Using Video and Mobile Applications to Manage Distress Following Acute COPD Exacerbation with Respiratory Failure: A Case Report

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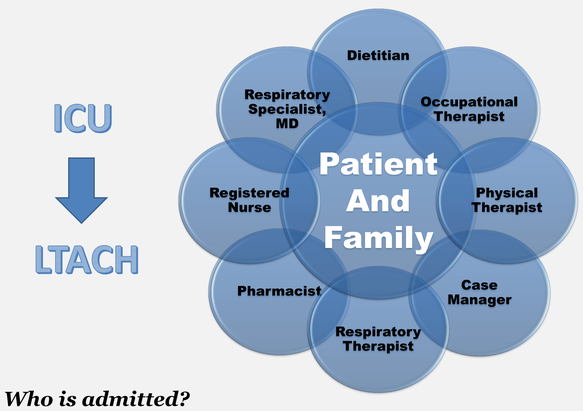
Background

- Chronic lower respiratory diseases, mainly chronic obstructive pulmonary disorder (COPD), represent a significant economic burden to the healthcare system and are among the top three leading causes of death in the United States.[1]
- An acute exacerbation of chronic pulmonary disorder (AECOPD) is a worsening of the respiratory symptoms associated with COPD including dyspnea, increased sputum production, cough, and airway obstruction.[2]
- Frequent AECOPD influences psychological status and may worsen comorbid anxiety, depression, and increase distress levels. As a result, motivation, mood, and participation in therapy may also be affected. [3]
- Most exacerbations may be treated effectively on an outpatient basis. A fraction of episodes escalate in severity, resulting in respiratory failure and intensive care or specialty hospital admission.[4]

Purpose

- The purpose of this case report is to describe the use of video and mobile applications to promote distress relief during the rehabilitation of a patient with respiratory failure secondary to AECOPD in an LTACH setting.

Long-Term Acute Care Hospital



- ***Who is admitted?***
  Complex patients who require on-going hospital level care and cannot yet safely be discharged to an inpatient rehabilitation facility, skilled nursing facility, or home.
- Inpatient setting, average length of stay is 25 days[5]
- 24-hour nursing and respiratory therapist coverage
- Weekly interdisciplinary team meetings
- Daily Physician visits
- Rapid response team
- Typically specialized in respiratory and wound care
  Mechanical vent weaning, complex wounds and burns, complex medical conditions, multiple IV medications, continuous telemetry

ICU = intensive critical care unit

Case

Demographics:
53 year-old Caucasian female
Co-morbidities:
COPD, hypertension, major depressive disorder, Diabetes Type 2, deconditioning, anxiety, chronic low back pain, chronic steroid use

Increased breathlessness, dyspnea

Worsening respiratory symptoms

Feeling of suffocation

Fear associated with breathlessness

Depression, anxiety

Admission to ICU
↓
Panic and distress; Rapid, shallow breathing
↓
Respiratory failure
↓
Transfer to LTACH

History of AECOPD (3-4 annually)

History smoking

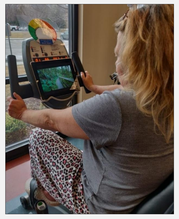
Influenza

Progression of COPD severity

Avoidance of Activities that cause breathlessness

DEC strength
DEC aerobic endurance
DEC functional mobility
INC respiratory rate
INC distress
INC use of accessory respiratory musculature

DEC = decreased, INC = increased



Breathing Re-training
Diaphragmatic Breathing

Functional Resistance Training
Sit to stands

Cardiovascular endurance
Recumbent bike, ambulation

Self-Management Techniques
Pacing, energy conservation vaccinations, hand washing assisted device training: 4ww COPD resources[6]

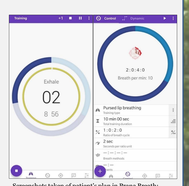
4WW=four wheeled walker

Independent Breathing Practice

"Prana Breath: Calm & Mediation" Mobile Application[7]

Customization included duration, ratio of breathing cycle, and option to set daily reminders

Instruction to avoid use of accessory breathing musculature



Screenshots taken of patient's plan in Prana Breath: Calms & Meditation Mobile Application

Supervised Therapy Sessions

Virtual nature walk video[8] played on I-pad during selected intervention

Instruction to visualize calming scene when use of I-pad wasn't practical

Vitals taken during treatment

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Pre-Admit Report
"Patient was doing extremely well after admit and was saturating well on 1-2 liters nasal cannula after receiving BiPAP PRN. She was planning on discharging back to home yesterday however she greatly decompensated. She became extremely anxious…"

DAY 1 - Admission
Physician intake
Evaluations ordered
• Physical Therapy
• Occupation Therapy
• Respiratory Therapy
• Nutrition
• Pharmacy
• Case Management

DAY 2 PT Evaluation
30 sec sit to stand test
Cleared to ambulate with staff supervision
Instruction in breathing technique
Introduction of Prana breathing application

Day 7 PT Intervention
NCCN Thermometer
6 MWT
Symptom-limited endurance, no I-pad video
Cleared to ambulate in-room independently
Patient Report:
"I always feel short of breath and am nervous about going out because of it"

Day 8 PT Intervention
Resistance Training
Cardiorespiratory endurance with I-pad video supplement
Patient Report:
"I really like practicing my breathing

Day 10 PT Intervention
Resistance training
Cardiorespiratory endurance with I-pad video supplement
Patient report:
"I did more than I thought I could"

Day 13 -Discharge to home PT intervention
NCCN Thermometer
6 MWT
-30 second sit-to-stand test
Symptom-limited endurance, with video supplement
Patient report: "I'm excited to go home. I want to keep using the phone app."

BiPAP = bilevel positive airway pressure

Outcomes

	Measure	Evaluation	Discharge
Cardio-Respiratory Endurance	6 minute walk test	190 feet with 4WW	490 feet with 4WW
	Symptom-limited endurance test	5 minutes and 25 seconds actively biking over 10 minute duration	8 minutes and 12 seconds actively biking over 10 minute duration
Distress	NCCN distress thermometer NCCN = national comprehensive cancer network	9/10 total distress, 17/36 distressing factors	4/10 total distress, 14/36 distressing factors
Strength	30 second sit to stand	7 without hands, 9 with use of hands	8 without hands, 10 with use of hands
Adherence	Self-reported	85% adherence to independent plan 100% adherence to supervised therapy sessions	
Length of Stay	Total days admitted	13 days at LTACH, shorter than average length of stay of 25 days	
Satisfaction	Report to therapist	"less fearful of community outings" "planned to continue use of mobile application" "enjoyed therapy"	

Conclusion

- Objective outcome measures improved considerably in the areas of functional aerobic endurance and distress, though the length of time for symptom recovery to baseline was slightly higher than the median for her diagnosis. This patient also verbally expressed enjoyment and satisfaction with the phone application and online video supplements, reporting that they increased her motivation for therapy.
- Online videos and mobile applications may present an accessible and cost-effective way to increase adherence to physical therapy plan of care, manage distress, and improve outcome in an inpatient setting.
- Further research should explore how this intervention strategy compares to traditional LTACH intervention, increase the number of participants, and identify if outcomes are maintained following discharge.

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