

# American Thoracic Society

## MEDICAL SECTION OF THE AMERICAN LUNG ASSOCIATION

### STANDARDS OF NURSING CARE FOR ADULT PATIENTS WITH PULMONARY DYSFUNCTION

THIS OFFICIAL STATEMENT OF THE AMERICAN THORACIC SOCIETY WAS ADOPTED BY THE ATS BOARD OF DIRECTORS, MARCH 1989

#### Introduction

Nursing, as a profession, is responsible to society for its actions. Each profession has the responsibility to monitor the quality of its practitioners (1). The Section on Nursing of the American Thoracic Society has identified a need to establish standards for the care of adult patients with actual or potential pulmonary dysfunction. We believe these standards will provide guidelines to assist nurses in the clinical decision-making process and the evaluation of patient outcomes.

A *standard* is generally defined as an acknowledged measure for comparison of value, a norm, or a criterion. An acceptable level of care can be defined from the perspective of *structure*, which includes the physical, fiscal, and organizational characteristics of a health care agency or group of professionals; *process*, the nature and sequence of events in the delivery of health care; or *outcome*, the changes observed in the patient's health status that are achieved through services of health professionals.

The American Lung Association/American Thoracic Society has previously developed *structure standards* (2) and *process standards* (3). This document includes *process and outcome standards* for the nursing care of adult patients with actual or potential pulmonary dysfunction.

These standards are for use within the nursing process, which includes assessment, diagnosis, goal setting, intervention, and evaluation. Nursing assessment is the gathering and analysis of data that led to the identification of the nursing diagnosis and related factors. Major factors included in the nursing assessment are physical, psychosocial, cultural, economic, and environmental. The assessment guide developed for this project (table 1) focuses primarily on the gathering of data related to the respiratory system and the patient's response to interferences with normal function and self-management capacity. This information can be obtained from the patient, family members, and significant others as well as case records and other health profession-

TABLE 1  
ASSESSMENT GUIDE

- I. Symptom profile and self-management capacity
  - A. Pulmonary symptoms (consider onset, duration, and character of symptoms; precipitating, aggravating, and relieving factors of symptoms)
    1. Dyspnea
    2. Cough
    3. Sputum
    4. Hemoptysis
    5. Wheeze
    6. Chest pain (e.g., pleuritic)
  - B. Extrapulmonary symptoms
    1. Night sweats
    2. Headaches on awakening
    3. Weight changes
    4. Fluid retention
    5. Snoring; sleep disturbances; daytime drowsiness
    6. Fatigue
    7. Orthopnea, paroxysmal nocturnal dyspnea
    8. Nasal stuffiness or discharge
    9. Sinus problem
  - C. Self-management capacity
    1. Physical ability (note level of independence using 0 to 4 scale; 0 = independent, 4 = dependent)
      - a. Lower extremity (e.g., walking, stair climbing)
      - b. Upper extremity (e.g., shampooing, meal preparation)
      - c. Activities of daily living
        - i. Toileting
        - ii. Hygiene
        - iii. Feeding
        - iv. Dressing
      - d. Activity pattern during a typical day
      - e. Patient statement re: management of problems
      - f. Sensory-perceptual factors (e.g., vision, hearing)
    2. Cognitive ability
      - a. Mental age
      - b. Memory
      - c. Judgment
      - d. Knowledge about diagnosis and treatment of pulmonary problem or risk factors
3. Psychosocial-cultural factors
  - a. Self-concept
    - i. Self-esteem
    - ii. Body image
  - b. Role(s), changes
  - c. Value system (e.g., spiritual and health beliefs)
  - d. Coping mechanisms
    - i. Displaced anger
    - ii. Anxiety
    - iii. Hostility
    - iv. Dependency
    - v. Withdrawal
    - vi. Isolation
    - vii. Avoidance
    - viii. Non-compliance
    - ix. Acceptance
    - x. Denial

(continued)

TABLE 1  
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- e. Socioeconomic factors
    - i. Social support system
      - (a) Family
      - (b) Significant others
      - (c) Friends
      - (d) Community resources
      - (e) Government resources
    - ii. Financial situation/health insurance
    - iii. Employment/disability
  - f. Environmental factors
    - i. Home
    - ii. Community
    - iii. Workplace
    - iv. Health care setting (e.g., hospital, nursing home)
- II. Pulmonary risk factors
- A. Smoking history
    - 1. Type (cigarettes, cigar, pipe)
    - 2. Amount per day
    - 3. Duration (yr)
  - B. Childhood respiratory disease/symptoms
  - C. Family history of respiratory disease
  - D. Alcohol and chemical substances abuse (e.g., heroin, marijuana, cocaine)
  - E. Environmental exposures
    - 1. Location (e.g., home, work, region)
    - 2. Type (e.g., asbestos, silica, gases, aerosols)
    - 3. Duration
  - F. Compromised immune system function (e.g., IgG deficiency, HIV infection, alpha-1 antitrypsin deficiency)
  - G. Obesity or nutritional depletion
- III. Previous history
- A. Pulmonary problems
  - B. Treatments
  - C. Number of hospitalizations
  - D. Medical diagnosis(es)
  - E. Immunizations
- IV. Physical examination
- A. General observation
    - 1. Appearance (e.g., condition of skin, body position)
    - 2. Speech pattern and pacing
    - 3. Mental status (e.g., alertness, memory, orientation to time, person, and place)
    - 4. Assistive devices
    - 5. Nasal flaring
    - 6. Cyanosis of nail beds, mucous membranes
    - 7. Clubbing
    - 8. JVD
    - 9. Peripheral edema (extremities, sacral, suborbital)
  - B. Chest examination
    - 1. Inspection
      - a. Shoulders equal in height
      - b. Sternum convex, concave
      - c. Thorax-AP diameter
      - d. Spine-kyphosis, scoliosis, kyphoscoliosis
      - e. Chest wall movement
        - i. Symmetry
        - ii. Splinting
        - iii. Retracting
        - iv. Use of accessory muscles

(continued)

TABLE 1  
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- f. Breathing pattern during rest, exercise, sleep rate, depth, rhythm, I/E ratio, inspiration time, pursed lip breathing
  - g. Synchrony of thoraco-abdominal motion
2. Palpation
- a. Tracheal alignment
  - b. Chest movement (symmetry, depth of excursion)
  - c. Tactile fremitus
  - d. Tenderness
  - e. PMI
  - f. Nodes (cervical, axillary)
  - g. Crepitus
  - h. Liver (location, hepatoyugular reflex)
3. Percussion
- a. Thoracoabdominal resonance
  - b. Thoracoabdominal organ borders
  - c. Diaphragmatic excursion (distance, symmetry)
4. Auscultation
- a. Breath sounds
    - i. Normal
      - (a) Vesicular
      - (b) Bronchovesicular—over main bronchi
      - (c) Bronchial—over trachea
    - ii. Abnormal
      - (a) Absent or diminished
      - (b) Bronchial or bronchovesicular sounds in abnormal location
    - iii. Adventitious sounds
      - (a) Type
        - (1) crackles/rales (discontinuous)
        - (2) rhonchi/gurgles (continuous)
        - (3) wheeze
        - (4) pleural friction rub
        - (5) inspiratory stridor
      - (b) Timing
        - (1) early or late inspiration
        - (2) expiration
        - (3) changes with respiratory maneuvers (deep breath, cough)
    - iv. Abnormal voice sounds
      - (a) Bronchophony
      - (b) Whispered pectoriloquy
      - (c) Egophony
    - v. Heart sounds

- C. Laboratory data
- 1. Arterial blood gases (consider body position [sitting, supine], activity,  $F_{IO_2}$ )
    - a. Oxygenation
    - b. Ventilation
    - c. Acid-base status
  - 2. Pulmonary function tests
    - a. Spirometry
      - i. Low FEV<sub>1</sub>/FVC ratio (airflow obstruction)
      - ii. Low FEV<sub>1</sub>, low VC; normal FEV<sub>1</sub>/FVC ratio (restrictive process)
    - b. Lung volumes
      - i. Low TLC (restrictive process)
      - ii. Large RV (obstruction with air trapping)
    - c. Mouth pressures (P<sub>max</sub>, P<sub>E<sub>max</sub></sub>)
      - i. Both low (neuromuscular disease, fixed or variable airflow obstruction)
      - ii. Low P<sub>max</sub> (airflow obstruction with hyperinflation)

(continued)

TABLE 1  
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d. DLCO
i. Low DLCO/TLC (pulmonary vascular disease, emphysema)
ii. Low DLCO, normal DLCO/TLC (restrictive process)
3. Electrolytes, creatinine, BUN
4. Sputum examinations
5. CXR/CT scan/MRI
6. Hemoglobin/hematocrit
7. Carboxyhemoglobin
8. Ventilation/perfusion studies
9. Exercise tests
10. Drug levels (theophylline, antibiotics)
11. Sleep apnea studies
12. Electrocardiogram
13. Respiratory Impedance Plethysmography (RIP)
14. Skin tests
15. Respiratory Exchange Ratio, R value
16. Caloric consumption and caloric need

*Definition of abbreviations: IgG = immunoglobulin G; HIV = human immunodeficiency virus; JVD = jugular-venous distention; AP = arterial-pulmonary; I/E = inspiratory/expiratory; PMI = point of maximal impulse; TLC = total lung capacity; RV = residual volume; P<sub>max</sub> = maximal inspiratory pressure; P<sub>exp</sub> = maximal expiratory pressure; DLCO = diffusing capacity.*

TABLE 2  
OUTCOME CRITERIA FOR MEDICATIONS AND OTHER MEDICAL THERAPY

A. Whenever the patient is receiving a prescribed medication (including O <sub>2</sub> ) the patient is expected to be able to state the following for each medication:
1. Name (or other method of identification)
2. Dosage
3. Method of administration
4. Schedule (relationship to meals and activities of daily living)
5. Purpose
6. Side effects
7. Appropriate behavior if side effects occur
8. Consequences of improper use
9. Importance of refilling prescription before medication runs out
B. Whenever the prescribed treatment requires the use of respiratory therapy equipment (including O <sub>2</sub> systems), the patient should be able to demonstrate the appropriate use of the equipment by:
1. Assembling equipment
2. Performing treatment procedures
3. Disassembling equipment used in treatment
4. Cleaning equipment
5. Seeking assistance when equipment is not functioning properly

als. The suggested guide for patient assessment (table 1) is comprehensive, including variation in acuity and severity. The selection of data may be determined by the nurse according to the acuity and severity of the individual patient.

Nursing diagnosis is a clinical judgement about an individual, family, or community, which is derived through a deliberative systematic process of data collection and analysis. It provides the basis for prescriptions for definitive therapy for which the nurse is accountable. It is expressed concisely and it includes the etiology of the condition when known (3). A nursing diagnosis has three components:

- (1) Defining characteristics—a cluster of signs and symptoms which determine the diagnosis.
- (2) Related factors or risk factors.

(3) Statement of actual or potential health problems/nursing diagnostic labels.

Nursing diagnoses are complementary to medical diagnoses in guiding the development of a comprehensive plan of care for patients. Physicians infer the abnormalities in function and structure from signs and symptoms. Nurses infer from signs and symptoms the effects of these abnormalities on the patient's capacity for self management.

Goals, which are derived from nursing diagnoses, are developed to give direction to the selection of nursing interventions. Achievement of goals is evaluated by measurable outcome criteria with specific target dates.

Nurses provide interventions on the basis of the related factor(s) of the actual health problem or the risk factor(s) of the potential health problem. Priorities are established for actions that will result in the restoration of

the patient to optimal levels of functioning. The selection of the most appropriate nursing intervention(s) for each patient will be based on the clinical judgement of the nurse and include the patient's preferences, abilities, and the environment in which the care is given.

Evaluation is a process through which the plan of action is validated. Outcome criteria are considered the most effective evaluative measures as they focus on whether or not the interventions selected and provided made a difference to the patient. The outcome criteria for nursing interventions involving the use of medications and other medical therapy are presented in table 2, to avoid repetition in each standard.

Five standards of nursing care were developed to illustrate the application and integration of the process and outcome standards in clinical practice. Specific process and outcome criteria were identified for selected nursing diagnoses found in the pulmonary patient population (tables 3 to 7). Neither the nursing interventions nor the outcome criteria are listed in order of priority. *It is expected that these standards of nursing care will be altered as research findings become available and will be applied to individual patients according to their specific situation and needs.*

#### Purposes of this Document

These standards are primarily intended to guide nurse generalists who care for patients with actual or potential pulmonary dysfunction, clinical nurse specialists, and nurse educators in the development of specialty content for pulmonary clinical nurse specialist programs. Furthermore, this document is intended to do the following:

- (1) Promote development of pulmonary nursing practice and peer review.
- (2) Standardize the assessment criteria for each pulmonary nursing diagnosis.
- (3) Standardize the goals and desired outcome criteria for each pulmonary nursing diagnosis.
- (4) Provide a selection of research-based interventions to improve the patient's pulmonary function and/or coping with pulmonary disease.
- (5) Stimulate nurses' participation in pulmonary program development, evaluation, and quality assurance.
- (6) Assist nurse administrators in the development of nurse performance evaluation tools.
- (7) Assist nurse administrators in the development of patient program evaluation tools.
- (8) Assist nurse researchers in their pursuit to describe, explain, and predict patient responses to pulmonary dysfunction across settings.
- (9) Assist nurse researchers in their ongoing evaluation of interventions and development of new interventions to optimize patient functional ability and self-care management.

TABLE 3  
STANDARD OF NURSING CARE

**Nursing diagnosis:** Ineffective airway clearance  
**Definition:** A state in which there is inability to clear the airways and evidence of retained secretions  
**Defining characteristics:**

- Difficulty expectorating sputum
- Presence of abnormal breath sounds (rhonch/gurgles)
- Cough—ineffective or absent

**Related factors:**

- Infection in airways
- Decreased level of consciousness
- Decreased airway humidity
- Presence of an artificial airway
- Thoracic and/or abdominal neuromuscular dysfunction
- Pain
- Environmental irritants leading to hypersecretion and/or decreased mucociliary transport
- Expiratory airflow obstruction

**Goal**  
To establish airway clearance

**Interventions (Process Criteria)**

- Facilitate deep breathing
- Encourage cough
- Teach alternative cough techniques (e.g., quad, huff)
- Position to facilitate cough
- Assure euolemia
- Provide bronchial drainage treatments (positioning, percussion and vibration)
- Perform tracheobronchial suctioning
- Schedule analgesia to facilitate airway clearance treatments
- Coordinate inhaled bronchodilator administration to facilitate clearance
- Administer antibiotics and teach patient about self-administration
- Minimize exposure to environmental irritants and/or pathogenic organisms
- Stabilize artificial airway
- Teach airway clearance modalities to patient and/or family
- Promote smoking cessation
- Teach signs and symptoms of infection and ineffective airway clearance
- Position to prevent pulmonary aspiration
- Humidify inspired air when upper airway is bypassed

**Evaluation (Outcome Criteria)**

- Absence of abnormal breath sounds (rhonch/gurgles)
- Effective cough is present
- Expectorates sputum easily
- Patient or significant other is able to perform airway clearance modalities

TABLE 4  
STANDARD OF NURSING CARE

**Nursing diagnosis:** Impaired breathing pattern  
**Definition:** A state in which there is an abnormality in the rate, depth, timing, or rhythm of inspiration, expiration, or both  
**Defining characteristics:**

- Respiratory rate:  $< 11$  or  $> 24$  breaths/min
- Depth of breathing:
  - decreased (if measured,  $VT < 200$  ml at rest)
  - increased (if measured,  $VT > 550$  ml at rest)
- Timing, ratio of inspiration and expiration:
  - if measurement available:
    - inspiratory time  $< 1.2$  or  $> 2.4$  s
    - fractional inspiratory time  $< .36$  or  $> .47$
  - Observation I:E  $< 1.2$ , 1.3, or  $> 1.1$
- Irregular breathing rhythm (e.g., apnea, frequent sighs, use of accessory muscles of breathing inappropriate to level of activity, asynchronous thoracoabdominal motion)

**Related factors:**

- Neuromuscular impairment
- Pain
- Musculoskeletal impairment
- Anxiety
- CNS depression
- Respiratory muscle fatigue/failure
- Increased work of breathing
- Obstruction to airflow (inspiratory or expiratory)
- Weaning attempt

**Goal**  
To normalize breathing pattern and reduce work of breathing

**Interventions (Process Criteria)**

- Initiate respiratory muscle training, if appropriate
- Provide comfort measures (e.g., positioning, analgesics)
- Initiate energy conservation techniques
- Provide mechanical support
- Provide relaxation training (e.g., biofeedback, progressive muscle relaxation, imagery)
- Use airway clearance techniques (see Ineffective Airway Clearance)
- Monitor upper airway patency, correct jaw and tongue position as appropriate

**Evaluation (Outcome Criteria)**

- Respiratory rate, depth, timing within normal limits
- Respiratory rhythm within normal limits for age
- Synchronous thoracoabdominal movement
- Use of accessory muscles appropriate to activity level

*Definition of abbreviations: VT = tidal volume; I:E = inspiratory/expiratory ratio; CNS = central nervous system*

**TABLE 5**  
**STANDARD OF NURSING CARE**

**Nursing diagnosis:** impaired gas exchange: hypercapnia  
**Definition:** A state in which the CO<sub>2</sub> pressure in arterial blood is greater than normal, with or without acidemia.  
**Defining characteristics:**  
 PaCO<sub>2</sub> > 45 mm Hg  
 Headache on awakening  
**Related factors:**  
 Alveolar hypoventilation  
 Low ventilation/perfusion ratio  
 Primary metabolic alkalosis

**Goal**  
 To re-establish usual compensated baseline PaCO<sub>2</sub>

**Interventions (Process Criteria)**

- Stimulate breathing effort as necessary (in conditions such as post-anesthesia use narcotics, hypnotics, or tranquilizers)
- Monitor vital capacity, P<sub>100</sub>, in neuromuscular weakness
- Assist with ventilatory support measures (e.g., mechanical ventilation)
- Teach potential hazard of excessive levels of inspired O<sub>2</sub> to patients with blunted CO<sub>2</sub> drive to breathe
- Teach signs, symptoms, and consequences of hypercapnia
- Teach avoidance of CNS depressants
- Monitor acid/base status of primary metabolic alkalosis and consult with physician about its causes and treatment

**Evaluation (Outcome Criteria)**

- PaCO<sub>2</sub> 40 mm Hg or patient's usual compensated baseline value
- Arterial pH is stable or within clinically acceptable range
- Demonstrates correct technique(s) to normalize PaCO<sub>2</sub> (e.g., secretion clearance and bronchodilator therapies)
- Recognizes and reports signs and symptoms of hypercapnia
- Reports absence or decreased incidence of headache upon awakening

*Definition of abbreviations: P<sub>100</sub> = maximal inspiratory pressure, CNS = central nervous system.*

**TABLE 6**  
**STANDARD OF NURSING CARE**

**Nursing diagnosis:** impaired gas exchange: hypoxemia  
**Definition:** A state in which the O<sub>2</sub> pressure and/or concentration in arterial blood is lower than the age-adjusted normal range at a given altitude

**Defining characteristics:**

- All ABG values measured on room air at sea level:
- Acute hypoxemia: PaO<sub>2</sub> < 80 mm Hg or SaO<sub>2</sub> < 90% at rest
- Chronic hypoxemia:  
 PaO<sub>2</sub> < 55 mm Hg or SaO<sub>2</sub> < 88% at rest or during sleep  
 PaO<sub>2</sub> < 80 mm Hg or SaO<sub>2</sub> < 90% during exercise

**Confusion**

**Tachycardia**

**Fatigue**

**Related factors:**

- Alveolar hypoventilation
- Intrapulmonary shunting
- Low ventilation/perfusion ratio
- Diffusion impairment
- Decreased ambient O<sub>2</sub> (gas mixture error)
- Decreased barometric pressure (high altitude)

**Goal**

To normalize arterial oxygenation

**Interventions (Process Criteria)**

- Teach and encourage deep breathing and/or use of incentive spirometer
- Teach and encourage pursed-lip breathing
- Position patient so that the most normal area(s) of lung is dependent
- Implement airway clearance techniques
- Counsel patient about management of hypoxemia associated with air travel and/or increased altitude
- Advise avoidance of respiratory depressants
- Assist with ventilatory support measures (e.g., mechanical ventilation, incentive spirometry)
- Teach symptoms and potential consequences of hypoxemia
- Teach self-management of ventilatory support equipment
- Teach and monitor proper placement of supplementary oxygen devices (e.g., nasal cannula)
- (Select O<sub>2</sub> supply systems and devices (nasal cannulas, mask, etc.) that are appropriate to patient's activities of daily living (rest, sleep, exercise, etc.)

**Evaluation (Outcome Criteria)**

- PaO<sub>2</sub> returns to normal range for that person
- Patient demonstrates a reduction in tachycardia and confusion
- Patient states that fatigue is reduced
- Patient demonstrates correct use of modalities and methods that support improved oxygenation

*Definition of abbreviation: ABG = arterial blood gases*

TABLE 7  
STANDARD OF NURSING CARE

<p><b>Nursing diagnosis:</b> Altered comfort: dyspnea  <b>Definition:</b> A state in which there is an unpleasant sensation associated with breathing  <b>Defining characteristics:</b>          Unpleasant breathing sensation (shortness of breath, breathlessness)          Gasping, truncated speech patterns          Abnormal use of accessory muscles at rest  <b>Related factors:</b>          Increased airways resistance (bronchoospasm and/or retained secretions)          Increased activity level/exercise          Psychologic stress provoking and worsening dyspnea (anxiety, depression, fear)          Noxious environmental stimuli          Air trapping/hyperinflation (increased FRC)          Decreased lung compliance (pulmonary edema)          Decreased chest wall compliance (musculoskeletal abnormalities)</p>	
<p><b>Goal</b> To improve comfort by reduction/elimination of dyspnea</p>	
<p><b>Interventions (Process Criteria)</b>          Administer and/or teach effective use of drugs and equipment (e.g., bronchodilators, diuretics, antibiotics, analgesics, mood elevators)          Schedule rest and activity periods          Provide relaxation training (e.g., biofeedback, imagery, progressive muscle relaxation)          Provide psychomotor distraction techniques to desensitize dyspnea (e.g., progressive exercise with coaching)          Help patient to assume position of comfort (e.g., tripod position, elevated backrest, support upper extremities to fix shoulder girdle)          Remove or limit noxious environmental stimuli          Teach/encourage pursed lip breathing</p>	<p><b>Evaluation (Outcome Criteria)</b>          Diminished sensation of unpleasant breathing          Use of accessory muscles appropriate to activity level          Complete sentence without stopping for breath</p>

(9) Assist nurse researchers in their ongoing evaluation of interventions and development of new interventions to optimize patient functional ability and self-care management.

This statement was prepared by an ad-hoc committee of the Scientific Assembly on Clinical Problems, Section on Nursing. Members of the committee are:

MARY V. HANLEY, M.A., R.N. *Chair*  
 MARYLYN ABRAHAM, M.S.N., R.N.  
 REGINA MAIBUSCH, M.S., R.N.  
 DIANA OPENBRIER, M.S., R.N.  
 MARTHA L. TYLER, M.A., R.N.  
 MI JA KIM, Ph.D., R.N., *Consultant*

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#### References

1. American Nurses Association. Nursing—a social policy statement. Kansas City, MO: American Nurses Association, 1980.

2. American Lung Association/American Thoracic Society. Report of the task force on comprehensive and continuing care for patients with chronic obstructive pulmonary disease. (Task force on care of COPD patients.) New York: American Lung Association, 1975.

3. American Thoracic Society. Standards for diagnosis and care of patients with chronic obstructive pulmonary disease (C.O.P.D.) and asthma. New York: American Thoracic Society, 1987; 136:225-44.

4. Shoemaker JK. Essential features of a nursing diagnosis. In: Kim MJ, McFarland GK, McLane AM, eds. Classification of nursing diagnoses: proceedings of the fifth national conference. St. Louis: C.V. Mosby, 1984; 108.

#### Additional References

Abraham M, Atkinson ML, Boyce B, Briggs AM, Kim MJ. Standards for nursing care of patients with COPD. American Thoracic Society News, 1981; 31-8.

American College of Chest Physicians and American Thoracic Society. Pulmonary terms and symbols. Chest 1975; 67:583-93.

American Nurses Association. Standards of nursing practice. Kansas City, MO: American Nurses Association, 1973.

American Nurses Association. Standards of medical-surgical nursing practice. Kansas City, MO:

American Nurses Association, 1974.

American Nurses Association. Guidelines for development of standards of practice and related criteria sets. Kansas City, MO: American Nurses Association, 1985.

Cherniack RM, Cherniack L. Respiration in health and disease. 3rd ed Philadelphia: W.B. Saunders, 1983.

Gilmartin ME. Patient and family education. Clin Chest Med 1986; 7:619-27.

Hanley MV, Tyler ML. Ineffective airway clearance related to airway infection. Nursing Clin North Am 1987; 22:135-50.

Hoffman LA. Ineffective airway clearance related to neuromuscular dysfunction. Nursing Clin North Am 1987; 22:151-66.

Hopp LJ, Williams M. Ineffective breathing patterns related to decreased lung expansion. Nursing Clin North Am 1987; 22:193-206.

Hurley ME. Classification of nursing diagnoses: proceedings of the sixth conference. St. Louis: C.V. Mosby, 1986.

Janson-Bjerkie S, Carrieri VK, Hudes M. The sensations of pulmonary dyspnea. Nursing Res 1986; 35:154-9.

Kim MJ, Larsen JL. Ineffective airway clearance and ineffective breathing patterns: theoretical and research base for nursing diagnosis. Nursing Clin North Am 1987; 22:125-34.

Kim MJ, McFarland GK, McLane AM. Pocket guide to nursing diagnoses. 2nd ed. St. Louis, C.V. Mosby, 1987.

Larsen S, Larsen JL. Ineffective breathing patterns related to airflow obstruction. Nursing Clin North Am 1987; 22:179-92.

Larsen JL, Kim MJ. Ineffective breathing patterns related to respiratory muscle fatigue. Nursing Clin North Am 1987 22:207-24.

Luce J, Tyler ML, Pierson D. Intensive respiratory care. Philadelphia: W.B. Saunders, 1984.

Maibusch R. Implementing nursing diagnoses. Nursing Clin North Am 1987; 22:955-69.

McLane AM. Classification of nursing diagnoses: proceedings of the seventh conference. St. Louis: C.V. Mosby, 1987.

Murphy RLH, Holford SK. Basics of R.D.: lung sounds. American Thoracic Society News, 1980; 6:24-9.

Nocturnal oxygen therapy trial group. Continuous or nocturnal oxygen therapy in hypoxemic chronic obstructive lung disease: a clinical trial. Ann Intern Med 1980; 93:391-8.

Openbrier DR, Covey M. Ineffective breathing pattern related to malnutrition. Nursing Clin North Am 1987; 22:225-48.

Shekleton ME, and Nield M. Ineffective airway clearance related to artificial airway. Nursing Clin North Am, 1987; 22:167-79.

Tobin MJ, Chada TS, Jenouri G, Birch SH, Gazerogla, HB, Sackner MA. Breathing patterns: normal subjects. Chest 1983; 83:202-5.

Tobin MJ, Chada TS, Jenouri G, Birch SH, Gazerogla HB, Sackner MA. Breathing patterns: 2 diseased subjects. Chest 1983; 83:286-94.

Traver GA. Respiratory nursing: the science and the art. New York: John Wiley & Sons, 1982.

West JB. Pulmonary pathophysiology—the essentials. 3rd ed. Baltimore: Williams & Wilkins, 1987.