A Novel Management of Breathlessness
Usefulness of a Handheld Fan

YU DTW, Chan ACM, Poon MWY, Lau PMY

Physiotherapy Departments
Kowloon Central Cluster

Kowloon Central Cluster
Hospital Authority
Prevalence of Ca Lung and COPD

New Ca Lung cases

COPD Total no.
Death & Discharge

Hong Kong Cancer Registry

Hospital Authority Annual Report 2012-13
Breathlessness / Dyspnoea

“a subjective feeling of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity”

ATS Consensus statement 1999

94% patients with advanced COPD
90% patients with end-stage Ca Lung
Multi-dimensional Model for Dyspnoea

Dyspnoea

Sensory

Affective
Cerebral Processing of Dyspnoea

Evans et al. J Neurophysiol 2002;88:1500-1511
Affective Dimension of Dyspnoea

Dyspnoea

Activate

Anterior insular

Affective changes

Emotion

Behavior outcomes

Seek treatment

Alter lifestyle to avoid dyspnoea

Avoid physical activity

Physical deconditioning

Excess lactate accumulation / CO2 production

Lansing et al. Respir Physiol Neurobio 2009;167:53-60
Management of Dyspnoea

- Pharmacological
  - Opioids
  - Nebulized furosemide
  - Anxiolytics
  - Antidepressants
  - Phenothiazines
  - Indomethacin
  - Inhaled topical anesthetics
  - Nitrous oxide
  - Sodium bicarbonate

- Non-pharmacological
  - Non-invasive ventilation
  - Stress management and relaxation
  - Physiotherapy interventions
Aerobic training
Breathing retraining
Acupuncture
Physiotherapy
Complementary & Alternative Medicine
Insipratory mm training
Aerobic training
Bronchial hygiene
Breathing retraining
Acu-TENS
Objective of the Study

• To evaluate the effectiveness of the Handheld Fan (HHF) in addition to Physiotherapy interventions in managing breathlessness
Inclusion and Exclusion Criteria

**Inclusion Criteria**

- Patients with advanced malignant disease (1° or 2° lung cancer)
- Patient with Stage III/IV COPD (GOLD Classification)
- Modified Medical Research Council (MMRC) >3

**Exclusion Criteria**

- Unconsciousness or semi-consciousness
- Used the HHF previously for SOB management
- Trigeminal nerve disease
- Using oxygen mask or full face mask in BiPAP for ventilation
Randomized, controlled, crossover study

Eligible candidates (n=24)

Randomized

Handheld fan to FACE for 5 min

Analysis

Handheld fan to KNEE CAP for 5 min

Analysis

After 30 minutes as wash-out

Handheld fan to KNEE CAP for 5 min

Analysis

Handheld fan to FACE for 5 min

Analysis
- Subjects put in a relaxed position
- Perform breathing exercises

**Experimental**

**Control**

- Handheld Fan to Face
- Handheld Fan to Knee Cap

*Comfortable distance: 15 cm*
Timeline for Analysis

HHF intervention for 5 minutes

Before Intervention
- Dyspnoeic level (VAS)
- Respiratory rate (RR)
- Oxygen saturation (SpO₂)

Immediate after Intervention
- Dyspnoeic level (VAS)
- Respiratory rate (RR)
- Oxygen saturation (SpO₂)

20-minute after Intervention
- Dyspnoeic level (VAS)
- Respiratory rate (RR)
- Oxygen saturation (SpO₂)
Outcome Measures

• Dyspnoeic level using Visual Analogue Scale (VAS)

![VAS Scale Image]

* A decrease of 1 cm in the VAS was considered clinically effective

Booth S. Palliat Med 2016;20:219-220

• Respiratory Rate (Counting of chest movement for the first minute)

• Oxygen Saturation (Nonin 3100 WristOx, Minnesota, USA)
Study period: June 2013 to Jan 2014

24 patients were recruited (QEH, BH)

Male : Female = 11 : 13

Mean age = 66 (± 8.5) years old

Mean Karnofsky Performance Status (KPS) Scale = 48.6 (±15.5)
Patient Types

- Advanced COPD: 63%
- End-stage Ca Lung: 37%
- Stage IV: 40%
- Stage III: 60%
- Secondary Ca Lung: 45%
- Primary Ca Lung: 55%
Dyspnoeic Level – Visual Analogue Scale

- 1cm (p=0.038)
- 1.6cm (p=0.023)

Graph showing changes in dyspnoeic level with handheld fan interventions:
- Handheld fan - face: 6 cm before intervention, 5 cm after 5 minutes, 4 cm after 20 minutes.
- Handheld fan - knee cap: 6 cm before intervention, 4 cm after 5 minutes, 3 cm after 20 minutes.

Legend:
- Orange: Before intervention
- Purple: 5-minute post intervention
- Blue: 20-minute post intervention
Respiratory Rate

Respiratory Rate (bpm)

- 8.8% (p=0.029)
- 3.5% (p=0.044)

Graph showing respiratory rate changes with different interventions:
- Handheld fan - face
- Handheld fan - knee cap

Legend:
- Before intervention
- 5-minute post intervention
- 20-minute post intervention
Oxygen Saturation (%)

- Before intervention
- 5-minute post intervention
- 20-minute post intervention

Handheld fan - face
Handheld fan - knee cap
Possible Mechanisms of the Handheld Fan

1. Cooling of the Maximally (V2) and Mandibular (V3) branches of the Trigeminal Nerve → reduce dyspnoea sensation

Galbraith et al, J Pain and Symptom Management, 2010;39:831-838
Possible Mechanisms of the Handheld Fan

2. Cooling of nasal or oral mucosal receptors → depress respiratory drive → slow down respiratory rate

Marchettiet al, ATS Conference, 2005
Advantages of Handheld Fan

- Enhance self-management of breathlessness
- Inexpensive
- Non-invasive
- Can apply in any setting
- Patient-directed

Handheld Fan
Clinical Application of Handheld Fan

- Incorporate with other pharmacological and non-pharmacological interventions to manage dyspnoea

- Applies HHF to
  - COPD Review Clinic, COPD Patient Empowerment Program
  - Breathlessness Clinic, Palliative Care
Conclusion

- 5-minute Handheld fan to face (around V2 and V3 branches of Trigeminal nerve) is effective to reduce dyspnoea sensations in patients with advanced COPD and end-stage Ca lung.

- Larger sample size warrants further investigation.
Thank You!

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