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- Rocky Mountain Health Plans
- Senior CommUnity Care PACE
- St. Mary’s Hospital Foundation
- Technical College of the Rockies
- Tri-County Health Network
- Volunteers of America
- WCAHEC
Learning Objectives

- Distinguish dyspnea from tachypnea
- Distinguish patient distress from observer distress
- Articulate a management plan for dyspnea related to advanced disease
Outline

• Experience
• Importance
• Pathophysiology
• Assessment
• Evidence-based plan of care
  Non-pharmacological
  Medical
**Question 1**

Dyspnea means someone has:

- Fast rate of breathing (tachypnea)
- Low oxygen levels (low O\(_2\) Sat)
- Unpleasant sensation of awareness of breathing
- Looks short of breath
Dyspnea means someone has:

- Fast rate of breathing (tachypnea)
- Low oxygen levels (low $O_2$ Sat)
- Unpleasant sensation of awareness of breathing
- Looks short of breath
Dyspnea

**Definition:** Uncomfortable sensation or awareness of breathing

Dyspnea is *not*

- Labored breathing
- Fast breathing
- Low oxygen saturation
...Or

Dyspnea is whatever the patient says it is
Hold Your Breath for 1 Minute
Breathe Through a Straw for 3 Minutes
DEBRIEF
Total Dyspnea
(Similar to total pain)

- Anatomic
- Physiologic
- Psychological
- Behavioral
- Social
- Environmental
Dyspnea Associated with

- Fear
- Anxiety
- Depression
- ↓ Quality of life
Prevalence

• Hospice population
  71 %

• Cancer population
  21 – 90 % depending on stage
  24 % without cardiopulmonary pathology

Muers M, Round C. Thorax. 1993
Higginson I, McCarthy M. J R Soc Med. 1989
Reuben D, Mor V. Chest. 1986
In Cancer, Dyspnea is a Prognostic Indicator
Trajectories of Dyspnea at EOL

Days before Death

SAS Score

Prognostic Importance in Cancer

- Prognosis < 6 months when no Rx for the underlying cause in cancer

## Prognosis in Cancer

<table>
<thead>
<tr>
<th>Unresectable (Advanced) or Metastatic Disease</th>
<th>Prognostic Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unresectable or Metastatic Disease</td>
<td>Prognostic Indicators</td>
</tr>
<tr>
<td>Maximal Therapy</td>
<td>% Alive 1 yr.</td>
</tr>
<tr>
<td>Bladder (TCC)</td>
<td>26%</td>
</tr>
<tr>
<td>Brain Metastases (all comers)</td>
<td>—</td>
</tr>
<tr>
<td>Brain - Glioblastoma Multiforme</td>
<td>30%</td>
</tr>
<tr>
<td>Breast</td>
<td>72%</td>
</tr>
<tr>
<td>Cervix - Squamous</td>
<td>20%</td>
</tr>
<tr>
<td>Colorectal</td>
<td>36%</td>
</tr>
<tr>
<td>Carcinoma Unknown Primary</td>
<td>35%</td>
</tr>
<tr>
<td>Esophageal</td>
<td>20%</td>
</tr>
<tr>
<td>Gastric</td>
<td>23%</td>
</tr>
<tr>
<td>Head and Neck</td>
<td>26%</td>
</tr>
<tr>
<td>Liver</td>
<td>—</td>
</tr>
<tr>
<td>Lung Cancer, Non-small Cell</td>
<td>25%</td>
</tr>
<tr>
<td>Lung Cancer, Small Cell Extensive</td>
<td>—</td>
</tr>
<tr>
<td>Melanoma</td>
<td>70-80%</td>
</tr>
<tr>
<td>Ovarian</td>
<td>59%</td>
</tr>
<tr>
<td>Pancreatic</td>
<td>27%</td>
</tr>
<tr>
<td>Prostatic</td>
<td>—</td>
</tr>
<tr>
<td>Sarcoma</td>
<td>—</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Prognostic Indicators</th>
<th>Criteria</th>
<th>Median Survival</th>
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</thead>
<tbody>
<tr>
<td>KPS</td>
<td>50-60%</td>
<td>90 days</td>
</tr>
<tr>
<td>KPS</td>
<td>20-30%</td>
<td>50 days</td>
</tr>
<tr>
<td>KPS</td>
<td>10-20%</td>
<td>17 days</td>
</tr>
<tr>
<td>ECOG</td>
<td>3</td>
<td>3 months</td>
</tr>
<tr>
<td>ECOG</td>
<td>4</td>
<td>1 month</td>
</tr>
<tr>
<td>Anorexia</td>
<td>Persistent</td>
<td>&lt; 6 months</td>
</tr>
<tr>
<td>Serum Albumin</td>
<td>&lt; 2.5 mg/dL</td>
<td>&lt; 6 months</td>
</tr>
<tr>
<td>Weight Loss</td>
<td>&gt; 10%</td>
<td>&lt; 6 months</td>
</tr>
<tr>
<td>Brain Mets multiple</td>
<td>XRT</td>
<td>7 months</td>
</tr>
<tr>
<td>Brain Mets multiple</td>
<td>Steroids</td>
<td>3 months</td>
</tr>
<tr>
<td>Brain Mets multiple</td>
<td>No Treatment</td>
<td>1 month</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Prognostic Indicators</th>
<th>Criteria</th>
<th>Median Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyspnea</td>
<td>Persistent</td>
<td>&lt; 6 months</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>Persistent</td>
<td>1 month</td>
</tr>
<tr>
<td>Malignant Pleural Effusion</td>
<td>Persistent</td>
<td>4 months</td>
</tr>
</tbody>
</table>

Pathophysiology...
Causes

- Anxiety
- Airway obstruction
- Bronchospasm
- Hypoxemia
- Pleural effusion
- Pneumonia
- Pulmonary edema
- Pulmonary embolism
- Thick secretions
- Anemia
- Metabolic
- Family / financial / legal / spiritual / practical issues
Respiratory Center

Sensory Receptors
- Mechanoreceptors
- Chemoreceptors
- Pulmonary vagal afferents
- Baroreceptors

Cerebral Cortex

Anterior Insula
- Dyspnea
- Pain
- Hunger
- Thirst

Respiratory Muscles
Pathophysiology

- Increased work of breathing
- Chemoreception
- Neuromechanical dissociation

Mismatch between

What the brain desires for respiration
The sensory feedback it receives
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>2.</td>
<td><strong>Description (type)</strong></td>
</tr>
<tr>
<td>3.</td>
<td><strong>Change over time</strong></td>
</tr>
<tr>
<td>4.</td>
<td><strong>Severity (0–10)</strong></td>
</tr>
<tr>
<td>5.</td>
<td><strong>Effect of treatments</strong></td>
</tr>
<tr>
<td></td>
<td>Benefit (+)</td>
</tr>
<tr>
<td></td>
<td>Side effects (-)</td>
</tr>
<tr>
<td>Condition</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Asthma</td>
<td>Tightness</td>
</tr>
<tr>
<td>Cystic Fibrosis</td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>Unable to get deep breath</td>
</tr>
<tr>
<td>CHF</td>
<td>Suffocating</td>
</tr>
<tr>
<td>CHF and COPD</td>
<td>Air hunger</td>
</tr>
<tr>
<td>Deconditioning</td>
<td>Heavy breathing or breathing more</td>
</tr>
<tr>
<td>Cancer cachexia</td>
<td></td>
</tr>
<tr>
<td>Cardiac disease</td>
<td></td>
</tr>
</tbody>
</table>

Temporal Profile

- Constant
- Breakthrough
- Intermittent
Medical Research Council (MRC) Dyspnea Scale for COPD

• Self-rating of activity causing breathlessness

0 = strenuous exercise

1 = walking fast on level ground, or walking uphill

2 = walking slower than others on level ground, or stop for breath walking own pace on level ground

3 = stop for breath after 100 yds / few minutes (level)

4 = too breathless to leave house or dress


SEVERITY ASSESSMENT SCALES
THE WONG-BAKER FACES PAIN RATING SCALE

Visual

NONE
1
2
3
4
5
6
7
8
9
10
WORST

Verbal

None
Annoying
Uncomfortable
Distressing
Horrible
Unbearable

Faces

None
Little Bit
Little More
Even More
Whole Lot
Worst


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Modified Borg Dyspnea Scale

- 0 – 10 self-rating of dyspnea severity
  0 = none
  1
  2
  3
  4
  5 = rather intense
  6
  7 = very intense
  8
  9
  10 = unbearable

Image: http://bit.ly/2a0Z6BS
Effect of Therapies + / –

• Relief of Dyspnea
  Correlate to severity & temporal profile

• Adverse Effects
  “Any effects you don’t like?”
Physical Exam

• General appearance
  Rate & volume
  Labored breathing –
    tachypnea =/= dyspnea
  Leaning forward
  Cyanosis
  Flared nostrils
  Accessory muscle use
  Intercostal indrawing
  Cough

• Auscultation
  Rales (crackles)
  Rhonchi (coarse)
  Wheezing
  Stridor
  Air movement
  Effort

• Percussion
Management...
Treat the Underlying Cause

- **Bronchospasm** – bronchodilators, steroids
- **Pulmonary edema** – diuretics
- **Obstruction** – steroids, radiation therapy
- **Pleural effusion** – thoracentesis, catheter
- **Anemia** – Transfuse?
- **Bleeding** – radiation therapy
Diagnostic Tests

• Is there a question of cause?
• Will it change your management plan?
  Pleural effusion—will you drain it?
  Pulse Oximeter—will you add or eliminate supplemental oxygen?
  Peak Flow monitor—will you treat bronchospasm if present?
Nonpharmacological

- Muscle strengthening
- Chest wall vibration
- Sit up or lean forward position
- Energy conservation
- Breathing training
- Cool, moving air
- ↑ Humidity
- ↓ Irritants, e.g., perfumes, smoke
- Acupuncture, acupressure

Nonpharmacological Tx

• Emotional & Cognitive Factors
  Counseling & support – patient & family
  Open environment
  Relaxation
  Distraction
  Hypnosis
  Psychotherapy

Opioids…

- Central & peripheral effect
- Safe & effective
  - Cancer, CHF, COPD,
    Neuromuscular disease
- With \(\downarrow\) dyspnea, may be:
  - No change in respiratory rate
  - No change in \(O_2\) saturation
  - \(\uparrow\) Exercise tolerance
DOSING – FIRST ORDER KINETICS

Immediate-release codeine, dihydrocodeine, fentanyl, hydrocodone, hydromorphone, morphine, oxycodone, all follow first-order kinetics, e.g., steady-state serum drug concentrations change proportionally with dosing.

- For constant pain/symptom, dose once every half-life $t_{1/2}$; steady state is reached after 5 half-lives
- For breakthrough or intermittent acute pain/symptom, dose once every time to maximum concentration $t_{C_{max}}$ as needed:
  - PO/PR: provide 10% of 24 hrs dose q 60 min prn
  - SC/IV infusions: provide 50% of 1 hr dose q 30 min SC prn or q 15 min IV prn
- Once pain is controlled, convert routine doses to extended-release formulations

See Medication Kinetic Parameter cards for other $t_{C_{max}}$ and $t_{1/2}$

<table>
<thead>
<tr>
<th>Opioids</th>
<th>$t_{C_{max}}$</th>
<th>$t_{1/2}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>15 min</td>
<td>4 hrs</td>
</tr>
<tr>
<td>SC/IM</td>
<td>30 min</td>
<td>4 hrs</td>
</tr>
<tr>
<td>PO/PR</td>
<td>60 min</td>
<td>4 hrs</td>
</tr>
</tbody>
</table>

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...Opioids

- Morphine, hydromorphone, oxycodone, fentanyl
- Titrate like pain
  PRN: PO Q1H, SC Q30min, IV Q15min
- Low doses, small increases often effective
  20 – 60 mg / 24 hr in opioid naïve
- Address misconceptions, e.g., ethical barriers, patient safety, addiction
A 72 yo man with CHF and shortness of breath has started taking morphine 2.5 mg q 4h. He is breathing 24 times per minute. He wears oxygen 2L / minute. His pulse oximeter reads 89% saturated. He says he is not short of breath though he speaks in two-three word phrases with pause for a breath between each phrase.
**Question 2**

- **You would best**

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase the FiO$_2$</td>
</tr>
<tr>
<td>Give additional Furosemide</td>
</tr>
<tr>
<td>Give breakthrough morphine</td>
</tr>
<tr>
<td>Recognize your own anxiety in watching him breathe</td>
</tr>
</tbody>
</table>
Question 2

- You would best
  - Increase the FiO$_2$
  - Give additional Furosemide
  - Give breakthrough morphine
  - Recognize your own anxiety in watching him breathe
Dyspnea

- Is what patient says it is
- What you see is NOT what the patient is experiencing
- Therapeutic Misadventures when you titrate opioids to respiratory rate or when YOU feel comfortable watching the patient
Nebulized Therapies

- Nebulized Opioids
  Mixed results from pilot studies
- Nebulized Furosemide
  Possible benefit with bronchospasm
- Nebulized Lidocaine
  No benefit in small studies
Oxygen

• Dyspnea generally doesn’t correlate with hypoxia ( % saturation or pO₂ )

• Oxygen – potent symbol of medical care

Loud, expensive:

- Liquid $ 521 / month
- Concentrator $ 228 / month

• Forced air = effective unless hypoxic

Other Medications

- Chlorpromazine 25 – 50 mg Q1H PRN
  Promising results in small trials

- Benzodiazepines for associated anxiety
  Mixed results
  2010 Cochrane Review says **NO**
  May make confusion worse in elderly
  Trazodone better

- Buspirone – conflicting small trials

Secretions

- Postural drainage
- Nebulized saline
- Mucolytic
  - Acetylcysteine, e.g., Mucomyst
- Anticholinergic
  - Hyoscyamine, e.g., Levsin 0.125 mg SL Q4H
  - Glycopyrrolate, scopolamine, atropine
    - 0.4 – 1.0 mg SL, SC Q4H
  - Scopolamine TD patches Q72H
MANAGING SHORTNESS OF BREATH

OPIOIDS RELIEVE THE PATIENT’S SENSE OF SHORTNESS OF BREATH (SOB) WITHOUT DEPRESSING RESPIRATORY DRIVE

For an opioid-naïve patient, starting equianalgesic doses are:
- Morphine 2.5 mg PO q 1 hr prn
- Morphine 1 mg SC q 30 min prn or 1 mg IV q 15 min prn
- Oxycodone 2 mg orally PO q 1 hr prn
- Hydromorphone 0.5 mg PO q 1 hr prn
- Hydromorphone 0.1 mg SC q 30 min prn or 0.1 mg IV q 15 min prn

Typical doses in opioid naïve patients are morphine 30-60 mg PO/24 hrs or equivalent

Clinical Pearl: Titrate opioids to patient report of SOB; do not titrate to respiratory rate or family/caregiver report of how SOB the patient looks

Chlorpromazine 25-50 mg PO q 1 hr prn may also help relieve SOB

Benzodiazepines treat anxiety, not SOB. If anxious, consider adding:
- Clonazepam 0.25 mg PO q 24 hrs (longer acting better → steady blood levels)
- Lorazepam 0.5 mg PO/SL q 12 hrs

A fan blowing air on the face relieves SOB through stimulation of Cranial Nerve V (facial nerve)

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Breathing at the End of Life

- Irregular patterns
  - Shallow breaths
  - Agonal breaths
  - Cheyne-Stokes
- Reflex response, associated dyspnea?
- Treat patient
- Support family, caregivers, staff
Summary

- Dyspnea is subjective
- Treat underlying cause
- Manage experience of breathlessness
  1\(^{st}\) line: Non-pharmacological
  2\(^{nd}\) line: Opioids
  3\(^{rd}\) line: Chlorpromazine
  Trazodone or benzodiazepines
  Buspirone
Gandhi... You need to be the change you want to see in the world...
Palliative Care Interdisciplinary Curriculum

A Joint Initiative of the Palliative Medicine Faculty & Staff of

We gratefully acknowledge the support of Award Number R25CA134309 from the National Cancer Institute

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute or the National Institutes of Health
The principals of the Palliative Care Interdisciplinary Curriculum gratefully acknowledge the support of

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Acknowledgment and appreciation are extended to faculty and staff of OhioHealth, the Ohio State University Wexner Medical Center, Nationwide Children’s Hospital, the OhioHealth Research Institute, the Institute for Palliative Medicine at San Diego Hospice and the consultants who provided the inspiration and assisted in the development of this curriculum.
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Contact the PCIC Principals…

Frank D. Ferris, MD, FAAHPM
Executive Director, Palliative Medicine, Research & Education
Kobacker House, OhioHealth
800 McConnell Dr
Columbus, OH, USA 43214-3463
Phone: +1 (614) 533-6299
Fax: +1 (614) 533-6200
Frank.Ferris@OhioHealth.com

Jillian Gustin, MD, FAAHPM
Fellowship Program Director, Hospice and Palliative Medicine Fellowship
Division of Palliative Medicine
Ohio State University Medical Center
5th Floor McCampbell Hall
1581 Dodd Dr
Columbus, OH, USA 43210
Phone: +1 (614) 293-2957
Fax: +1 (614) 688-3700
Jillian.Gustin@osumc.edu
Contact the PCIC Principals

Lisa Humphrey, MD, FAAP
Director, Hospice and Palliative Medicine
Nationwide Children’s Hospital
700 Children’s Drive, A1061
Columbus, OH 43205
Phone: +1 (614) 722-5139
Fax: +1 (614) 355-2878
Lisa.Humphrey@NationwideChildrens.org