jul; 158(1): 131-144*.

Summary

The purpose of this study was to investigate the effect of aerobic training and exercise prescription on VO2peak in COPD. A total of 112 studies were included in 21 controlled trials. 13 trials were randomized and 91 were uncontrolled studies. Meta-analysis found a moderate positive change in VO2peak with intervention. The change in VO2 peak was positively associated with target duration of the exercise session. The change in VO2peak was greater for programs >12 weeks compared with those that were 6-12 weeks long. However, prescribed exercise intensity, training modality, and mode did not affect VO2peak. Cohorts with more severe airflow obstruction exhibited smaller improvements in VO2peak.

Comments

1. People with COPD achieved moderate improvements in VO2peak through supervised aerobic training.
2. Programs with greater total exercise volume, including duration of exercise session and program duration, are more effective.

OTHER ARTICLES OF INTEREST

Donaldson AV, Maddocks M, Martolini D, Polkey MI, Man WD-C. **Muscle function in COPD: a complex interplay**. *International Journal of COPD. 2012; 7:523-535*.

O'Donnell DE, James MD, Milne KM, Neder JA. **The pathophysiology of dyspnea and exercise intolerance in chronic obstructive pulmonary disease**. *Clin Chest Med. 2019; 40(2):343-366.*

Pleguezuelos E, Esquinas C, Moreno E, Guirao L, Ortiz J, Garcia-Alsina J, Meri A, Miravitlles M. **Muscular dysfunction in COPD: Systemic effect or deconditioning?** *Lung. 2016; 194:249-257*

Casaburi R. **Impacting patient-centered outcomes in COPD: deconditioning**. *Eur Respir Rev. 2006; 15: 99, 42-26.*

ATS 2021

conference.thoracic.org