Summer 8-12-2021

Sleep Disordered Breathing Screening in Hospitalized Patients with COPD Using Overnight Oximetry and End-Tidal Carbon Dioxide Monitoring: A Feasibility Study

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Summer Undergraduate Research Program

Introduction

- 78% of chronic obstructive pulmonary disease (COPD) patients report some form of sleep disturbance (1).
- Patients with moderate to severe COPD often fall into two categories:
    - High body mass index and right-sided heart failure (2)
    - Increased risk for obstructive sleep apnea (OSA)
    - Low body mass index and lung hyperinflation (3)
    - Retention of carbon dioxide, resulting in risk for central sleep apnea (CSA) and hypercapnic respiratory failure
- Prevalence of undiagnosed OSA and/or CSA has been found to be as high as 65% in patients with COPD referred to pulmonary rehabilitation, who often experience severe debility (4).
    - No standardized process of screening or identification
- Delayed diagnosis and treatment of SDB causes systemic inflammation, diminished immune function, impaired cognition, and physical inactivity which leads to:
    - Decreased functional status
    - Increased daytime fatigue
    - Overall decreased quality of life (5)
- **Feasibility testing of physiologic measures is needed to promote more accurate screening of sleep-disordered breathing in patients with COPD**

Purpose

- This descriptive study will test the feasibility of completing obstructive sleep apnea (OSA) and central sleep apnea screening in hospitalized patients with COPD who have not been diagnosed with a sleep-related breathing disorder.
- **Aim 1:** Evaluate the feasibility of: a) enrollment (recruitment, efficiency, attrition, problems), b) data collection (technology transfer of data, instruments, time required, missing data), and c) clinical data collection from electronic medical record (inpatient and private practice settings).

Theoretical Framework

The model shown in Figure 1 was influenced by the Chronic Disease Self-Management theory by Dr. Kate Lorig (6). The first author adapted the theory to support the study design, and to encouraged patients with COPD to:

1. Explore the consequences of their illness using **emotional, spiritual, and social coping mechanisms**, instead of solely focusing on the physiological aspects.
2. Engage in **problem solving, decision making, and self-efficacy** instead of focusing on prescription and adherence.
3. Establish **partnership with their health professionals**, that include open communication, self-advocacy, and collaboration in medical management.

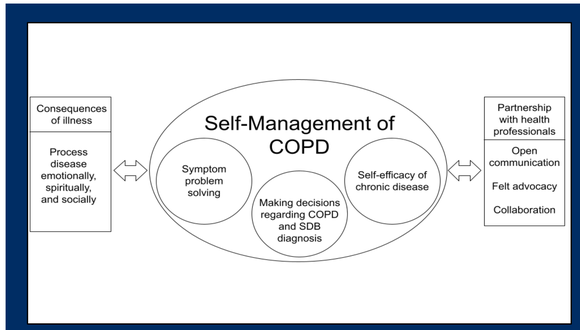
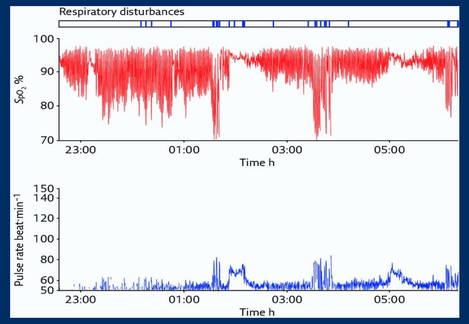
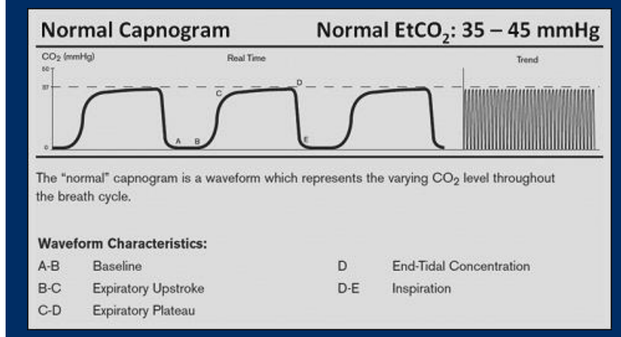


Figure 1: Self-Management of COPD model adapted from Lorig's Chronic Disease Self-Management theory (6)

Abnormal overnight oximetry testing





Normal end-tidal C02 monitoring

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Reference list available upon request

Methods

Sample and Setting: Patients (N=10) recruited for Bryan Health in Lincoln, NE and followed post-discharge at Nebraska Pulmonary Specialties, LLC.
Measurements: a) demographic variables, b) STOP Bang, c) overnight oximetry, d) end-tidal carbon dioxide, e) sleep testing data, f) forced expiratory volume, g) apnea-hypopnea index, h) acid-base balance i) PROMIS-29, j) MoCA-Blind, k) EuroQoL (EQ-5D)
Procedures:

- Patients hospitalized with COPD will be asked a respiratory therapist staff if they are willing to discuss the study with the primary investigator.
- Upon meeting inclusion/exclusion criteria and consent, participants will complete self-reported measures prior to overnight monitoring.
- 1-2 days before discharge, respiratory therapists will assist the patient in completing overnight oximetry and end-tidal carbon dioxide monitoring. Forced expiratory volume in one second (FEV1) will also be completed.
- Screening results will be provided to health-care provider Nebraska Pulmonary Specialties, LLC. at hospital follow up
- Sleep study data will be collected (the type of testing, time to complete testing, apnea-hypopnea index, oxygen desaturation index, and diagnosis) if ordered.

Analysis: Descriptive statistics will be completed to analyze the feasibility and completeness of data collected.

Results

Participant recruitment and enrollment procedures are underway. Study results are pending.

Impact

- This study promotes self-management of COPD by testing physiologic screening methods of SDB to encourage timely diagnosis and treatment.
- It is hypothesized that expediting the diagnosis of SDB will promote treatment adherence and increase individuals' functional status and quality of life.
- The long-term effect of SDB on lung function through measuring forced expiratory volume still needs to be studied but is an important mediatory variable to the self-management process.

Acknowledgements

- This study is funded by Center for Patient, Family, and Community Engagement in Chronic Care Management (CENTRIC) through Just in Time Accelerator (JITA) Funding
- UNMC IRB #266-20-EP
- We would like to acknowledge the resource support provided by Bryan Health and Nebraska Pulmonary Specialties of Lincoln, NE. We are grateful for their support on this research project