MEDICAL EDUCATION SYSTEMS, Inc.

Course 702

Critical and Long Term Ailments:
COPD/Respiratory Emergencies

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Critical and Long Term Ailments

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COPD

Breathless in America: New Survey Reveals Impact of Chronic Obstructive Pulmonary Disease

INTRODUCTION

This Continuing Education Unit highlights the toll of emphysema and chronic bronchitis. The study finds that many patients are not meeting the treatment goals they believe are possible.

It affects twice as many Americans as diabetes[1] and is the nation's fourth leading cause of death.[2] Yet surprisingly little is known about how chronic obstructive pulmonary disease (COPD), which includes emphysema and chronic bronchitis that decreases airflow in and out of the lungs, is viewed by patients and their physicians. A new national survey released today helps shed some much-needed light on a disease that is taking a tremendous toll on millions of people in the U.S.

Confronting COPD in America, the most comprehensive U.S. survey ever done on the disease, reveals that millions of Americans are suffering from shortness of breath so severe it interferes with even the most basic daily activities. Of the nearly 600 people with COPD interviewed:

- Nearly half get short of breath while washing and dressing (44 percent) and or doing light housework (46 percent).
- One in three (32 percent) get short of breath while talking, and 28 percent have difficulty breathing even when sitting or lying still.
- Almost one in four (23 percent) say their condition has made them an invalid; eight percent are too breathless to leave home.

"The survey confirms and quantifies what people living with COPD or caring for someone with COPD know from first-hand experience: It can be a debilitating disease that robs people of their breath and their independence," said Dr. Norman Edelman, spokesperson for the American Lung Association. "We see a growing demand for information about COPD, and a growing awareness that it is actually more common - and has a more profound impact - than other respiratory diseases."

COPD costs the U.S. economy an estimated $31.9 billion a year,[3] or twice the amount associated with asthma, and in 1998 caused more than 112,000 deaths.[2] The disease affects tens of millions of Americans. One estimate is that 16 million patients have been diagnosed with some form of COPD and as many as 16 million more are undiagnosed.[1] New government data based on a 1998 prevalence survey suggest that three million Americans have been diagnosed with emphysema and nine million are affected by chronic bronchitis.[4]

Key Survey Findings
In addition to illuminating the disease burden of COPD, the survey also reveals several issues related to treatment. While the survey finds that patients and physicians are generally optimistic about advances in COPD treatment, it also suggests that patients are not meeting the treatment goals they believe are possible. The survey points to a strong need for better education about how to better manage the condition.

The survey paints a picture of a disease that takes a tremendous toll on patients. Describing their worst three months in the previous year, 58 percent said they had shortness of breath every day and 23 percent of patients said symptoms woke them up every night.

In general, half of all COPD patients (51 percent) say their condition limits their ability to work. Many say it also limits them in normal physical exertion (70 percent), household chores (56 percent), social activities (53 percent), sleeping (50 percent) and family activities (46 percent).

The survey also reveals that COPD symptoms are a cause of great distress for patients:

- 58 percent say they panic when they cannot get their breath; 52 percent feel they are not in control of their breathing and 52 percent admit that their coughing is embarrassing in public.
- 47 percent say they have a hard time making plans because of their condition, and 39 percent worry about having serious breathing problems when away from home.
- 66 percent say they expect their condition to get worse.

Even though COPD is a progressive disease, the survey reveals that younger patients (45 to 54 years old) report more severe and frequent symptoms, and greater psychosocial impact, than do older patients. This is a counterintuitive finding - older patients, not younger patients, should report the greater impact. One explanation is that younger patients are more acutely aware of their symptoms, while older patients have either grown more accustomed to symptoms or restrict their activities to avoid breathing problems.

Optimistic But Suffering: Are Patients Settling for Too Little?
Patients and physicians are generally optimistic about the benefits of proper disease management. Nearly four out of five patients (78 percent) believe that there is better control of the disease than there was five years ago, and 74 percent believe that with proper treatment, it is possible to live a full and active life. Similarly, 76 percent of physicians say that the long-term health outlook for COPD has improved in the past decade, and most of this group (78 percent) credit the improvement to better medications.

Yet the survey also reveals a gap between what patients believe about COPD treatments and the realities of their life with the disease, says Dr. Stephen Rennard, Larson Professor of Medicine at the University of Nebraska Medical Center and one of the nation's top experts on COPD.

"On the one hand, patients believe that treatments are more effective than ever, and can allow them to lead full and active lives," says Dr. Rennard. "On the other hand, the high levels of

breathlessness and activity limitations revealed by the survey would seem to suggest that patients are not living up to their own expectations."

One issue revealed by the survey is that a considerable number of patients underestimate the severity of their COPD and/or overestimate the degree of control they have achieved. More than a third (36 percent) of those whose symptoms fit the criteria for the most severe degree of breathlessness describe their condition as "mild" or "moderate." One in four (25 percent) of those with the most severe degree of breathlessness say their COPD has been "completely controlled" or "well controlled" in the past year.

This disparity may reflect an underestimation of the extent to which COPD can be managed, and a tendency for patients to believe that even a high degree of suffering is the best that can be expected.

"The data suggests that people with COPD are judging their health and quality of life against drastically lowered standards," says Dr. Rennard. "They appear to be accepting the limitations imposed by the disease as normal."

The survey also points to the need for more education about effective COPD management. Although 36 percent of patients say they "completely" understand how best to manage the condition, just one percent of doctors say this about their patients. Still, a majority of patients (76 percent) and doctors (69 percent) agree that there is a "strong need" for better education about COPD.

The findings of Confronting COPD in America are based on interviews with 573 patients and 203 physicians. Interviews covered a wide range of attitudes, beliefs and practices related to COPD.

Confronting COPD in America was conducted by SRBI, a national research firm specializing in health issues. Its findings are supported by several leading respiratory organizations, including the American Lung Association, American College of Chest Physicians, National Lung Health Education Program and American Association of Respiratory Care. The survey was funded by the GlaxoSmithKline group of companies.

LEARNING OBJECTIVES

Upon successful completion of this course, you should be able to:

- Define and discuss what is meant by the term "COPD"
- Identify the symptoms, describe their frequency and prevalence in the United States
- Describe the current guidelines for physician care and COPD management
- Identify the study's major conclusions, including the need for better education

OVERVIEW

Chronic obstructive pulmonary disease (COPD) is an umbrella term used to describe airflow obstruction that is associated mainly with emphysema and chronic bronchitis.

COPD has affected tens of millions of Americans. One current estimate is that 6.5 million patients have been diagnosed with some form of COPD and as many as 15.2 million more have been left undiagnosed.[1] Government data based on a 1998 prevalence survey suggested that three million Americans have been diagnosed with emphysema and nine million have been affected by chronic bronchitis.[2] In 1998, COPD was the fourth leading cause of death in the United States, accounting for more than 112,000 deaths.[3]

Surprisingly little has been learned about COPD. Studies of the disease burden on patients with COPD have been scarce, and the social and healthcare costs of the disease have not been well quantified. As a result, there have been limited data about COPD symptoms and severity, disability or activity limitations, lifestyle impact, social and psychosocial consequences, healthcare utilization, and patterns of treatment.

Confronting COPD in America was designed to help answer some of these questions and unmask one of the nation's least understood public health problems. It was the largest and most comprehensive US survey to date of patient and provider knowledge, attitudes, and behavior related to COPD. Among the issues it explored were the frequency and severity of symptoms, the burden of illness, healthcare utilization, disease management and treatment, and quality of life issues.

The survey yielded several major findings, such as:

- COPD imposes a profound burden on patients, including medical emergencies and hospitalizations, work absenteeism and activity limitations. This, in turn, results in significant physical and emotional impact on patients.

- Dyspnea, or shortness of breath, associated with COPD caused significant activity restrictions, interfering with the everyday tasks most people take for granted: dressing, bathing, talking, and sleeping.

- Both doctors and patients agreed that the outlook for COPD has improved in recent years, and both recognized the benefits of treatment. Yet the symptoms and disease burden patients reported suggests that they are not achieving the level of treatment success that they believe is possible.

- Doctors and patients also agreed that there is a strong need for better education about COPD and the best ways to manage the disease.

The survey findings are particularly important because, despite the large and growing number of Americans affected by the disease, COPD, it has remained relatively invisible to the general public. As America ages, it will be increasingly important to understand one of the leading causes of death and disability among middle-aged and older Americans.

How the Survey Was Conducted

The survey was conducted between August 2 and November 21, 2000. Telephone interviews were completed with a national sample of 573 patients with COPD. The sample was identified by systematically screening a national sample of 26,880 US households to find people aged 45 and older who had been diagnosed with COPD, emphysema, or chronic bronchitis, or whose symptoms matched a strict definition of chronic bronchitis. A national sample of 203 physicians— 100 primary care physicians and 103 respiratory specialists— was also interviewed as part of the survey (Figure 1).

Confronting COPD in America was conducted by Schulman, Ronca, and Bucuvalas, Inc. (SRBI), a national public-opinion research firm. Dr. Stephen Rennard of the University of Nebraska Medical Center served as an advisor. The survey was funded by GlaxoSmithKline, one of the world's leading research-based pharmaceutical and healthcare companies.

Figure 1: STUDY DESIGN FOR SURVEY

STUDY DESIGN FOR SURVEY

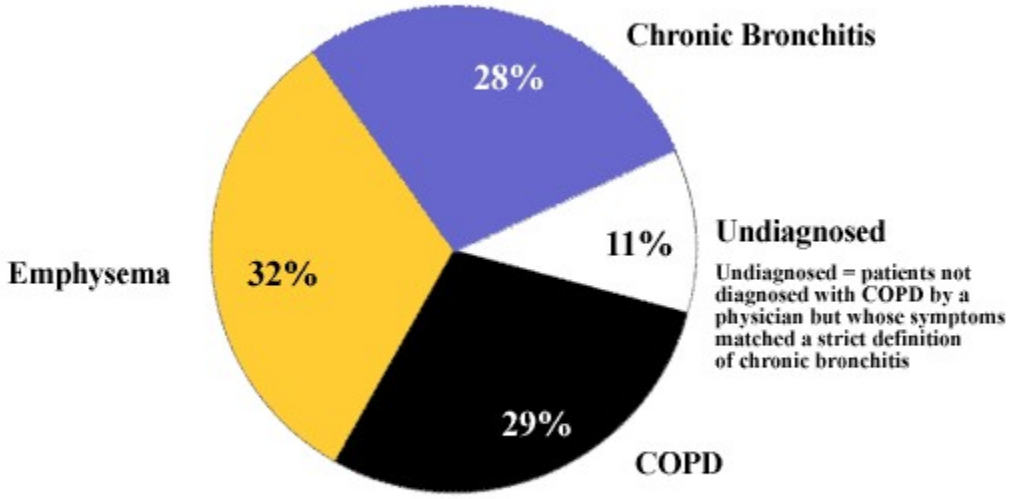
Population	Sampling Frame	Interview Length	Final Sample Size
People aged 45 and older diagnosed as having emphysema, chronic bronchitis, or chronic obstructive pulmonary disease, or meeting symptomatic definition of chronic bronchitis	National probability sample of 26,880 households screened by random digit dialing	34 minutes	573
Primary care doctors in direct patient care in outpatient setting	AMA/AOA* listings	26 minutes	100
Respiratory specialists in direct patient care in outpatient setting	AMA/AOA* listings	22 minutes	103

*AMA=American Medical Association and AOA=American Osteopathic Association

WHO HAS COPD?

Confronting COPD in America focused on people aged 45 and older who reported that they had been diagnosed with COPD, emphysema, or chronic bronchitis, or that they had symptoms of chronic bronchitis. Nearly equal proportions of patients with COPD reported diagnoses of COPD (29%), emphysema but not COPD (32%), and chronic bronchitis but not emphysema or COPD (28%). In addition, 11% of the survey sample was made up of people who met a stringent symptomatic definition of chronic bronchitis* but who had never been diagnosed as having COPD, emphysema, or chronic bronchitis (Figure 2). While the actual population prevalence of undiagnosed COPD is much greater than this would suggest, this subsample of symptomatic but undiagnosed patients with COPD provides important insights into the management of undiagnosed COPD.

Figure 2: PRIMARY DIAGNOSIS
Patients



Q1-3. Have you ever been diagnosed by a physician as having: emphysema, chronic bronchitis, chronic obstructive pulmonary disease (COPD)? N = 573

Q1-2. How many months in the past 12 months have you had bronchitis or chronic coughing with phlegm/sputum from the chest? For how many years have you had...? N = 573

COPD is frequently thought of as a disease of the elderly. Yet half (50%) of all patients with COPD surveyed were under 65 years old, and nearly a quarter (22%) were under 55 (Figure 3). The average age at diagnosis was 53 years.

The vast majority of people with COPD surveyed (87%) described themselves as white. The proportion of people with COPD who considered themselves African-American (7%), mixed (3%), or other race (3%) was substantially lower than the expected population proportions for those races (Figure 3). This may have been due in part to lower smoking rates among minority groups in the past, a possible underdiagnosis of COPD in these populations, the sample population, or some combination of these factors.

Figure 3: DEMOGRAPHIC PROFILE OF PEOPLE WITH COPD INTERVIEWED

Total number of people interviewed 573

AGE	
45-54	22%
55-64	28%
65-74	29%
75+	21%

GENDER	
Male	40%
Female	60%

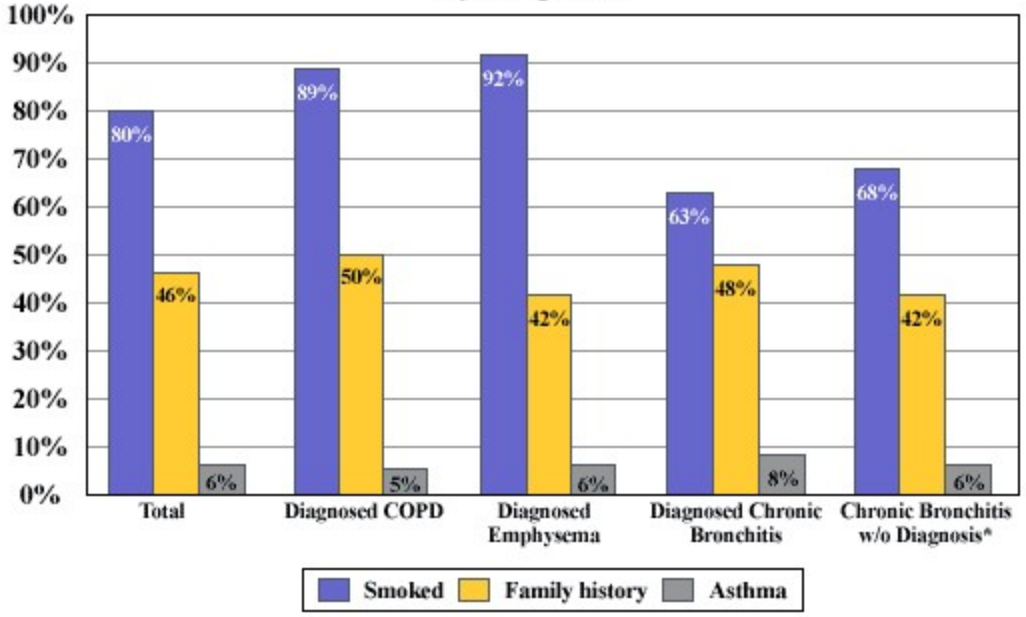
RACE / ETHNICITY	
White	87%
Black	7%
Mixed	3%
Other	3%

WORK STATUS	
Employed full-time	18%
Employed part-time	7%
Unemployed	6%
Retired	52%
Homemaker	4%
Too ill to work	13%

EVER SMOKED	
Yes	80%
No	18%

While COPD is often considered a disease that affects mostly male smokers, more women than men (60% versus 40%) qualified for the survey. Nine out of 10 people with a diagnosis of COPD (89%) or emphysema (92%) were current or former smokers. About three out of five people with diagnosed (63%) or symptomatic (68%) chronic bronchitis had a smoking history (Figure 4). Yet nearly one in five (18%) of all of these patients had never smoked.

Figure 4: SMOKING, FAMILY HISTORY, AND ASTHMA
By Diagnosis



*Respondents in this category had to report that, for at least two years, they had suffered from persistent (at least three months/year) bronchitis or coughing with phlegm/sputum from the chest

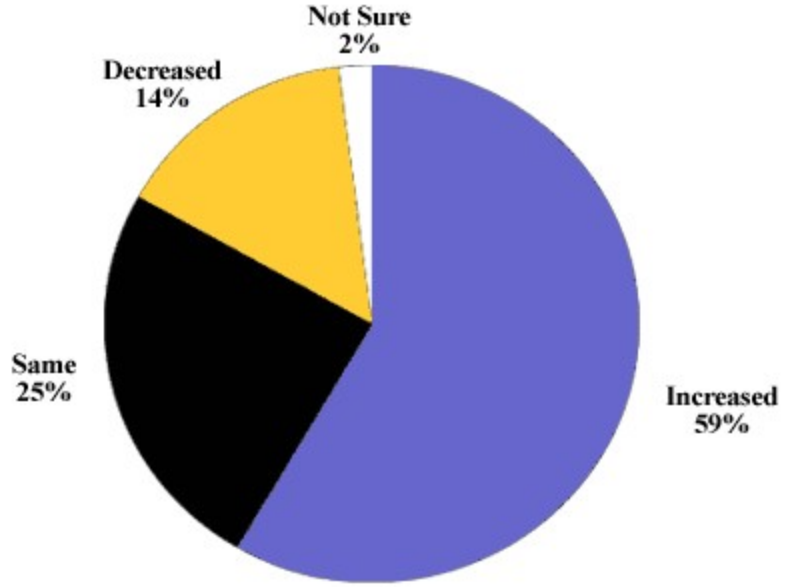
There appears to be a strong familial association with COPD. It is unclear if this familial association is related to genetic factors, environmental factors, or both. Half of the patients with COPD surveyed (50%) reported that members of their immediate family outside of their household have had COPD, emphysema, or chronic bronchitis. Similar proportions of people diagnosed with emphysema (42%), and people with diagnosed (48%) or symptomatic (42%) chronic bronchitis, had a family history of COPD (Figure 4).

The survey revealed that most physicians believe that cases of COPD have increased. Nearly six out of 10 physicians (59%) said that the prevalence of COPD in America has increased in the last 10 years (Figure 5).

** Respondents in this category had to report that, for at least two years, they have suffered from persistent (at least three months/year) bronchitis or coughing with phlegm/sputum from the chest.*

Figure 5: PREVALENCE OF COPD IN PAST 10 YEARS

Doctors' Perceptions



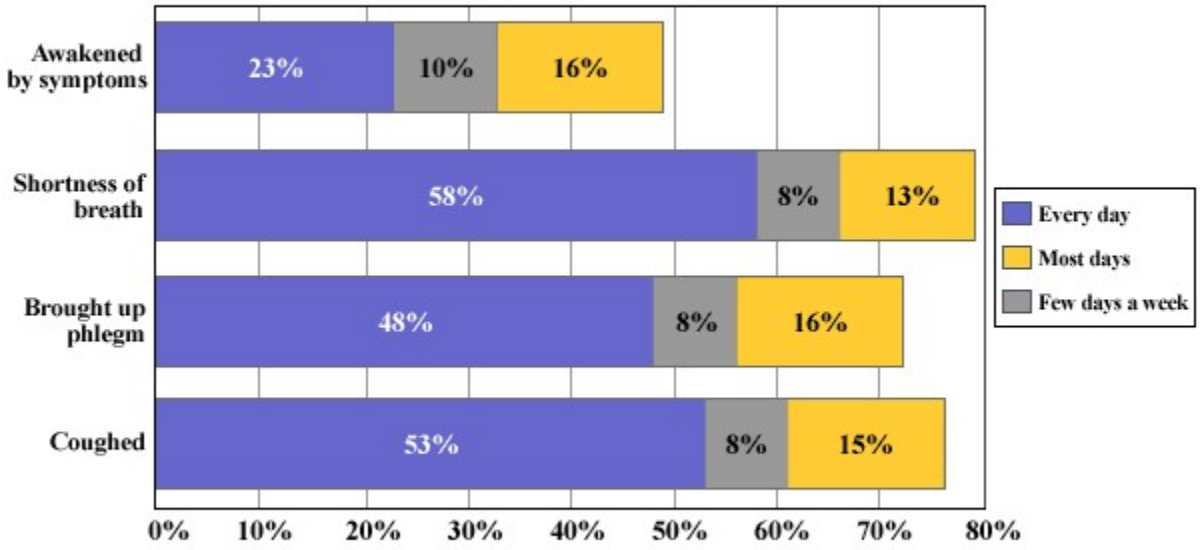
D9. Based on what you know or have heard, would you say that the prevalence of COPD in the USA has increased, decreased, or remained about the same over the past 10 years? N = 203

SYMPTOM FREQUENCY AND SEVERITY

Although COPD symptoms are more chronic than episodic, patients may have acute changes, and the severity of symptoms may vary during the year. Hence, patients surveyed were asked about the frequency of their symptoms during their worst three-month period in the past year (Figure 6). During that time period:

- **79%** had been short of breath at least a few days a week; **58%** had shortness of breath every day.
- **76%** had coughed at least a few days a week; **53%** had coughed every day.
- **72%** had brought up phlegm at least a few days a week; **48%** had brought up phlegm every day.
- **49%** had awakened at night due to coughing, wheezing, or shortness of breath at least a few days a week; **23%** had been awakened by these symptoms every night.

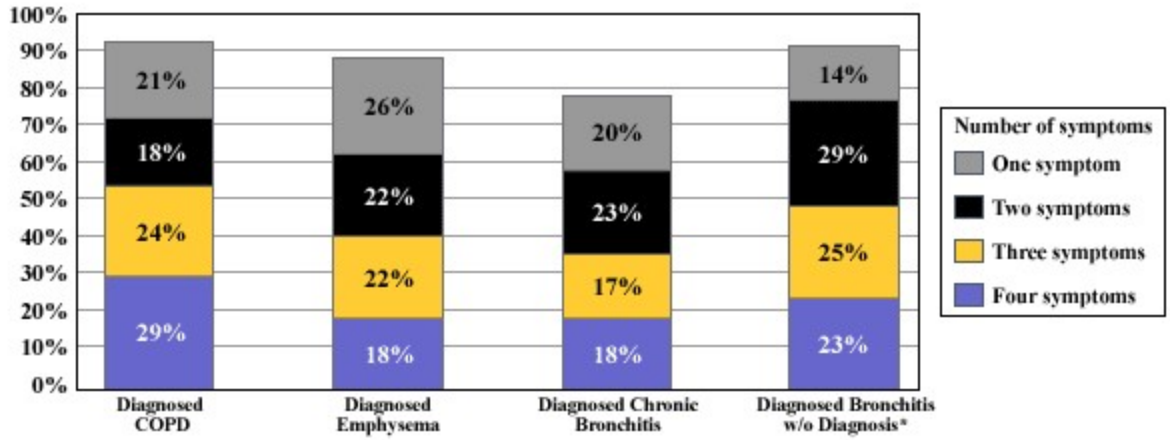
Figure 6: SYMPTOM FREQUENCY
Worst 3 Months in Past Year



P11. Has there been any three-month period in the past year when you (READ ITEM) – every day, most days a week, a few days a week, a few days a month, less than that? N = 573

The vast majority of people diagnosed with COPD (90%) said they had one or more COPD symptoms either every day or most days during their worst three-month period in the past year. Surprisingly, the same percentage of people with undiagnosed COPD (91%) also reported one or more of these symptoms every day or most days (Figure 7).

Figure 7: NUMBER OF SYMPTOMS ON ALL OR MOST DAYS
Worst 3 Months in Past Year



Q11. Has there been any three-month period in the past year when you (READ ITEM) - every day, most days (N = 573):

a. Coughed?
b. Brought up phlegm or sputum?
c. Had shortness of breath?
d. Were awakened at night by coughing or shortness of breath?

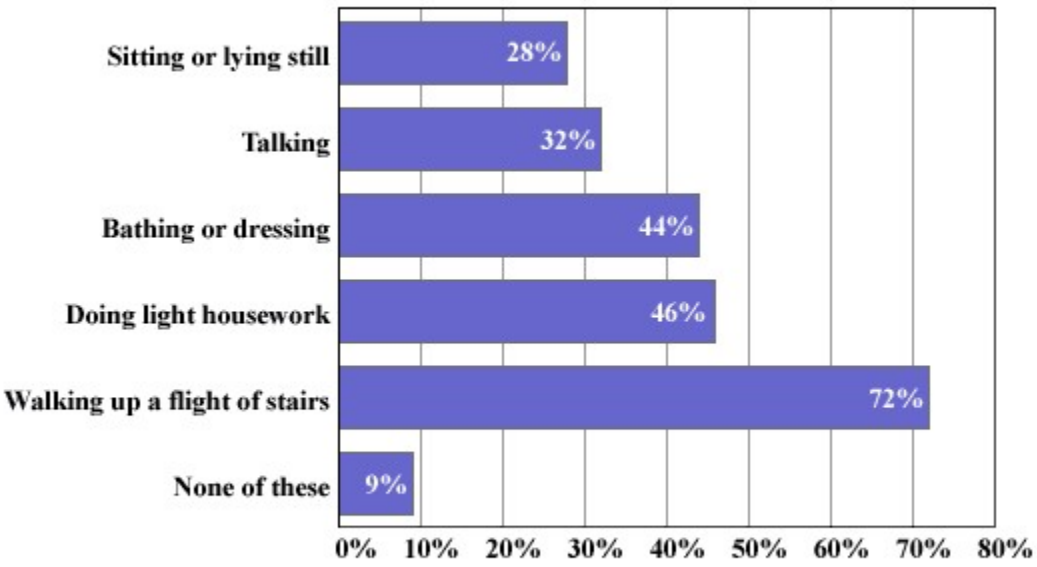
*Respondents in this category had to report that, for at least two years, they had suffered from persistent (at least three months/year) bronchitis or coughing with phlegm/sputum from the chest.

Impact of Breathlessness on Activities

The impact of breathlessness on everyday activities was striking (Figure 8):

- **28%** had difficulty breathing even when sitting or lying still.
- **32%** got short of breath when talking.
- **44%** got short of breath when washing or dressing.
- **46%** got short of breath when doing light housework.
- **72%** felt breathless when walking up one flight of stairs.

Figure 8: DO YOU FEEL BREATHLESS WHEN...

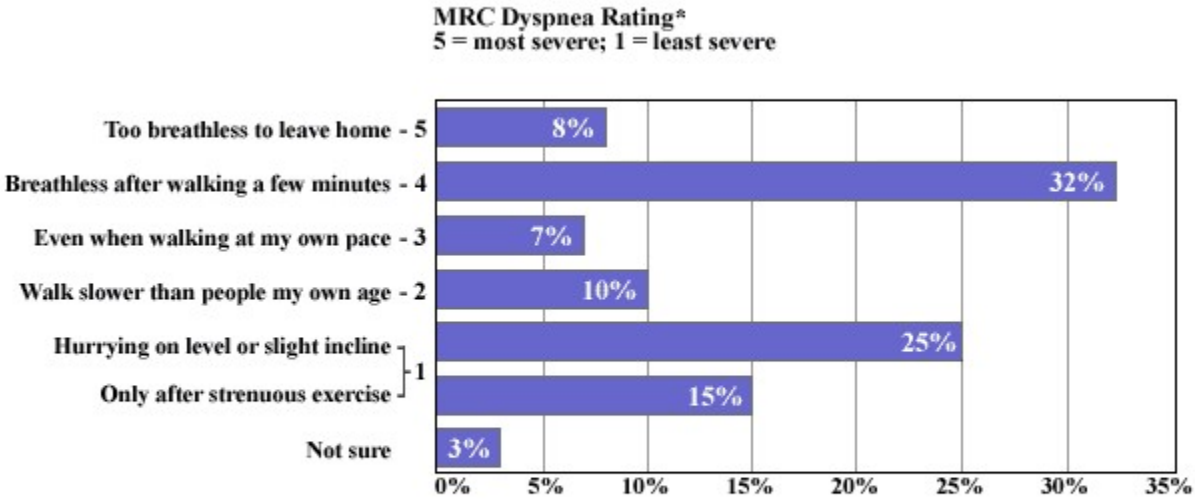


P13. Do you feel breathless when...? N = 573

Patients were asked to rate their condition according to the Medical Research Council (MRC) five-point breathlessness scale (Figure 9):[4]

1. **25%** got breathless when hurrying on level ground or walking up a slight incline; **15%** got breathless after strenuous exercise— the mildest degree of dyspnea.
2. **10%** walked slower than most people their age.
3. **7%** got breathless even when walking at their own pace.
4. **32%** had to stop for breath after walking a few minutes.
5. **8%** were too breathless to leave the house— the most severe level of dyspnea.

Figure 9: BEST DESCRIBES YOUR BREATHLESSNESS

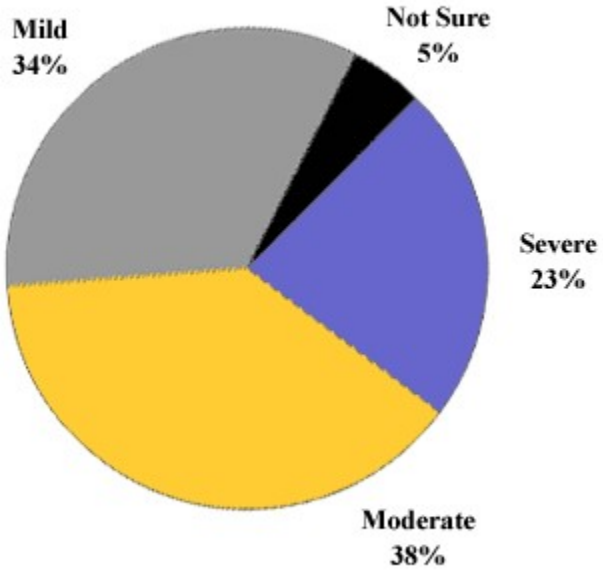


P12. Which of the following best describes how breathless you get, these days? N = 573

*Dyspnea is defined as breathlessness.

Despite this level of functional impairment, not even a quarter (23%) of patients with COPD described their condition as "severe." Thirty-eight percent described their COPD as "moderate," and another third (34%) described their condition as "mild" (Figure 10).

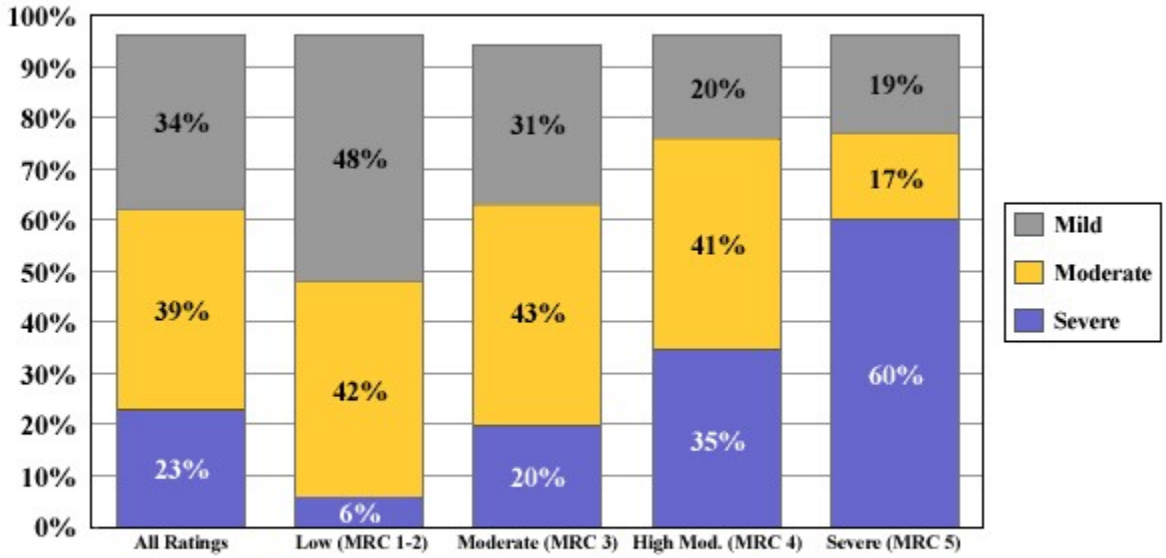
Figure 10: HOW SEVERE IS YOUR (CONDITION)?



P4. Overall, how severe is your (condition), now? Is it severe, moderate, or mild? N = 573

Indeed, there was a significant disparity between patient perceptions of their disease severity and the degree of severity indicated by the MRC breathlessness scale. A surprising 36% of people with the most severe degree of breathlessness described their condition as "mild" or "moderate" (Figure 11).

Figure 11: PERCEIVED SEVERITY OF RESPIRATORY CONDITION



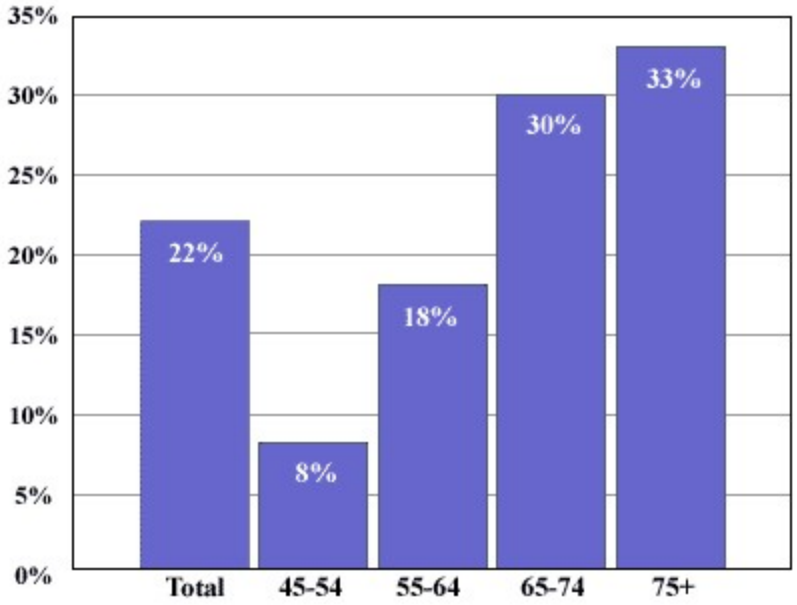
MRC Scale Rating as Shown in Fig. 9 (Degree of Breathlessness: Least – Most)

P4. Overall, how severe is your (CONDITION), now? Is it severe, moderate, or mild? N = 573
P12. Which of the following best describes how breathless you get, these days? N = 573

Symptom Severity and Age

The survey findings corroborated the clinical observation that COPD tends to get worse as patients get older: use of home oxygen therapy, an indicator of disease severity, increased from 8% among 45-54 year olds to 33% among patients 75 and older (Figure 12).

Figure 12: OXYGEN USE FOR COPD BY AGE



P27a. Have you used home oxygen therapy for your (CONDITION) in the past 12 months? N = 573

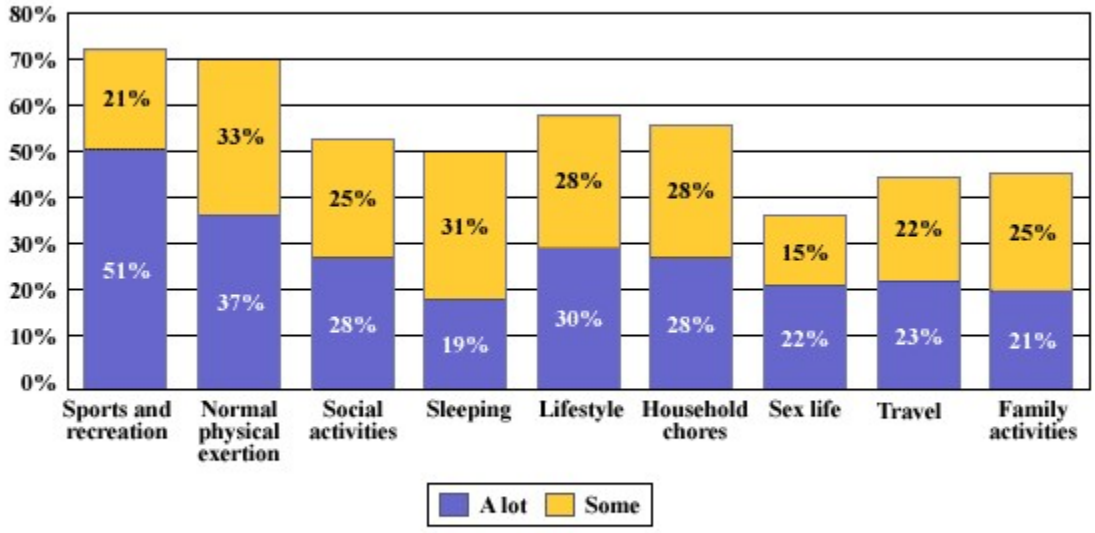
Yet surprisingly, younger patients reported more severe and frequent symptoms than did older patients. One possible explanation for this finding— older patients, not younger patients, should be reporting more severe and frequent symptoms— is that younger patients were more acutely aware of their symptoms. Older patients may have grown so accustomed to living with COPD that they tended to underreport their symptoms and adjusted their lifestyles in order to minimize the occurrence of symptoms.

BURDEN OF DISEASE

Physical Limitations
A majority of patients with COPD said their condition limited what they can do (some or a lot) in (Figure 13):

- Normal physical exertion (**70%**)
- Lifestyle (**58%**)
- Household chores (**56%**)
- Social activities (**53%**)
- Sleeping (**50%**)

Figure 13: RESPIRATORY CONDITION LIMITS WHAT YOU CAN DO IN...

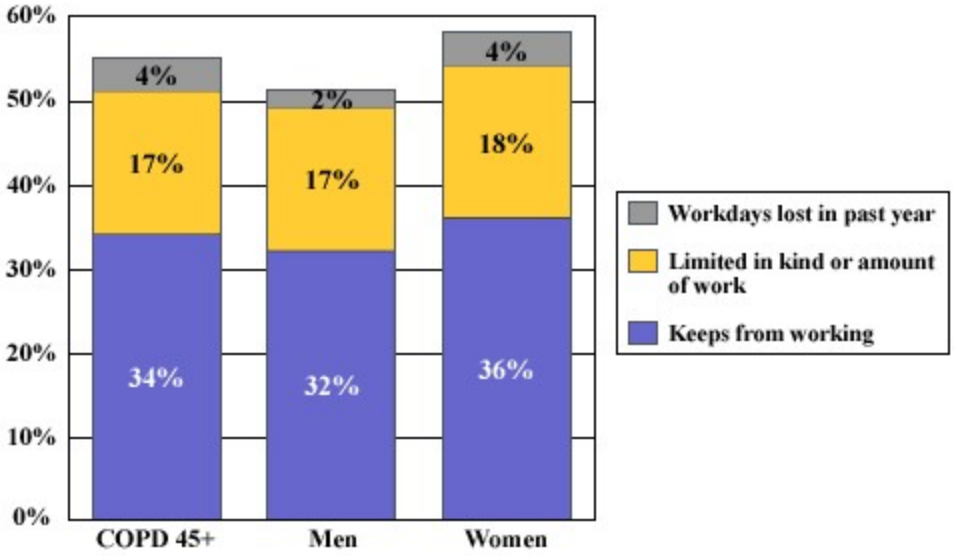


P17. How much do you feel your respiratory condition limits what you can do in each of the following areas? N = 573

Half of people with COPD (51%) reported that their condition limited their ability to work (Figure 14).

- **34%** said that COPD kept them from working.
- **17%** said their condition limited them in the kind or amount of work they can do.

Figure 14: WORK LIMITATIONS DUE TO CONDITION
By Gender



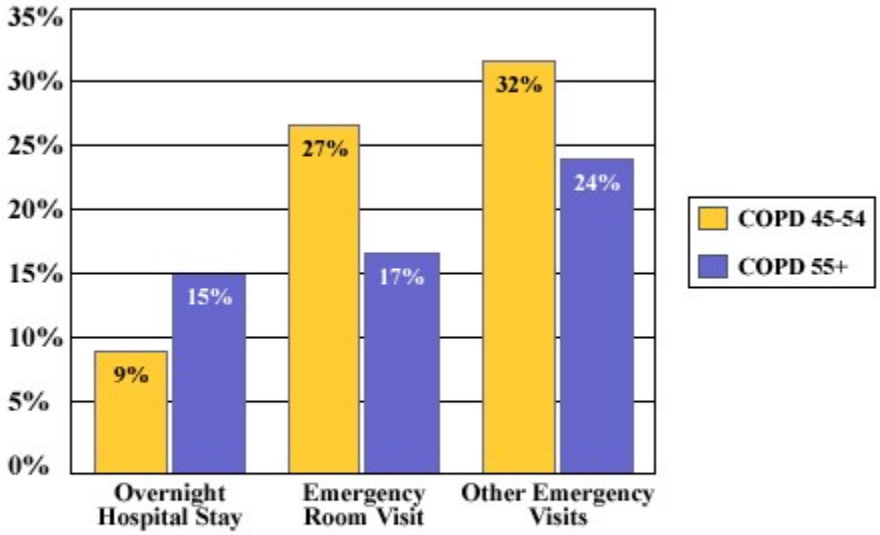
P8a. Does your (CONDITION) keep you from working? N = 573
P8b. Are you limited in the kind or amount of work you can do because of your (CONDITION)? N = 573
P9a. Have you missed work in the past 12 months due to your (CONDITION)? N = 573

Measures of work limitation most likely understated the disease burden because more than half of these people were already retired (Figure 3).

The disease burden of COPD was also seen in the demand for urgent or emergency medical care. Among people aged 55 and older with COPD (Figure 15):

- **15%** were hospitalized overnight in the past year for their condition.
- **17%** had emergency room visits in the past year for their condition.
- **24%** had other unscheduled medical visits in the past year for their condition.

Figure 15: PAST YEAR HEALTHCARE UTILIZATION FOR CONDITION



P5b. Have you been hospitalized overnight in the past 12 months or longer as a direct result of your (CONDITION)? N = 573

P6a. Have you gone to a hospital emergency room in the past 12 months for your (CONDITION)? N = 573

P7a. Aside from any hospitalizations and emergency room visits, has your (CONDITION) caused any unscheduled emergency visits to a doctor's office, clinic or somewhere else in the past 12 months? N = 573

This use of urgent care among patients with COPD was surprising given the frequency of regularly scheduled physician visits they reported. In addition, just as younger patients reported more severe and frequent symptoms than did older patients, there was also a greater degree of healthcare utilization among younger patients (i.e., those aged 45-54) (Figure 15):

- **27%** had emergency room visits in the past year for their condition.
- **32%** had other unscheduled emergency visits for their condition.

Doctor visits were relatively frequent for patients with COPD (Figure 16). Nearly a quarter (24%) saw a doctor for their condition at least once a month and a total of 74% saw a doctor at least a few times a year. However, 13% did not see a doctor about their condition in the past year.

Psychosocial Impact

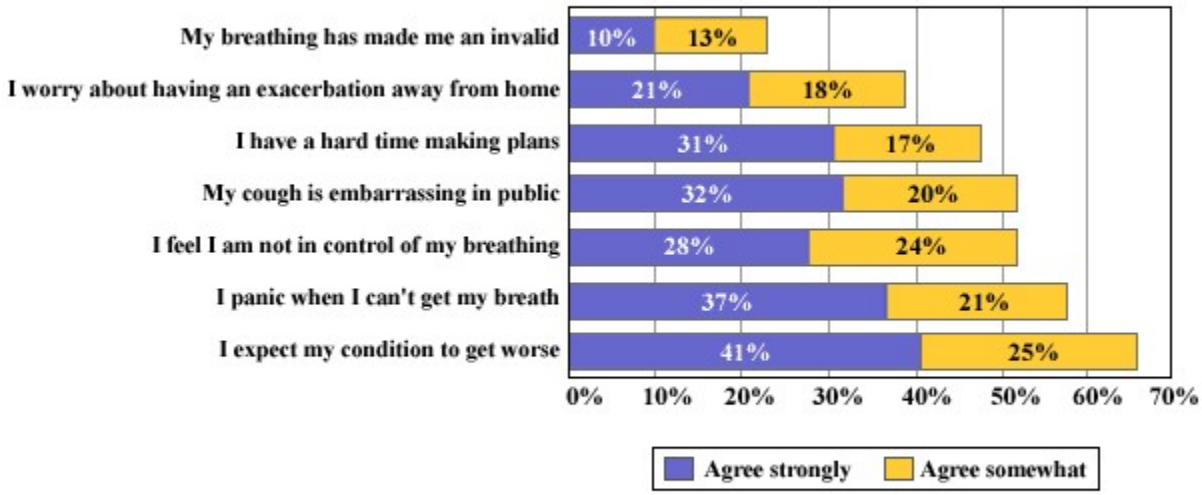
Nearly a quarter (23%) of patients said their breathing problems have made them an invalid (Figure 17). Even larger proportions of patients with COPD said they:

- worried about having an exacerbation away from home (**39%**)
- had a hard time making plans because of their condition (**47%**)
- felt that they are not in control of their breathing (**52%**)

- panicked when they could not get their breath (**58%**)
- admitted that their coughing was embarrassing in public (**52%**)
- expected their condition to get worse (**66%**)

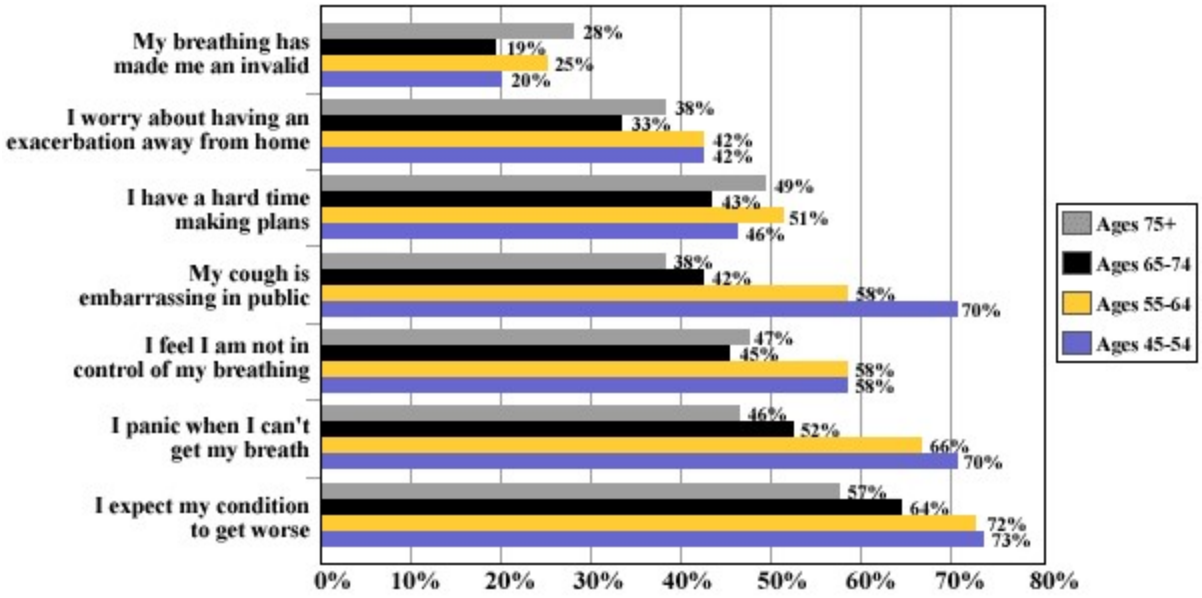
The apparent psychosocial impact of COPD appeared to vary with age. On five out of seven measures, younger patients appeared to be more distressed by their condition than did older patients (Figure 18).

Figure 17: IMPACT OF CONDITION ON PATIENTS



P14. Would you agree strongly, agree somewhat, disagree somewhat, or disagree strongly with each of the following statements? N = 573

Figure 18: IMPACT OF CONDITION ON PATIENTS BY AGE



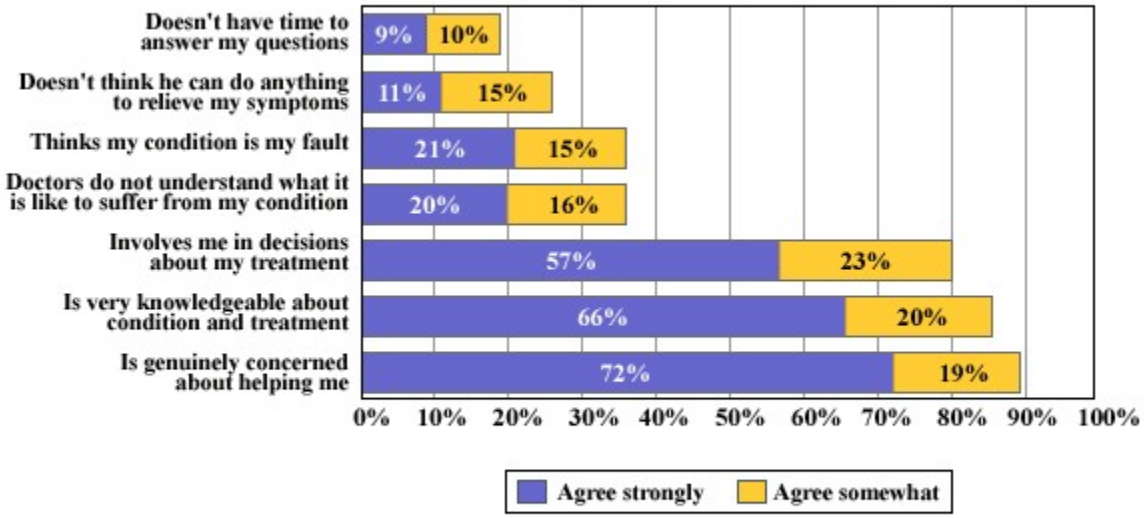
P14. Would you agree strongly, agree somewhat, disagree somewhat, or disagree strongly with each of the following statements? N = 573

PHYSICIAN CARE AND COPD MANAGEMENT

Patients with COPD gave their doctors high marks for knowledge and care (Figure 19):

- **91%** said their doctor is "genuinely concerned about helping me."
- **86%** said their doctor is knowledgeable about their condition and treatment.
- **80%** said their doctor involves them in decisions about their treatment.

Figure 19: I AGREE THAT MY DOCTOR...



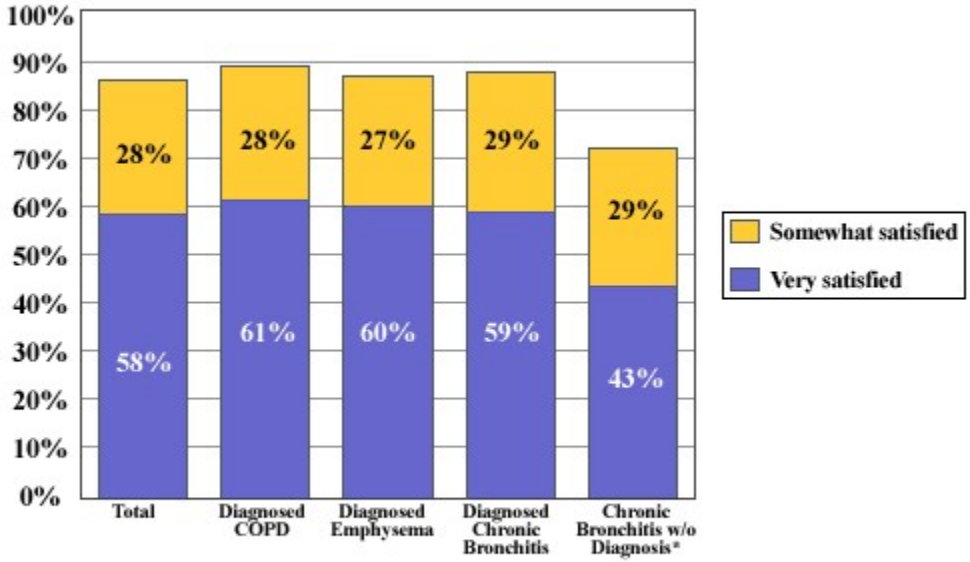
P31. Based on your experience with the doctor you see most often for your condition, would you agree or disagree with the following statements? N = 573

On the other hand, some patients with COPD indicated significant problems with doctor-patient interactions:

- **36%** said doctors do not understand their suffering from the condition.
- **36%** said their doctor thinks the condition is their fault.
- **26%** said their doctor doesn't think he can do anything to relieve their symptoms.
- **19%** said their doctor doesn't have time to answer their questions.

Overall, most patients were satisfied with their care. Six out of seven said they were very (58%) or somewhat (28%) satisfied with their doctor's management of their condition (Figure 20). But less than half (42%) said their doctor's advice had helped improve their ability to manage their condition "a lot" (Figure 21).

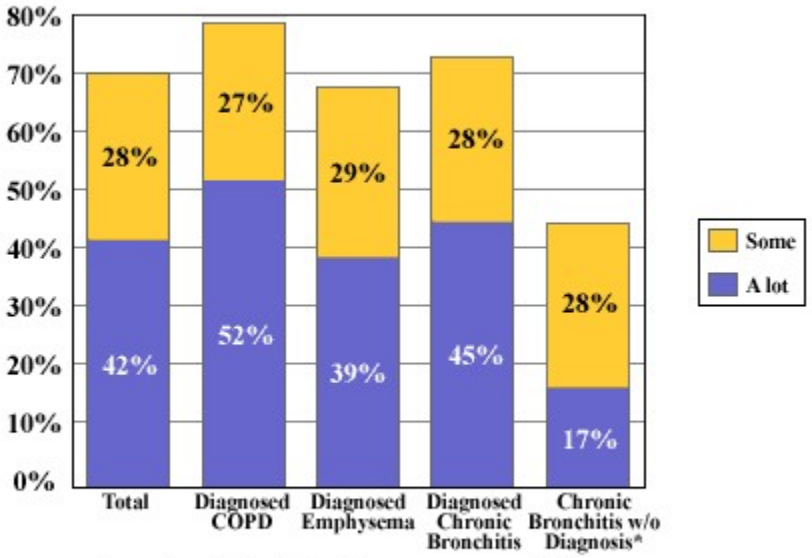
Figure 20: SATISFACTION WITH DISEASE MANAGEMENT
By Diagnosis



P30. Overall, how satisfied are you with your doctor's management and treatment of your (CONDITION)? Are you very satisfied, somewhat satisfied, somewhat dissatisfied, or very dissatisfied? N = 573

*Respondents in this category had to report that, for at least two years, they had suffered from persistent (at least three months/year) bronchitis or coughing with phlegm/sputum from the chest.

Figure 21: IMPACT OF DOCTOR'S ADVICE
By Diagnosis



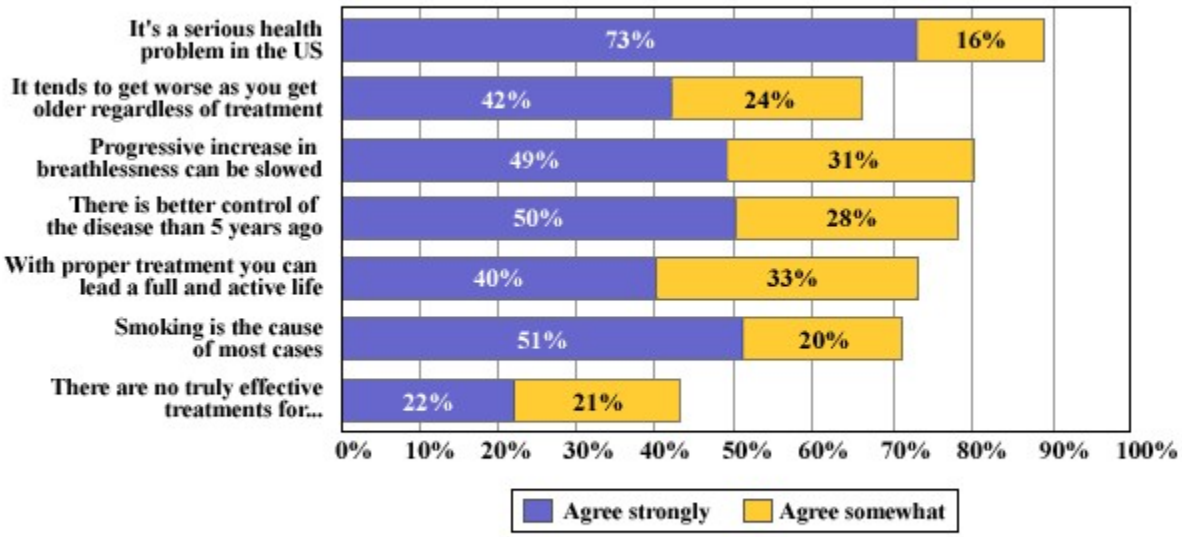
P29. How much has your doctor's advice helped improve your ability to manage your respiratory symptoms? Has it improved it – a lot, some, only a little, or not at all? N = 573

*Respondents in this category had to report that, for at least two years, they had suffered from persistent (at least three months/year) bronchitis or coughing with phlegm/sputum from the chest.

Patients overwhelmingly agreed (89%) that COPD is a serious health problem in the United States, but they were also optimistic about new developments and the benefits of proper management (Figure 22). Though two thirds (66%) acknowledged that COPD tended to get worse with age regardless of treatment, most had positive attitudes about treatment:

- **80%** felt that the progressive increase in breathlessness can be slowed.
- **78%** felt that there is better control of the disease than there was five years ago.
- **74%** felt that with a proper treatment plan it is possible to lead a full and active life.

Figure 22: PATIENT ATTITUDES ABOUT COPD



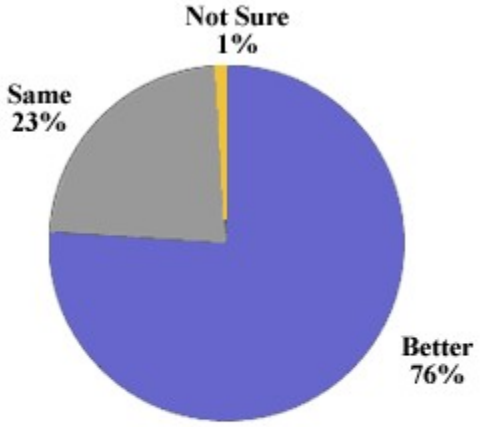
P46. Now I am going to read you a series of statements, and I would like you to tell me whether you agree strongly... N = 573

Doctors shared their patients' optimism (Figure 23):

- **76%** of doctors said that the long-term health outlook for patients with COPD is better now than it was 10 years ago.
- Most of these doctors (**78%**) attributed this improvement to better medications.

Figure 23: LONG-TERM HEALTH OUTLOOK FOR COPD

Doctors' Perceptions



D10a. Compared to 10 years ago, would you say that the long-term health outlook for persons with COPD has become better, become worse, or has stayed about the same? N = 203

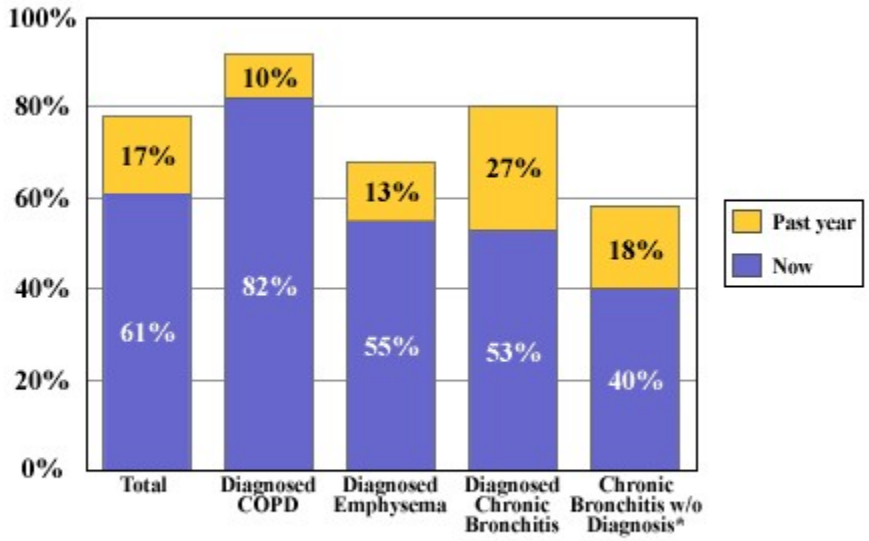
D10b. Why has the health outlook improved for persons with COPD? N = 154

Reasons for Improvement in Outlook	Doctors who feel there is improvement
Reasons for Improved Health Outlook	**Percent**
Better Compliance	11%
Better Lifestyle	11%
Better Medications	78%

TREATMENT ATTITUDES AND PRACTICES

Only 61% of patients with COPD reported that they were taking any prescription medicine for their condition; another 17% said they had taken prescription medicines in the past year but were not doing so at the time of the interview (Figure 24).

Figure 24: PRESCRIPTION MEDICINE USE FOR CONDITION
By Diagnosis

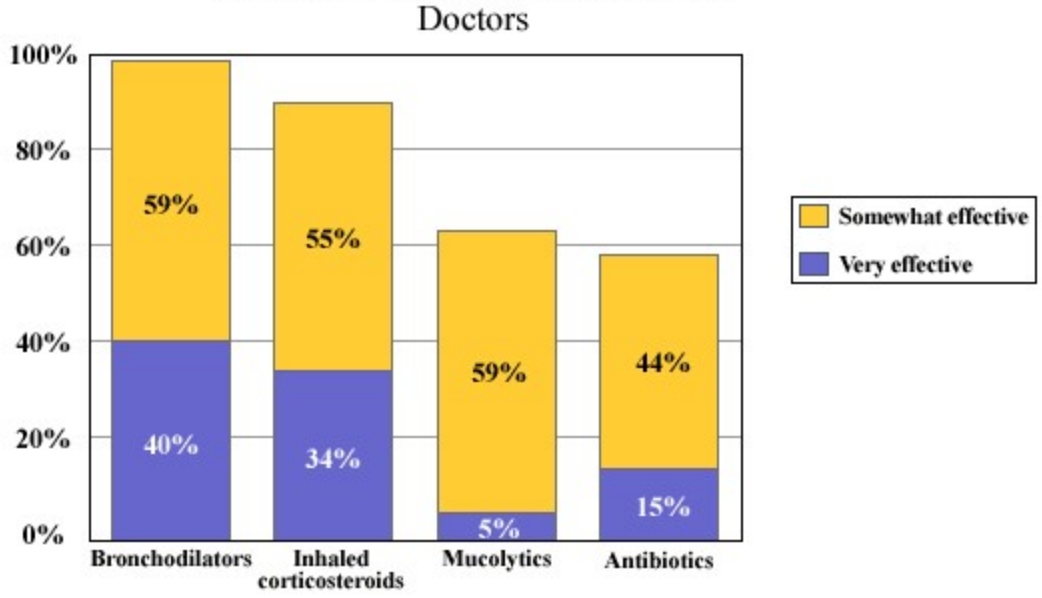


P32a-b. Are you taking any prescription medicine for (CONDITION)? When was the most recent time that you took a prescription medicine for (CONDITION)? N = 573

*Respondents in this category had to report that, for at least two years, they had suffered from persistent (at least three months/year) bronchitis or coughing with phlegm/sputum from the chest.

Doctors rated bronchodilators (40%) and inhaled corticosteroids (34%) as very effective in the treatment of mild to moderate COPD. The role of these anti-inflammatory medications in COPD therapy is not well-defined, and they are not yet approved for COPD in the United States. However, clinical trials are underway. Ninety-nine percent of doctors interviewed said that bronchodilators were somewhat effective for mild to moderate COPD (Figure 25). Similarly, nine out of 10 (89%) agreed that inhaled corticosteroids were somewhat effective for mild to moderate COPD.

Figure 25: EFFECTIVENESS OF SELECTED MEDICATIONS IN MILD TO MODERATE COPD

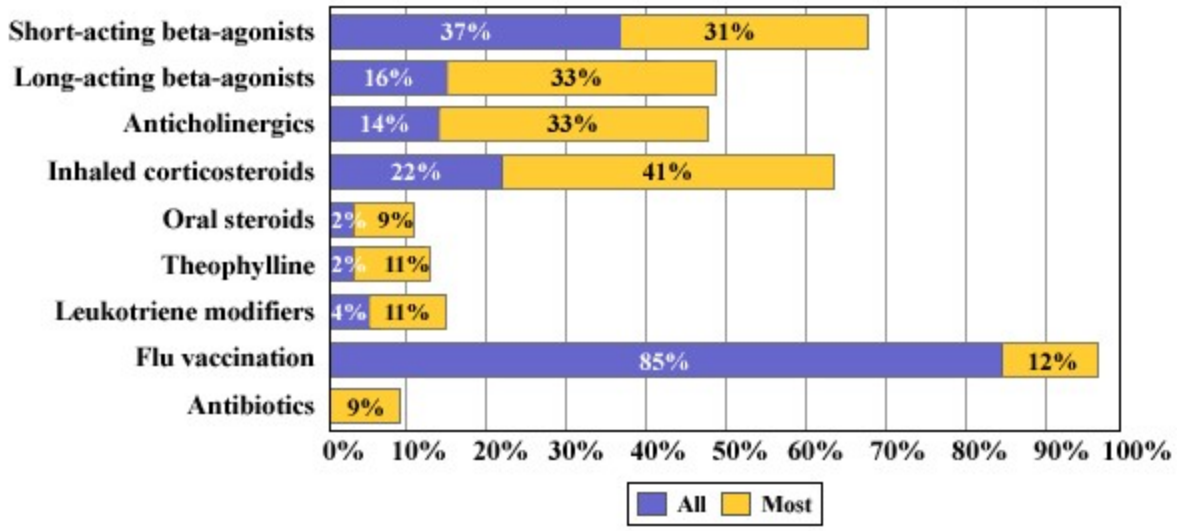


D25-28. How effective are (ITEM) in the treatment of mild to moderate COPD? Are they usually – very effective, somewhat effective, not too effective, or not effective at all? N = 203

Substantial proportions of doctors reported that they would normally prescribe the following to "all or most" newly diagnosed patients (Figure 26):

- Short-acting beta$_2$-agonists (**67%**)
- Inhaled corticosteroids (**62%**)
- Anticholinergics (**47%**)
- Long-acting beta$_2$-agonists (**48%**)

Figure 26: MEDICATIONS NORMALLY PRESCRIBED FOR NEWLY DIAGNOSED MODERATE COPD
Doctors

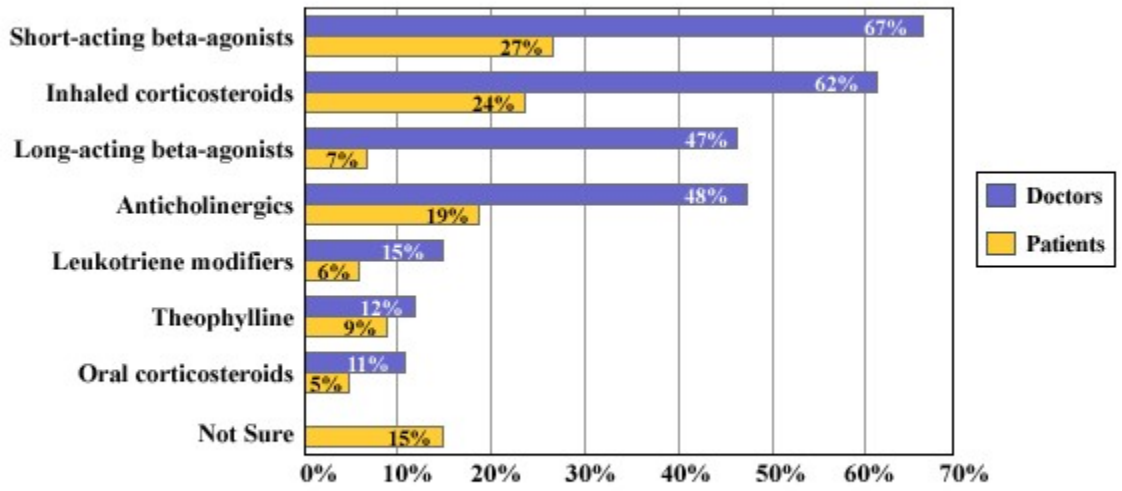


D21. What proportion of newly diagnosed patients with moderate or Stage 2 COPD would you normally prescribe (ITEM) – all, most, some, only a few, or none? N = 203

Virtually all doctors (96%) said they would normally prescribe flu vaccinations to all or most newly diagnosed patients with moderate, or Stage 2, COPD (Figure 26).

The percentage of patients with COPD who reported taking specific types of prescription medicines for their condition was substantially less than the proportion of physicians who said they would prescribe these medications for moderate COPD. One notable disparity: while about the same proportion of physicians said they would recommend long-acting beta$_2$-agonists (47%) as often as anticholinergics (48%), substantially fewer patients reported taking long-acting beta$_2$-agonists (7%) than anticholinergics (19%) in the past year (Figure 27).

Figure 27: NORMALLY PRESCRIBED vs. MEDICINES USED IN PAST YEAR
Doctors and Patients



D21. What proportion of newly diagnosed patients with moderate or Stage 2 COPD would you normally prescribe (ITEM) – all, most, some, only a few, or none? N = 203

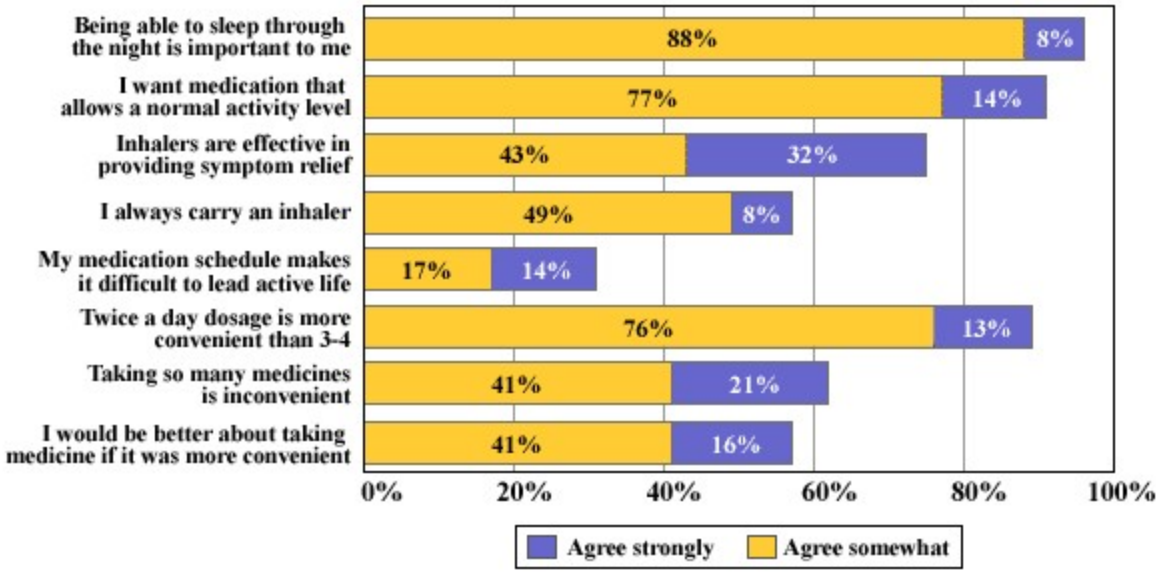
P32C. What is the name of that/those prescription medicines (you take now/you have taken in the past year) for (CONDITION)? Any others? N = 573

Patient attitudes toward treatment, which may be informed by the medications they are taking, suggested that patients perceived a "treatment burden" in addition to a disease burden (Figure 28):

- **31%** said their medication schedule made it difficult to lead an active life.
- **62%** said that taking so many medicines was inconvenient, and **57%** said they would be better about taking their medicine if it were more convenient.
- **89%** agreed that twice-a-day dosing would be more convenient than 3 to 4 times a day.

Figure 28: ATTITUDES ABOUT TREATMENT FOR COPD

Patients

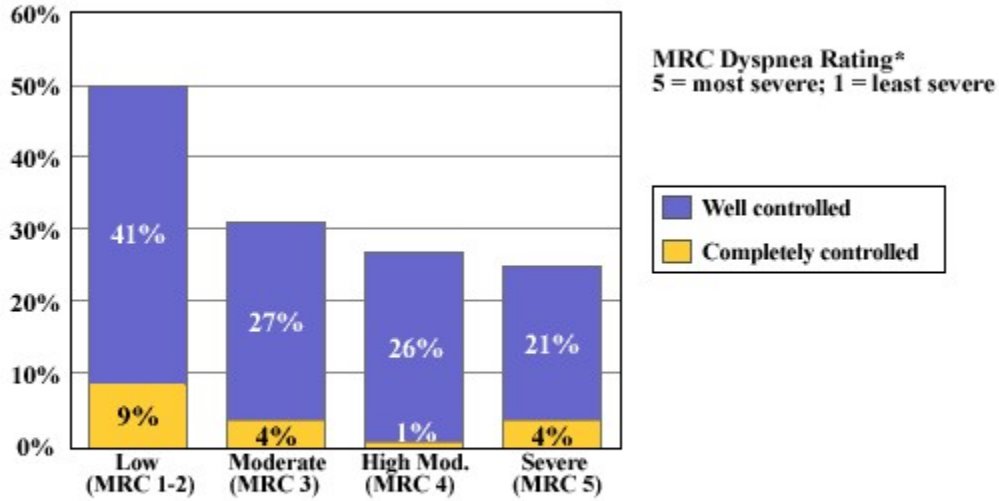


P47. I would like to know whether you agree or disagree with each of the following statements about treatment... N = 573

OVERESTIMATION OF CONTROL

A central problem in disease management is that patients with COPD tend to overestimate their degree of symptom control. The survey showed that patients' self-perception of disease control was not in keeping with more objective measures of disease severity. One in four (25%) patients with the most severe degree of breathlessness said that their COPD had been completely or well controlled in the past year, as did 27% of patients with the next most severe level of breathlessness (Figure 29).

Figure 29: PERCEIVED CONTROL BY SEVERITY
Degree of Breathlessness (MRC Dyspnea Scale)



P15. Overall, how well would you say that your respiratory condition has been controlled in the past 12 months? Would you say it was: completely controlled, well controlled, somewhat controlled, poorly controlled, or not controlled? N = 573

P12. Which of the following best describes how breathless you get, these days? N = 573

*Dyspnea is defined as breathlessness

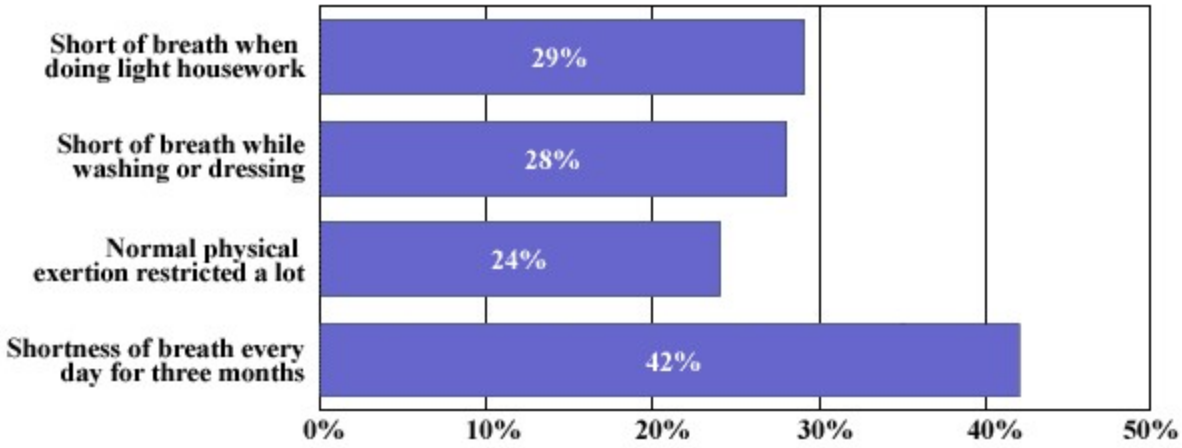
In addition (Figure 30):

- **42%** of patients who said that their COPD had been "completely" or "well controlled" over the past year also said there was a three-month period during that time when they had shortness of breath every day.

- One in four (**24%**) of those who said their COPD had been "completely" or "well controlled" over the past year also said their condition restricts them "a lot" in normal physical exertion.

- More than a quarter of patients who said their COPD had been "completely" or "well controlled" over the past year also said they get short of breath while getting washed or dressing (**28%**) or doing light housework (**29%**).

Figure 30: PERCEIVED CONTROL vs. PHYSICAL STATUS
Response From Patients Who Feel Their Respiratory Condition Is Completely or Well Controlled



P15. Overall, how well would you say that your respiratory condition has been controlled in the past 12 months? Would you say it was: completely controlled, well controlled, somewhat controlled, poorly controlled, or not controlled? N = 573

This underscores the need for better education: if patients underestimate the severity of their condition, or do not realize that it can be better controlled, they may be less likely to seek the care they need.

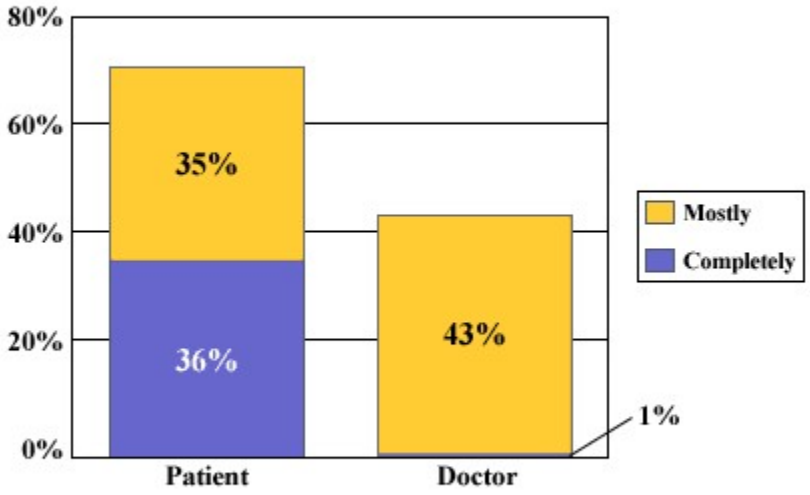
NEED FOR BETTER EDUCATION

The survey revealed that although patients with COPD in general said they felt relatively informed about their condition, they and their doctors also recognized that there was a significant need for better education — particularly in terms of the best ways to manage COPD.

One important finding was that doctors and patients disagreed about how well patients understood the best ways to manage their condition (Figure 31). Although 71% of patients said that they either completely (36%) or mostly (35%) understood the best ways to manage their condition, only 44% of doctors said that most patients completely (1%) or mostly (43%) understood how to manage their condition.

Figure 31: HOW WELL PATIENTS UNDERSTAND HOW TO MANAGE THEIR CONDITION

Patients and Doctors



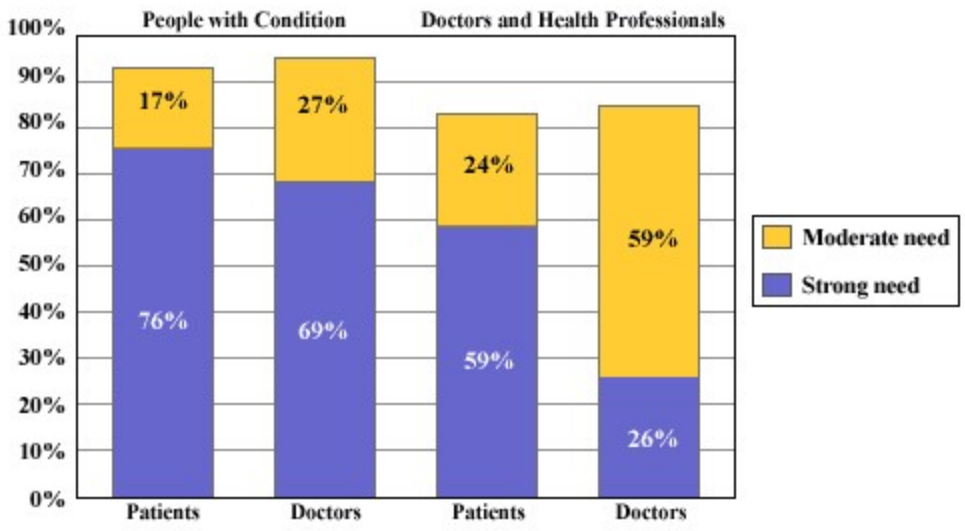
P42. How well do you feel (you/patients) understand the best ways to manage your (CONDITION) – completely, mostly, somewhat, not too well, or not at all? N = 573 Patients

D43. Would you say that most patients understand it – completely, mostly, somewhat, not too well, or not at all? N = 203 Doctors

Yet both doctors and patients agreed that there was a need for better education about the management of the condition (Figure 32):

- **76%** of patients and **69%** of doctors agreed there was "strong need" for better patient education about their condition and treatment.

Figure 32: NEED FOR BETTER EDUCATION
Patients and Doctors



P43/D45. How much need do you think there is for better education of PEOPLE with COPD about their condition and its treatment? Is there a strong need, moderate need, or not much of a need? N = 573

P44/D46. How much need do you think there is for better education of DOCTORS about the management of COPD? Do you think there is a great need, moderate need, or not much of a need? N = 203

Two other areas where better education might be particularly useful:

- **Underdiagnosis:** There may be a vast number of Americans who are suffering and not getting proper treatment. Educational campaigns may be able to alert undiagnosed patients to COPD symptoms and urge them to seek further information from their healthcare providers.

- **Treatment Options:** Given patient complaints about the inconvenience of medications (Figure 28), it might be useful for patients to talk with their healthcare providers about ways they can simplify their treatment regimen.

CONCLUSIONS

In addition to the major findings outlined in the overview, there are several general conclusions that can be drawn from the survey findings:

- COPD is a debilitating disease. Shortness of breath and other symptoms took a tremendous toll on the patients interviewed.

- There was a significant gap between the level of disease control that patients reported and more objective indicators of the impact and severity of their condition. This disparity may reflect patients' underestimation of the degree to which COPD can be managed and therefore a troublesome tendency to accept their condition as the best that can be expected.

- Doctors and patients agreed there is a need for better education about ways to manage the disease. Patients should talk to their healthcare providers about simple treatment options to improve lung function.

Examination

Select the ***best*** answer to each of the following items. Mark your responses on the Answer form.

1. COPD costs the U.S. economy an estimated $_____ a year.

a. 489.4 million
b. 52 billion
c. 31.9 billion
d. 872.2 billion

2. Chronic obstructive pulmonary disease (COPD) is an umbrella term used to describe airflow obstruction that is associated mainly with _____.

a. emphysema
b. chronic bronchitis
c. all of the above
d. none of the above

3. _____ out of 10 people with a diagnosis of COPD or emphysema were current or former smokers.

a. Three
b. Five
c. Seven
d. Nine

4. There appears to be a strong familial association with COPD.

a. True
b. False

5. Despite their level of functional impairment, only ___% of patients with COPD described their condition as "severe."

a. 5
b. 10
c. 23
d. 42

6. The survey findings corroborated the clinical observation that COPD tends to get worse as patients get older: use of home oxygen therapy, an indicator of disease severity, increased from 8% among 45-54 year olds to ___% among patients 75 and older.

a. 14
b. 19
c. 33
d. 63

7. Younger patients reported more severe and frequent symptoms than did older patients.

a. True
b. False

8. _____ of people with COPD reported that their condition limited their ability to work.

a. 20%
b. 33%
c. 51%
d. 77%

9. _____ said doctors do not understand their suffering from the condition.

a. 16%
b. 36%
c. 66%
d. 86%

10. Patients overwhelmingly agreed (89%) that COPD is a serious health problem in the United States, but they were also optimistic about new developments and the benefits of proper management. Though two thirds (66%) acknowledged that COPD tended to get worse with age regardless of treatment, most had positive attitudes about treatment.

a. True
b. False

11. _____ of doctors said that the long-term health outlook for patients with COPD is better now than it was 10 years ago.

a. 26%
b. 56%
c. 76%
d. 96%

12. _____ of doctors interviewed in this study agreed that inhaled corticosteroids were somewhat effective for mild to moderate COPD.

a. 19%
b. 39%
c. 69%
d. 89%

13. Virtually all doctors (96%) said they would normally prescribe flu vaccinations to all or most newly diagnosed patients with moderate, or Stage 2, COPD

a. True
b. False

14. A central problem in disease management is that patients with COPD tend to overestimate their degree of _____.

a. illness
b. medication compliance
c. symptom control
d. none of the above

15. Given patient complaints about the _____, it might be useful for patients to talk with their healthcare providers about ways they can simplify their treatment regimen.

a. symptoms of COPD
b. degree of their illness
c. inconvenience of medications
d. none of the above

16. According to this course, in the surveys conducted More than a quarter of patients who said their COPD had been "completely" or "well controlled" over the past year also said they get short of breath while getting washed or dressing (28%) or doing light housework (29%).

a. True
b. False

17. There may be a vast number of Americans who are suffering and not getting proper treatment. Educational campaigns may be able to alert undiagnosed patients to COPD symptoms and urge them to seek further information from their healthcare providers.

a. True
b. False

18. In the study it was found that there was no gap between the level of disease control that patients reported and more objective indicators of the impact and severity of their condition.

a. True
b. False

19. According to the study, given patient complaints about the inconvenience of medications, it might be useful for patients to talk with their healthcare providers about ways they can simplify their treatment regimen.

a. True
b. False

20. In the study it was reported that over 90% studied said their doctor is "genuinely concerned about helping me."

a. True
b. False

EMERGENCY RESPIRATORY CARE

LEARNING OBJECTIVES

Upon completion of this course, you should be able to:

1. Name three diseases associated with breathing emergencies.
2. Name three breathing devices and the expected oxygen delivery each provides.
3. Describe the emergency management of choking and airway obstruction.
4. Describe the emergency treatment of the drowning and near drowning patient.
5. Describe the emergency treatment of patients with carbon monoxide poisoning.

INTRODUCTION

This course covers the nine steps of the emergency care process. Each step of the process is presented separately in sequential order.

Organized chaos describes the emergency room. The nine steps of the emergency care process outlined in this class are the organized part of the chaos. By using the same care process, all members of the emergency team can anticipate the care of the other and interrelate as a team. A team approach leads to stronger professional practices and improved patient outcomes. During a true emergency, it may be necessary to perform the steps simultaneously or out of sequence. When the care process is known and the same for all team members, the ability to adapt to change during a true emergency is easy.

PART ONE : BREATHING EMERGENCY

The organized systematic care process outlined in this section optimally manages the patient with a breathing emergency. The steps include assessment, problem identification, planning, interventions, ongoing evaluations, and disposition. Detailed information is included for the common medications used for patients with a breathing emergency. The related information section at the end of the course provides an overview of terms, concepts, and pathophysiology related to breathing emergencies.

Topics discussed in this course include:

- ABG critical values
- Acid-base imbalances
- Acute epiglottitis
- Acute and chronic bronchitis
- Asthma
- Autotransfusion
- COPD
- Croup
- Endotracheal tube placement confirmation technique
- Five steps for successful extubation including NIF and FVC
- Mechanical ventilation modes
- Oxygen delivery devices
- Oxygen saturation levels for arterial and venous blood
- Petechial rashes
- Pneumonia
- Post arrest ventilator settings
- Pulmonary edema and embolus
- Pulse oximetry saturations and corresponding pO_2 levels
- Ratio of respiratory rate to the pulse
- Sodium bicarbonate
- Smoke inhalation
- Spontaneous pneumothorax

Rapid ABC Assessment

1. Is the patient's airway patent?
    a. The airway is patent when speech is clear and no noise is associated with breathing.
    b. If the airway is not patent, consider clearing the mouth and placing an adjunctive airway.
2. Is the patient's breathing effective?
    a. Breathing is effective when the skin color is within normal limits and the capillary refill is < 2 seconds.
    b. If breathing is not effective, consider administering oxygen and placing an assistive device.
3. Is the patient's circulation effective?
    a. Circulation is effective when the radial pulse is present and the skin is warm and dry.
    b. If circulation is not effective, consider placing the patient in the recumbent position, establishing intravenous access, and giving a 200 ml fluid bolus.

The patient's identity, chief complaint, and history of present illness are developed by interview. The standard questions are ***who, what, when, where, why, how, and how much***.
Who identifies the patient by demographics, age, sex, and lifestyle.

What develops the chief complaint that prompted the patient to seek medical advice.
When determines the onset of the symptom.
Where identifies the body system or part that is involved and any associated symptoms.
Why identifies precipitating factors or events.
How describes how the symptom affects normal function.
How much describes the severity of the affect

Patient Identification

1. Who is the patient?
    a. What is the patient's name?
    b. What is the patient's age and sex?
    c. What is the name of the patient's current physician?
    d. Does the patient live alone or with others?

Chief Complaint

The chief complaint is a direct quote, from the patient or other, stating the main symptom that prompted the patient to seek medical attention. A symptom is a change from normal body function, sensation, or appearance. A chief complaint is usually three words or less and not necessarily the first words of the patient. Some investigation may be needed to determine the symptom that prompted the patient to come to the ER. When the patient, or other, gives a lengthy monologue, a part of the whole is quoted

1. In one to three words, what is the main symptom that prompted the patient to seek medical attention?
    a. Use direct quotes to document the chief complaint.
    b. Acknowledge the source of the quote, e.g., the patient states; John Grimes, the paramedic states; Mary, the granddaughter, states.

History of Present Illness

1. When was the onset of the breathing problem?
2. Are any other symptoms associated with the breathing problem?
3. How does the breathing problem affect normal function?
    a. Does the patient have orthopnea (breathing discomfort in all positions except upright, sitting, or standing) or dyspnea (air hunger)?
    b. Is the patient able to sleep and rest?
    c. Is the patient able to tolerate normal activity?
4. Was any treatment started before coming to the hospital and has it helped?
5. Has the patient had similar problems before?
    a. When was the problem?
    b. What was the diagnosis and treatment?
6. Is the patient on oxygen at home?
    a. What is the rate of flow?
    b. How often does the patient use the oxygen?

7. Has the patient ever been on a breathing machine?
8. Does the patient have any pertinent past history?
    a. Does the patient have heart problems?
    b. Does the patient have asthma, COPD, or emphysema?
    c. Does the patient smoke tobacco or have a smoking history?
9. Does the patient take any routine medications?
    a. What is the name, dosage, route, and frequency of the medication?
    b. When was the last dose?
10. Does the patient have allergies to drugs or foods?
    a. What is the name of the allergen?
    b. What was the reaction?
11. When was the patient's last tetanus immunization?
12. If the patient is female and between the ages of 12 to 50 years, when was the first day of her last menstrual period?

Caregiver Diagnoses

- □ Ineffective airway clearance
- □ Impaired gas exchange
- □ Pain
- □ Altered tissue perfusion
- □ Knowledge deficit
- □ Anxiety
- □ Fluid volume deficit
- □ Activity intolerance

Anticipated Medical Care

Review of the Anticipated Medical Care of Breathing Emergencies	
Exam	Full body
Urine test	None
Blood tests	ABG analysis, CBC, electrolytes, chemistries, drug levels if taking aminophyllin, blood cultures if febrile
Sputum	Culture, gram stain
ECG	ECG for females over 45 years and males over 35 years
X-ray	PA and lateral chest x-ray, portable one view at the bedside for unstable patients

Other	Peak expiratory flow rate (PEFR), ventilation perfusion scan
Diet	NPO
IV	Hydration with NS or Ringer's solution if patient has COPD without fluid overload. No intravenous infusion if the patient has a fluid overload (CHF or pulmonary edema).
Medications	Diuretics, NTG, and potassium replacements for patients with fluid overload. IV steroids and bronchodilators by hand-held nebulizer for patients with COPD.
Other	Supplemental oxygen by mask, bipap, or endotracheal intubation and mechanical ventilation to keep saturation $\geq$94%, an indwelling urinary catheter to monitor urinary output (normal urinary output in a child is 1 to 2 ml/kg per hour and normal adult urinary output is $\geq$ 30 ml/hr.)
Disposition	Hospital admission may be required if the patient is unable to ventilate effectively (respiratory rate > 30, heart rate >120, PEFR < 120 L/min., FEV < 1000 ml, oxygen sat $\leq$ 94%).
Worse case scenario	The worse case scenario is an unnoticed pCO_2 build-up to toxic levels causing coma. Management is mechanical ventilation to correct the acid-base problem.

Initial Assessments and Interventions

1. Ask the patient to undress, remove necklaces and other jewelry that might interfere with the exam, and put on an exam gown. Assist as needed.
2. Get initial vital signs including oxygen saturation. Consider obtaining a rectal temperature if the patient is mouth breathing.
3. Place on oxygen to maintain an oxygen saturation of $\geq$ 94%.
4. Position the patient to expand lungs and enhance breathing, e.g., sitting with arms supported in an armchair-like position.
5. Observe for signs of respiratory distress, e.g., flaring nostrils, the use of accessory muscles, learning forward in a tripod position, head bobbing, and decreased level of alertness. Use these indicators as a quick assessment of the patient's ability to cope with the breathing problem.
6. Perform a focused patient examination
    a. Auscultate the lungs (instruct the patient to take several quick, short, deep breaths).
    b. Inspect for peripheral edema.

c. Evaluate the level of consciousness to use as a base line. Use the mnemonic **AVPU**. Deterioration of the level of consciousness is indicative of hypoxia.

> **A** for alert signifies that the patient is alert, awake, responsive to voice and oriented to person, time, and place.
> **V** for verbal signifies that the patient responds to voice, but is not fully oriented to person, time, or place.
> **P** for pain signifies that the patient does not respond to voice, but does respond to painful stimulus such as a squeeze to the hand.
> **U** for unresponsive signifies that the patient does not respond to painful stimulus.

7. Establish and maintain intravenous access for administration of medications and intravenous fluids.
    a. Hydrate a COPD patient with normal saline
    b. Limit fluids on a CHF or pulmonary edema patient.
8. If the patient is wheezing, initiate treatment with bronchodilators via nebulizer according to hospital policy.
9. Consider placing a urinary indwelling catheter if an accurate output is needed or the patient is activity intolerant.
10. Advise the patient and family if fluids are encouraged or limited. Hydrate a COPD patient and limit fluids on a CHF or pulmonary edema patient.
11. Elevate the siderails and place the stretcher in the lowest position.
12. Inform the patient, family, and caregivers of the usual plan of care. Include time involved for each aspect of the stay and the expected overall time in the ER.
13. Provide the patient with a device to reach someone for assistance and explain how to use it. Ask the patient to call for help before getting off the stretcher.

Ongoing Evaluations and Interventions

> Inform the physician of adverse changes noted during ongoing evaluation. Document that the physician was notified of the adverse change and what orders, if any, were received.

1. Monitor vital signs and effectiveness of breathing and circulation.
2. Keep oxygen saturation $\geq$ 94%.
3. Monitor therapy closely for the patient's therapeutic response to bronchodilators by nebulizer.
    a. Peak flow rates before and after bronchodilator treatments are the most reliable measure of the effectiveness of the bronchodilator.
    b. Onset is rapid. If therapy does not improve the peak flow within 20 minutes, ask the physician for a repeat dose or an alternative.
4. Monitor intake and output hourly.
5. Monitor closely for the development of adverse reactions to therapy.

    a. Perform interventions to relieve the adverse reaction.
    b. Ask the physician for a remedy.
6. Provide the patient with food at mealtimes.
7. Keep the patient, family, and caregivers well informed of the plan of care and the remaining time anticipated before disposition.
8. Monitor the patient's laboratory and x-ray results. Notify the physician of critical abnormalities. Remedy abnormalities as ordered.
9. Notify the physician when all diagnostic results are available for review. Ask for establishment of a medical diagnosis and disposition.

Discharge Instructions

1. Provide the patient with the name of the nurse and doctor in the emergency room.
2. Inform the patient of their diagnosis or why a definitive diagnosis couldn't be made. Explain what caused the problem if known.
3. Instruct the congestive heart failure patient:
    a. To weigh daily until seen by the follow-up physician. A daily weight gain of a couple of pounds is a sign of fluid buildup and the follow-up physician should be notified. An increase in the diuretic medication may be needed.
    b. Notify the follow-up physician immediately for shortness of breath, swelling, or chest pain. If the physician is not immediately available, return to the ER.
4. Instruct the COPD patient that:
    a. The best treatment is prevention, maintaining adequate hydration, using mediations on a regular basis, avoiding smoke, and seeking early treatment.
    b. Influenza and pneumonia are the most common causes of respiratory infections. Ask the patient to seek medical advise about vaccines for influenza and pneumonia.
    c. Follow-up is essential. Notify the follow-up physician immediately for worsening of symptoms. If the physician is not immediately available, return to the ER.
5. Instruct the patient with a rib contusion or a minor rib fracture to report fever, dyspnea on exertion, or sputum production to the follow-up physician as they may indicate pneumonia.
6. Teach the patient how to take the medication as prescribed and how to manage the common side effects. Instruct the patient not to drive or perform any dangerous tasks while taking narcotic pain medications.
7. Recommend a physician for follow-up care. Provide the name, address, and phone number with a recommendation of when to schedule the care.
8. Call the follow-up physician immediately or return to the emergency room if the problem worsens or any unusual symptoms develop. Encourage the patient NOT to IGNORE WORSENING OF SYMPTOMS.
9. Ask for verbal confirmation or demonstration of understanding and reinforce teaching as needed.

Medications

Aminophyllin

Aminophyllin	
Indications	Asthma, wheezing, bronchospasm
Adult dose	5 mg/kg IV loading dose over 30 to 45 minutes, maximum loading dose 500 mg 0.7 mg/kg/hr IV maintenance x 12 hours and then 0.5 mg/kg/hr.
Pediatric dose	5.6 mg/kg IV loading dose over ½ hour, maintenance 1 mg/kg/hr
Onset	IV onset immediate, duration 6 to 8 hours
Compatible	Compatible at Y-site with potassium chloride, Bretylium, Dopamine, heparin, Inocor, Lidocaine, Neosynephrine, nitroglycerin, Pronestyl
Adverse reaction	Restlessness, insomnia, muscle twitching, tachycardia, nausea, vomiting
Note	Check Theophylline level if patient is on oral Aminophylline before giving a loading dose. Theophylline 400 mg equals Aminophyllin 500 mg.

Bumex

Bumex (bumetanide)	
Indications	Fluid overload
Dose	1 to 2 mg IV, maximum 20 mg/day
Onset	IV onset 5 minutes, peak ½ hour, duration 2 to 3 hours
Side effects	Orthostatic hypotension, hypokalemia, hyperglycemia
Monitor	Urinary output, blood pressure

Lasix

Lasix (furosemide)	
Indications	Peripheral edema, congestive heart failure, pulmonary edema
Dose	0.5 to 1 mg/kg over 1 to 2 minutes If no response, double the dose to 2 mg/kg over 1 to 2 minutes
Onset	IV onset 5 minutes, peak ½ hour, duration 2 hours
Side effects	Circulatory collapse, hypokalemia, loss of hearing, nausea
Monitor	Output, blood pressure

Proventil, Albuterol, Ventolin

Proventil, Albuterol, Ventolin	
Indications	Bronchospasm, asthma
Adult Dose	2.5 to 5 mg nebulized
Pediatric dose	Nebulized pediatric dose: Age < 1 year .05 to .15 mg/kg Age 1 to 5 years 1.25 to 2.5 mg/dose Age 5 to 12 years 2.5 mg/dose Age > 12 years 2.5 to 5 mg/dose
Onset	Inhaled onset 5 to 15 min., peak 1 to 1 ½ hour, duration 4 to 6 hours
Side effects	Anxiety, tremors, tachycardia
Monitor	Oxygen saturation, heart rate
Other Bronchodilators	
Bronkosol	A bronchodilator used for patients with cardiac arrhythmia. Usual adult nebulized dose is 0.5 mg in 2.5 ml NS.
Alupent	Alupent is a long acting bronchodilator. Usual adult nebulized dose is 0.3 ml of a 5% solution of 2.5 ml NS.

Solu-Medrol

Solu-Medrol (methylprednisolone)	
Indications	Severe inflammation, shock, contact dermatitis, pruritus
Dose	100 to 250 mg IV
Pediatric dose	117 mcg to 1.66 mg/kg IV in 3 to 4 divided doses
Onset	IV onset rapid, IM onset unknown, duration 1 to 4 weeks
Side effects	Circulatory collapse, thrombophlebitis, embolism, thrombocytopenia
Monitor	Hypokalemia and hyperglycemia are adverse effects of long- term therapy.

Related Information

ABG Critical Values

Review of ABG Critical Values Requiring Interventions	
PH	Critical value < 7.25 or > 7.55
pCO_2	Critical value $\geq$ 55 and $\geq$ 60 for COPD patients
O_2	Critical value < 55
SpO_2	Critical value < 85 (equals a pO_2 of 46 to 56)

ABG Oxygen Saturation

Review of ABG Oxygen Saturation Levels in Arterial and Venous Blood	
Arterial blood	Oxygen saturation is usually >75%.
Venous blood	Oxygen saturation is usually <75%.
Mixed arterial and venous blood	A specimen of mixed arterial and venous blood commonly has an oxygen saturation level in the eighties. Check the patient's saturation with a pulse oximetry. If

	oxygen saturation in the ABG result is less than the pulse oximetry saturation, redraw the ABG. The ABG specimen was probably mixed arterial and venous blood.

Acid-Base Imbalance

Review of Acid-Base Imbalance	
Respiratory Acidosis	ABG findings of a pH < 7.35 with a CO_2 > 45 are characteristic of respiratory failure. Symptoms may include confusion and lowered level of consciousness. Causes are sedatives, stroke, chronic pulmonary disease, airway obstruction, severe pulmonary edema, and cardiopulmonary arrest. Management is aimed at improvement of ventilation with pulmonary toilet and reversal of bronchospasm. Intubation may be required.
Respiratory Alkalosis	ABG findings of alkalosis are characteristic of excessive ventilation causing a primary reduction in CO2 and an increase in pH. Symptoms may include seizures, tetany, cardiac arrhythmia, or loss of consciousness. Causes include pneumonia, pulmonary edema, interstitial lung disease, and asthma. Pain and psychogenic causes are common. Other causes include fever, hypoxemia, sepsis, delirium tremors, salicylates, hepatic failure, mechanical hyperventilation, and central nervous system lesions. Management is directed at the underlying disorder. Sedation or a rebreathing bag may be used for psychogenic cases.

Acute Epiglottitis

Acute epiglottitis is a rare life-threatening process in children (typically between the ages of 3 and 7 years) associated with a large, cherry-red, edematous epiglottis. The symptoms are drooling, muffled voice sounds or aphonia, dysphagia, and a croaking froglike sound on inspiration. The child may assume the tripod position (sitting forward leaning on both arms) for better air exchange. The child should not be disturbed for fear of worsening the airway obstruction. Vital signs are not taken until the potential of airway obstruction has passed. Parents are asked to stay with the child because separation may increase the child's anxiety and oxygen needs. Visualization of the epiglottis should not be attempted until intubation and tracheotomy equipment is available. Complete airway obstruction can occur suddenly. Bacteremia is present in 50% of cases.

Airway Obstructions

The most common cause of airway obstruction is a relaxed tongue that falls over the back of the throat obstructing the pharynx and larynx. Because the tongue is attached to the lower jaw, performing a head-tilt-chin-lift maneuver forces the tongue away from the back of the throat and restores spontaneous respirations. When a patient goes into respiratory arrest, the first priority is to open the airway with a head-tilt-chin-lift or a jaw-thrust maneuver.

Asthma

Review of Asthma	
Description	The National Asthma Education Program defines asthma as "a disease characterized by airway obstruction that is reversible, airway inflammation, and increased airway responsiveness to a variety of stimuli." Status asthmaticus is obstruction that lasts days or weeks. Extrinsic asthma is asthma due to a known allergen or environmental factor, e.g., pollen, dander, feathers, dust, and foods. Intrinsic asthma is asthma assumed to be due to some endogenous cause because no external cause can be determined.
Symptoms	Symptoms may include bronchospasm with wheezes and a prolonged expiratory phase.
Tests	Chest x-ray may show hilar or basilar infiltrates, or be normal,
Management	Medications may include inhaled nebulized bronchodilators every 20 min. for three doses, then every 2 hours until attack subsides. Peak flow rates are essential before and after each bronchodilator treatment to determine the effectiveness of the therapy. Theophylline and Predisone may be used. Panic and anxiety can be avoided by maintaining a calm reassuring attitude.
Note	An estimated 5% of adults and 10% of children have asthma.

Autotransfusion

Autotransfusion is indicated for a patient with hemothorax and hypotension. A basic autotransfusion device is attached to a chest tube and infused intravenously. Autotransfusion from other sites such as the abdomen places the patient at an increased risk for bacterial contamination. In the emergency setting, sites other than the chest are not used unless the patient is exsanguinating and no blood products are available.

Bradycardia

Bradycardia is the most common arrhythmia in critically ill children and is usually a symptom of hypoxia.

Clinical Assessment of Lungs

Review of Clinical Assessment of Lungs	
Auscultation	**Bronchial** sounds are normally heard over the bronchus and the manubrium of the sternum (the broad upper division of the sternum with which the clavicle and first two ribs articulate), along the sternal border, and over the trachea. Bronchial sounds heard over the lungs indicate abnormal sound transmission and may be due to consolidation such as atelectasis and pneumonia. **Bronchial vescicular** sounds are normally head over the large bronchi below the clavicles and between the scapulae. They are of moderate amplitude, medium to high pitched, and resemble a mixture of bronchial and vescicular sounds. Bronchial vescicular sounds may indicate consolidation or other abnormalities if heard over the lungs. **Vesicular sounds** are normally produced by the opening of the alveoli on inspiration, the movement of air through the larynx during expiration, heard over the lungs, of low amplitude, medium to low pitch, and described as swishing or rustling. **Decreased breath sounds** may indicate disruption of alveolar function, consolidation or compression (pulmonary fibrosis, pleural effusion, or COPD).
Palpation	**Palpation for tenderness** is used in trauma cases to assess

	for injured areas. **Chest excursion** is measured by placing the hands parallel to each other over the lower portion of the rib cage on both sides of the spine. The fingers should be 2 inches apart with thumbs pointing toward the spine with fingers spread laterally. On deep inspiration, observe the movement of the thumbs. Chest excursion should separate the thumbs 1 ½ to 3 inches.
Percussion	**Percussion** is performed over the intercostal spaces following a systemic pattern to compare both sides. The posterior thorax is normally resonant on percussion and the area over the scapula, ribs, and spine is dull. Areas of consolidation are dull.
Adventitious sounds	**Crackles** (rales) are the most common in dependent lobes and are caused by fluid. **Rhonchi** are heard over the trachea and bronchi and are caused by fluid in the larger airways. **Wheezes** can be heard over all lung fields and are caused by bronchospasm that narrows the airways. **Pleural friction** rub is heard over the lateral lung fields with the patient upright and is caused by inflamed pleura.

Bronchitis, Acute

Review of Acute Bronchitis	
Description	Bronchitis is an acute inflammation of the bronchus most often caused by viral infectious agents. Secondary bacterial infection also occurs.
Signs and symptoms	Signs and symptoms may include a recent upper respiratory infection and a dry nonproductive cough that is worse at night. Taking a deep breath or talking may initiate coughing. Sputum production occurs in a few days. Scattered wheezes and a mild fever may be present.
Tests	Chest x-ray may be normal.

Management	Management may include humidified oxygen, cough suppressant medications, and antibiotics for bacterial infections.
Prognosis	Prognosis is good. The disease is usually self-limiting.

Bronchitis, Chronic

Review of Chronic Bronchitis	
Description	Chronic bronchitis occurs frequently in middle-aged men and is uncommon in non-smokers.
Signs and symptoms	Signs and symptoms are excessive mucus production and a cough that occurs for at least 3 consecutive months each year for 2 successive years.
Tests	Chest x-ray may be insignificant. In the late stages, chest x-ray may reveal hyperinflation.
Management	Management may include bronchodilators, nebulized inhalers, and steroids.

Congestive Heart Failure

Review of Congestive Heart Failure	
Causes	Congestive heart failure is a fluid overload brought about by an inadequate heart pump. Forward failure causes fluid to accumulate in the lungs and backward failure causes fluid to accumulate in the body. The most common cause of right ventricular failure is left ventricular failure. The increasing pulmonary venous and arterial pressures of the left ventricular failure increase the preload of the right ventricle. Other causes of right ventricular failure are lung disease, valvular disease, and right ventricular infarction.
Symptoms	**Forward failure (left ventricular failure):** Early signs of respiratory failure may include activity intolerance, tachypnea, orthopnea, shortness of breath, and tachycardia. Cyanosis and production of pink frothy sputum are late signs. Impaired ventilation causes hypoxia and hypercapnia.

	Backward failure (right ventricular failure): Symptoms may include peripheral edema and hepatosplenomegaly from systemic vascular engorgement (with or without tenderness).
Diagnostic findings	ABG findings may include hypoxia and respiratory acidosis. Electrocardiogram may show left ventricular enlargement. Chest x-ray may have findings of infiltrates (pulmonary fluid overload) and an enlarged heart.
Management	The goal of therapy is to maintain sufficient oxygenation to body tissues by increasing oxygenation, decreasing preload, decreasing afterload, and increasing the contractility of the heart. Medical management may include oxygen to keep oxygen saturation $\geq$ 94%, fluid restriction, diuretics (Lasix, Bumex) to reduce the fluid preload, inotropic medications (digoxin, dobutamine) to increase the pumping action of the heart, morphine to decrease anxiety and the workload placed on the heart, and blood pressure reducing medications (nitroglycerin, nitroprusside) to decrease afterload.

COPD

Review of COPD	
Description	COPD is a group of conditions that include chronic bronchitis, emphysema, and asthma. These conditions cause hyperplasia, inflammation of goblet cells, and increased production of thick mucus.
Facts	Smoking is the most significant factor contributing to the patient's condition. Cessation of smoking may prevent progression. A patient with severe bronchial abnormalities and mild emphysema is commonly called a blue bloater. Hypoventilation leads to hypoxemia and hypercapnia. The patient with severe emphysema and mild bronchitis is commonly called a pink puffer. Hyperventilation assists in adequate oxygenation and cyanosis is absent. Cor pulmonale (hypertrophy or failure of the right ventricle)

	is a complication of COPD secondary to decreased intravascular blood volume with arterial congestion. A common sign of COPD is a barrel chest that results from hyperinflation and over distention of alveoli. Elastin and collagen, the supporting structures of the lungs, are destroyed and the bronchiolar walls tend to collapse. Air is trapped in the distal alveoli resulting in hyperinflation and over distention of the alveoli. This trapped air causes the barrel chest.
Management	Medical management may include administration of 30% oxygen via mask and bronchodilators by nebulized therapy, steroids, and hydration. Most COPD patients are dependent on the hypoxic drive to maintain adequate ventilation. Uncontrolled or high-flow oxygen therapy may precipitate severe carbon dioxide narcosis and respiratory arrest. Precise oxygen therapy delivered by mask may allow time for medical intervention, thus avoiding intubation and mechanical ventilation. Placing the patient in a high Fowler's position or leaning upright over an over-bed table will ensure optimal ventilation. Pursed lip breathing slows expiration, prevents collapse of lung units, and helps the patient control rate and depth of respirations that decreases dyspnea and feelings of panic.

Croup

A low-grade fever and a barking or brassy cough with inspiratory stridor caused by partial upper airway obstruction characterize croup. Croup commonly follows an upper respiratory infection by one to two days. The earliest signs of respiratory failure are hypoxemia, restlessness, tachypnea, and tachycardia. A fever can increase respiratory rate by four breaths per minute for each degree rise above normal. Intermediate signs of respiratory failure are accessory respiratory muscle use, retractions, and nasal flaring. Late signs are cyanosis and lethargy. Treatment is directed towards maintaining the airway and adequate respiratory exchange. Aspirin is avoided as an antipyretic because it has been correlated with Reyes syndrome. Medical management of croup may include a cool high-humidity mist, hydration, oxygen, and intubation for anoxia and airway obstruction. Intravenous hydration is weight based and monitored by skin turgor and urinary output. An initial intravenous fluid bolus of 20 ml/kg can be given based on the child's hemodynamic response. The 4-2-1 rule for maintenance fluids is 4 ml/kg for the first 10 kg of body weight, 2 ml/kg for the next 10 kg of body weight, and 1 ml/kg for the rest of the weight.

Endotracheal Intubation

Endotracheal intubation is attempted only after other methods of oxygenation have failed. It is not the initial procedure for ventilation in respiratory arrest. Adequate oxygenation is first provided with the use of a bag-valve-mask device. If intubation takes more than 20 to 30 seconds, oxygenation is required with a bag-valve-mask device between attempts. Endotracheal tube placement is confirmed by first listening over the stomach for sounds of rushing air. If nothing is heard, the lungs are then auscultated. If breath sounds are heard, both lungs are auscultated to confirm equality. Final tube placement is confirmed by a portable chest x-ray. The carina is the landmark by which proper depth of endotracheal intubation is measured.

Extubation

Review of Extubation	
1	Obtain a negative inspiratory force (NIF) of > -20 cm. (normal < -50 to -100)
2	Obtain a forced vital capacity (FVC) of > 10 ml/kg (normal 40 to 70 ml/kg)
3	Suction the tube, suction the mouth, deflate the balloon, have the patient cough, and pull the tube during the cough.
4	Place the patient on supplemental oxygen at the same FiO2 used prior to extubation.
5	Monitor vital signs including oxygen saturation every 5 to 10 minutes for 30 minutes.

Hypercarbia

Hypercarbia is the first change that occurs in severe airway obstruction in a child.

Mechanical Ventilation Modes

Review of Mechanical Ventilation Modes	
PEEP (Positive End Expiration Pressure)	PEEP is an expiratory ventilator maneuver that limits unimpeded expiratory flow at a preset level of system pressure.

CPAP (Continuous Positive Airway Pressure)	CPAP increases oxygenation by increasing positive airway pressure throughout the respiratory cycle and not just on expiration.
CMV (Controlled Mandatory Ventilation)	CMV delivers tidal volume at a preset rate regardless of the patient's inspiratory efforts.
ACV (Assist Control Ventilation)	ACV augments spontaneous ventilation in patients with normal respiratory drive but weak respiratory musculature.
PSV (Pressure Support Ventilation)	PSV provides positive pressure only in response to a spontaneous breath so the patient determines rate of delivery.
IMV (Intermittent Mandatory Ventilation)	IMV provides positive pressure breaths at a preset volume and rate independent of the patient's effort.
SIMV (Synchronized Intermittent Mandatory Ventilation)	SIMV synchronizes a mandatory machine delivered breath with the patient's next spontaneous breath.

Oxygen Delivery Devices

Oxygen Delivery Devices	Oxygen Delivered
Nasal cannula	4% oxygen per liter
Simple Mask	5 to 8 L/m equals 40% to 50% oxygen
Partial non-rebreather	6 to 8 L/m equals 55% to 70% oxygen
Non-rebreather	6 to 10 L/m equals 100% oxygen
Ventura mask	Variable 24% to 50% oxygen
Nebulizer with aerosol mask, face shield, and T-piece at 8 to 12 L/m	30% to 100% oxygen with controlled moisture and temperature

Oxygen, High Flow

High flow oxygen is the first priority when a trauma patient is pale, diaphoretic, and hypoventilating. Long-term high flow oxygen on a COPD patient who is not hypoventilating can decrease the respiratory drive.

Oxygen, Supplemental

Oxygen delivery systems deliver oxygen that is supplemental to room air. The percentage of supplemental oxygen must be added to the 21% oxygen in room air to equal the total amount delivered to the patient.

Peak Expiratory Flow Rates (PEFR)

Peak expiratory flow rates before and after bronchodilator treatments are essential to determine the effectiveness of the bronchodilator therapy. PEFR is how much air is exhaled forcibly from full-lung inflation. Normal range is 400 to 600 L/min. 200 L/min. indicates respiratory fatigue. Oxygen saturation is the indicator for severity.

Petechial Rash

Petechial rash may develop 12 to 96 hours after an injury and is a result of fat globules obstructing the capillaries in the skin and subcutaneous tissue. When a petechial rash is associated with breathing problems, it may be a sign of pulmonary fat embolism.

Pneumonia

Review of Pneumonia	
Description	Pneumonia is an acute bacterial, viral, or fungal infection of the pulmonary parenchyma. The most common causal agent is S*treptococcus pneumoniae*.
Symptoms	Symptoms may include fever, pleuretic chest pain, productive cough, and tachypnea.
Signs	Bronchial breath sounds over the lung area indicate pneumonia.
Tests	Tests may include chest x-ray, hematology, and sputum for gram stain and culture.
Findings	Chest x-ray may show a pattern characteristic of the infecting organism.

Management	Medical management includes identification of the infecting organism and initiation of appropriate antimicrobial therapy.
Note	1% of Americans will have pneumonia during their lifetime.

Respiratory Normal Values

Review of Normal Respiratory Values	
Tidal volume	8 to 12 cc/kg
Minute ventilation	Respiratory rate times tidal volume
Vital capacity	60 to 70 cc/kg
Peak expiratory flow rate	400 to 600 liters/min.

Ventilator Settings, Post Arrest

Review of Post Arrest Ventilator Settings	
FiO2	100%
Inspiratory: Expiratory Ratio (I:E)	1:2
Mode	AC or SIMV
PEEP	Minus 5
Pressure Limits	10 cm H_2O higher than pressure generated by the delivered tidal volume
Rate	10 to 12 breaths per minute
Sensitivity	-2 cm H2O on assist control, not applicable on IMV
Temperature	97 degrees Fahrenheit (Gabriel Daniel Fahrenheit 1686-1736. German-born physicist who invented the mercury thermometer [1714] and devised the Fahrenheit temperature scale).

Tidal Volume	Ten times the patient's lean weight in kilograms

Pulse Oximetry Saturation and Corresponding pO_2

Pulse Oximetry Saturation and corresponding pO_2	
Saturation	Oxygen levels (pO_2)
80% SpO_2	40 to 49 pO_2
85% SpO_2	46 to 56 pO_2
87% SpO_2	49 to 60 pO_2
90% SpO_2	55 to 67 pO_2
93% SpO_2	63 to 78 pO_2
95% SpO_2	72 to 89 pO_2

Pulmonary Edema

Review of Pulmonary Edema	
Description	Acute pulmonary edema is a result of an acute event. Inadequate pumping of the left ventricle causes cardiogenic pulmonary edema. Noncardiogenic pulmonary edema or adult respiratory distress syndrome (ARDS) is a result of damage to the alveolar-capillary membrane.

Signs and symptoms	Cardiogenic pulmonary edema may show signs of generalized fluid overload including dyspnea, decreased oxygenation, metabolic acidosis, crackles, wheezes, and productive cough with foamy or pink-tinged sputum.
Tests	Chest x-ray may show bilateral interstitial and alveolar infiltrates.
Management	Medical management may include strict fluid restriction, high-flow oxygen, bronchodilators, bipap, diuretics, dobutamine, nitroglycerin, intravenous morphine, and a urinary catheter to monitor output.
Note	Most patients who require mechanical ventilation have a 50% mortality rate.

Pulmonary Embolus

Review of Pulmonary Embolus	
Description	A pulmonary embolus is an embolus that causes obstruction of arterial pulmonary blood flow to the distal lung commonly resulting in ischemia and infarction of the lung
Symptoms	Symptoms may include sudden onset of dyspnea, chest pain, and sinus tachycardia.
Tests	Tests may include blood hematology, ABG studies, chest x-ray, ventilation perfusion scan, and pulmonary arteriogram.
Diagnostic findings	Findings may include decreased oxygen on room air (PaO_2 < 80 mm Hg) and elevated LDH. An elevated LDH is common in many diseases and alone is not diagnostic of pulmonary embolus. A PaO_2 of > 80 is inconsistent with pulmonary embolus. The WBC may be elevated or normal.
Management	Medical management may include intravenous heparin. Heparin reduces the risk of secondary thrombi formation.

Respiratory Failure

Respiratory failure is any condition in which the blood oxygen is insufficient to meet the demands of the tissues secondary to decreased lung function. A diagnosis of respiratory failure is based on the patient's history, clinical appearance, and serial changes in the ABG studies. ABG abnormalities alone do not indicate respiratory failure.

Respiratory Rate Ratio to Pulse

Respiratory rate ratio to pulse is 1:4. An adult with a respiratory rate of 20 will normally have a heart rate of 80.

Sodium Bicarbonate

Although not commonly used for respiratory acidosis, one ampule of sodium bicarbonate can be given for each –5 of base excess to temporarily correct the pH in respiratory and metabolic acidosis. The acidity of the blood must be kept in a near normal range for medications to be effective.

Smoke Inhalation

Smoke inhalation is a combination of carbon monoxide intoxication, upper airway obstruction, and chemical injury to the lower airways and lung parenchyma. Carbon monoxide is a killer. Most people that die in fires succumb from the carbon monoxide poisoning before they are burned. Carbon monoxide links with the hemoglobin replacing the oxygen causing hypoxia and death.

Spontaneous Pneumothorax

Review of Spontaneous Pneumothorax	
Description	Pneumothorax is the collapse of a lung and most commonly occurs in patients between the ages of 20 and 40 years.
Symptoms	Symptoms may include sudden sharp chest pain and dyspnea.
Tests	Chest x-ray
Management	Observation may be indicated for a small pneumothorax area and chest tube insertion for large areas. The typical size chest tube (with or without a trocar) for an adult is a #36 or #40 French for hemothorax, and a #28 for a pneumothorax. The chest tube is not clamped for any reason including transport. Clamping does not allow the air

	or fluid to escape and tension may reoccur.
Complications	Complications include hemothorax or cardiovascular compromise from a tension pneumothorax.
Note	50% of the patients who need chest tubes suffer recurrence. A rupture or laceration of the diaphragm can allow the abdominal contents to enter the chest. The movement of the bowel into the thorax creates excessive pressures that compress and shift the thoracic structures and can mimic a pneumothorax.

Sputum Color

Sputum color is an indicator of the pathological process. Yellow sputum signifies white blood cells that are the major component of pus. Green sputum signifies production of an enzyme produced by stagnant pus cells. Rust, red, and brown sputum signifies red blood cells in the sputum.

Subcutaneous Emphysema

Subcutaneous emphysema results from an increase in intrathoracic pressure that results in alveolar rupture. Air dissects into the tissue and gravitates up to the neck, face, and supraclavicular area. The air can be felt under the skin. A mediastinal air leak can arise from the esophagus or from the lungs. The leak can be heard during auscultation when air is compressed by the contraction of heart (Hamman's sign).

Venous Carbon Dioxide Levels

Elevated venous carbon dioxide levels are an indicator of acidosis.

PART 2: CHOKING AND AIRWAY OBSTRUCTION

The organized systematic care process outlined in this section optimally manages the patient with an airway obstruction. The steps include assessment, problem identification, planning, interventions, ongoing evaluations, and disposition. Detailed information is included for the common medications used for patients with an obstructed airway. The related information at the end of the section provides an overview of terms, concepts, and pathophysiology related to choking and airway obstruction.

Topics reviewed include:

- Foreign body airway obstruction
- Heimlich maneuver for infants, children, and adults

Rapid **ABC** Assessment

1. Is the patient's airway patent?
    a. The airway is patent when speech is clear and no noise is associated with breathing.
    b. If the airway is not patent, consider clearing the mouth and placing an adjunctive airway.
2. Is the patient's breathing effective?
    a. Breathing is effective when the skin color is within normal limits and the capillary refill is < 2 seconds.
    b. If breathing is not effective, consider administering oxygen and placing an assistive device.
3. Is the patient's circulation effective?
    a. Circulation is effective when the radial pulse is present and the skin is warm and dry.
4. If circulation is not effective, consider placing the patient in the recumbent position, establishing intravenous access, and giving a 200 ml fluid bolus.

Be prepared to perform the Heimlich maneuver on a patient that is actively choking. Manual blind finger sweeps are NOT performed in infants and children because of the risk of pushing the foreign body further back into the airway.

The patient's identity, chief complaint, and history of present illness are developed by interview. The standard questions are ***who, what, when, where, why, how,*** and ***how much.***
Who identifies the patient by demographics, age, sex, and lifestyle.
What develops the symptom that prompted the patient to seek medical advice.
When determines the onset of the symptom.
Where identifies the body system or part that is involved and any associated symptoms.
Why identifies precipitating factors or events.

How describes how the symptom affects normal function.
How much describes the severity of the affect.

Patient Identification

1. Who is the patient?
    a. What is the patient's name?
    b. What is the patient's age and sex?
    c. What is the name of the patient's current physician?
    d. Does the patient live alone or with others?

Chief Complaint

The chief complaint is a direct quote, from the patient or other, stating the main symptom that prompted the patient to seek medical attention. A symptom is a change from normal body function, sensation, or appearance. A chief complaint is usually three words or less and not necessarily the first words of the patient. Some investigation may be needed to determine the symptom that prompted the patient to come to the ER. When the patient, or other, gives a lengthy monologue, a part of the whole is quoted.

1. In one to three words, what is the main symptom that prompted the patient to seek medical attention?
    a. Use direct quotes to document the chief complaint.
    b. Acknowledge the source of the quote, e.g., the patient states; John Grimes, the paramedic states; Mary, the granddaughter, states.

History of Present Illness

1. When was the onset of the choking?
2. Where is the obstruction (airway or esophagus)?
3. Why did the patient choke?
4. How does the obstruction affect normal function now?
    a. Is the patient able to speak clearly?
    b. Is the patient breathing effectively?
    c. Is the patient able to swallow?

> Choking may result from spasm of the larynx induced by an irritating gas. Not all choking victims inhale food or foreign bodies. Irritation of the larynx can cause airway obstruction from spasm.

5. Did anyone try any maneuvers to stop the choking and did they help?
6. Has the patient had similar problems before?
    a. When was the problem?
    b. What was the diagnosis and treatment?
7. Does the patient have any pertinent past history?

8. Does the patient take any routine medications?
    a. What is the name, dose, route, and frequency of the medication?
    b. When was the last dose?
9. Does the patient have allergies to drugs or foods?
    a. What is the name of the allergen?
    b. What was the reaction?
10. When was the patient's last tetanus immunization?
11. If the patient is female and between the ages of 12 to 50 years, when was the first day of her last menstrual period?

Caregiver Diagnoses

- □ Ineffective airway clearance
- □ Impaired gas exchange
- □ Pain
- □ Knowledge deficit
- □ Anxiety

Anticipated Medical Care

Review of the Anticipated Medical Care of Choking and Airway Obstructions	
Exam	Full body
X-ray	Chest x-ray, soft tissue neck x-ray
Diet	NPO
IV	None
Medications	Glucagon
Other	Direct laryngoscopy, bronchoscopy
Disposition	Hospital observation may be required if edema of the throat is suspected.
Worse case scenario	The worse case scenario is a compromised airway with inability to ventilate. Management is STAT bronchoscopy with removal of foreign body.

Initial Assessments and Interventions

1. Ask the patient to undress, remove all jewelry that might interfere with the examination, and put on an exam gown. Assist as needed.
2. Position the patient in a high Fowler's position.
3. Get vital signs; attach heart monitor leads, automatic blood pressure cuff, and pulse oximetry for continuous monitoring. Document the initial heart monitor strip and document changes of rhythm.
4. Assure the patient that he is safe.
5. Perform a focused physical examination.
    a. Auscultate the lungs.
    b. Listen to the sounds of breathing at the neck.
    c. Evaluate the level of consciousness to use as a base line.
    A for alert signifies that the patient is alert, awake, responsive to voice and oriented to person, time, and place.
    V for verbal signifies that the patient responds to voice, but is not fully oriented to person, time, or place.
    P for pain signifies that the patient does not respond to voice, but does respond to painful stimulus such as a squeeze to the hand.
    U for unresponsive signifies that the patient does not respond to painful stimulus.
6. Establish an intravenous access if obstruction is still present and draw blood specimens. Draw a variety of tubes that will allow the lab to perform hematology, chemistry, and coagulation studies and hold for physician order.
7. Administer medications covered by hospital protocol.
8. Inform the patient not to eat or drink and teach the rationale for the NPO status.
9. Elevate the siderails and place the stretcher in the lowest position.
10. Inform the patient, family, and caregivers of the usual plan of care and the expected overall time before disposition.
11. Provide the patient with a device to reach someone for assistance and explain how to use it. Ask the patient to call for help before getting off the stretcher.

Ongoing Evaluations and Interventions

Inform the physician of adverse changes noted during ongoing evaluation. Document that the physician was notified of the adverse change and what orders, if any, were received.

1. Monitor vital signs and effectiveness of breathing.
2. Monitor for signs of worsening, e.g., restlessness, difficulty swallowing, dyspnea, and hoarseness.

Airway obstruction can occur after a foreign body is removed. Swelling and laryngeal spasm can cause airway compromise leading to airway obstruction later in the ER course.

3. Monitor therapy closely for the patient's therapeutic response.
    a. The usual time for a medication effectiveness check is 20 to 30 minutes after giving the drug.
    b. If therapy is not effective, ask the physician for a repeat dose or an alternative.
4. Monitor closely for the development of adverse reactions to therapy.
    a. Perform interventions to relieve the adverse reaction.
    b. Ask the physician for a remedy.
5. If not NPO, provide the patient with food at mealtimes and fluids during the stay.
6. Keep the patient, family, and caregivers well informed of the plan of care and the remaining time anticipated before disposition.
7. Monitor the patient's laboratory and x-ray results and notify the physician of critical abnormalities. Remedy abnormalities as ordered.
8. Notify the physician when all diagnostic results are available for review. Ask for establishment of a medical diagnosis and disposition.

Discharge Instructions

1. Provide the patient with the name of the nurse and doctor in the emergency room.
2. Inform the patient of their diagnosis or why a definitive diagnosis couldn't be made. Explain what caused the problem if known.
3. Teach the patient how to take the medication as prescribed and how to manage the common side effects. Instruct the patient not to drive or perform any dangerous tasks while taking narcotic pain medications.
4. Recommend a physician for follow-up care. Provide the name, address, and phone number with a recommendation of when to schedule the care. Encourage the patient to follow-up to assure no injury is present on repeat examination.
5. Instruct the patient that the airway or breathing passages may be injured or inflamed to a minor degree. Any airway problems or worsening is not expected. Return to the emergency room for difficulty breathing, swallowing, hoarseness, or fever. Encourage the patient NOT to IGNORE WORSENING OR PERSISTENT SYMPTOMS.
6. Ask for verbal confirmation or demonstration of understanding and reinforce teaching as needed.

Medications

Glucagon

Glucagon	
Indications	Esophageal foreign body obstruction
Adult dose	1 to 5 mg SC or IV
Pediatric dose	1 mg SC or IV

Onset	IV onset 1 min., duration 9 to 17 min.
Side effects	Nausea
Note	Use immediately after reconstitution.
Monitor	Blood sugar levels

Valium

Valium (diazepam)	
Indications	Conscious sedation
Dose	5 to 10 mg IV single dose 5 to 20 mg IM single dose
Onset	IV onset 5 min., peak 15 min., duration 15 min. IM onset 15 min., peak ½ to 1 ½ hours
Side effects	Decreased respiratory effectiveness, dizziness, drowsiness, orthostatic hypotension, blurred vision, tachycardia
Monitor	Level of consciousness, respiratory effectiveness

Versed

Versed (midazolm hydrochloride)	
Indications	Conscious sedation
Adult dose	1 to 2.5 mg IV over at least 2 min., every 2 min., maximum 5 mg IV (If the patients had narcotic medications before the Versed, use approximately 30% less Versed.)
Pediatric dose	Pediatric patients 12 to 16 years old should be dosed as adults. 0.05 to 0.2 mg/kg IV loading dose over 2 to 3 min. (Usually not given to children unless they are intubated.)
Onset	IV onset 3 to 5 minutes

Compatibility	Use NS to flush IV line before and after dose
Side effects	Serious life threatening decreased respiratory tidal volume and respiratory rate
Monitor	Effectiveness of breathing
Note	Versed is a potent sedative that requires slow administration and individualization of dosage. Versed is 3 to 4 times as potent as Valium. The reversing agent is Romazicon (flumazenil).

Related Information

Assessment of Versed Affect

Sedation Level	Facial Expression	Response
Alert	Normal, eyelids open	Readily responds to voice
Drowsy	Mild relaxation, eyelids < ½ closed	Lethargic response to normal voice
Asleep	Marked relaxation, jaw slack, eyelids > ½ closed	Responds only to prodding or shaking
Deep sleep	Eyelids closed	Does not respond to prodding or shaking

Bronchoscopy

A bronchoscopy is an examination of the bronchi commonly done under conscious sedation with Valium or Versed through a bronchoscope. The scope is designed to pass through the trachea and allow visualization of the tracheal bronchial tree. The instrument can be used for tissue biopsy and removal of foreign body.

Foreign Body Airway Obstruction in Children

The National Safety Council reports more than 90% of the deaths from foreign body aspiration occur in children younger than 5 years and 65% of the victims are infants. Since safety standards have regulated the size of toys and their parts for young children, the incidence of foreign body aspiration of toys has decreased. Food size has not changed and hot dogs, nuts, and grapes are among the leading foods aspirated. Foreign body aspiration should be immediately suspected in infants and children who have a sudden onset of coughing, gagging, and stridor or wheezing. The Heimlich maneuver is recommended for removal of an upper airway obstruction in children.

Heimlich Maneuver

MANUAL BLIND FINGER SWEEPS ARE NOT PERFORMED IN INFANTS AND CHILDREN TO REDUCE THE RISK OF PUSHING THE FOREIGN BODY FURTHER INTO THE AIRWAY.

Infants
The Heimlich maneuver for age <1 year

1. With the patient face down, deliver up to five back blows with the heel of the hand.
2. Turn the patient over and alternate deliver five abdominal thrusts with two fingers placed on the lower half of the sternum. Repeat alternating back and abdominal blows until the object is expelled or it is determined that the patient needs an artificial airway.

Children
The Heimlich maneuver procedure for age >1 year

1. Perform abdominal thrusts in a conscious victim.
2. Continue until the object is expelled or it is determined that the patient needs an artificial airway.

Adults
The Heimlich maneuver procedure for patients > 8 years (adults)

1. Deliver abdominal thrusts for a conscious victim until the object is expelled or the patient losses consciousness.
2. For victims who are unconscious, lay supine, and place hands just below the rib cage at the distal end of the sternum. Perform abdominal thrusts until the object is expelled or it is determined the patient needs an artificial airway.

PART THREE: DROWNING AND NEAR DROWNING

The organized systematic care process outlined in this section optimally manages the patient with a drowning or near drowning event. The sequential steps outlined include assessment, problem identification, planning, interventions, ongoing evaluations, and disposition. Detailed information is included for the common medications used for patients with a drowning or near drowning event. The related information at the end of the section provides an overview of terms, concepts, and pathophysiology related to drowning and near drowning events.

The topics include:

- Acid-base balance
- Aspirations
- Critical ABG values
- Pulmonary edema
- Warming efforts
- Infections

Rapid ABC Assessment

1. Is the patient's airway patent?
    a. The airway is patent when speech is clear and no noise is associated with breathing.
    b. If the airway is not patent, consider clearing the mouth and placing an adjunctive airway.
2. Is the patient's breathing effective?
    a. Breathing is effective when the skin color is within normal limits and the capillary refill is < 2 seconds.
    b. If breathing is not effective, consider administering oxygen and placing an assistive device.
3. Is the patient having any pain or tenderness of the spine?
    a. Immobilize the C-spine for neck pain or tenderness if injury is less than 48 hours old.
    b. Place a hard C-collar on the neck and immobilize the back by laying the patient on a stretcher.
4. Is the patient's circulation effective?
    a. Circulation is effective when the radial pulse is present and the skin is warm and dry.
    b. If circulation is not effective, consider placing the patient in the recumbent position, establishing intravenous access, and giving a 200 ml fluid bolus.

The patient's identity, chief complaint, and history of present illness are developed by interview. The standard questions are ***who, what, when, where, why, how, and how much***.
Who identifies the patient by demographics, age, sex, and lifestyle.
What develops the chief complaint that prompted the patient to seek medical advice.

When determines the onset of the symptom.
Where identifies the body system or part that is involved and any associated symptoms.
Why identifies precipitating factors or events.
How describes how the symptom affects normal function.
How much describes the severity of the affect

Patient Identification

1. Who is the patient?
    a. What is the patient's name?
    b. What is the patient's age and sex?
    c. What is the name of the patient's current physician?
    d. Does the patient live alone or with others?

Chief Complaint

The chief complaint is a direct quote, from the patient or other, stating the main symptom that prompted the patient to seek medical attention. A symptom is a change from normal body function, sensation, or appearance. A chief complaint is usually three words or less and not necessarily the first words of the patient. Some investigation may be needed to determine the symptom that prompted the patient to come to the ER. When the patient, or other, gives a lengthy monologue, a part of the whole is quoted

1. In one to three words, what is the main symptom that prompted the patient to seek medical attention?
    a. Use direct quotes to document the chief complaint.
    b. Acknowledge the source of the quote, e.g., the patient states; John Grimes, the paramedic states; Mary, the granddaughter, states.

History of Present Illness

1. When did the incident take place?
2. Where are the injuries?
    a. Consider placing the patient in cervical spine immobilization if neck pain or tenderness is present.
    b. Are any associated symptoms present?
3. Why did the incident happen, e.g., heart attack, seizure, trauma, fatigue, or suicide attempt?
4. How is the patient's normal function affected?
    a. How long was the patient submerged?
    b. How long was the patient apneic?
    c. Was CPR initiated and by whom?
    d. Is neurovascular function normal distal to injury sites?
    e. Does the patient have normal use of injured areas?
5. Has any treatment been initiated, e.g., oxygen and has it helped?

6. Where did the incident take place, e.g., at the beach in saltwater, at a lake in fresh water, or in a swimming pool?
7. Is unlawful activity suspected?
    a. Was law enforcement at the scene?
    b. What agency?

Medical personnel are obligated to notify law enforcement if unlawful activity is suspected.

8. Does the patient have any pertinent past history?
9. Does the patient take any routine medications?
    a. What is the name, dosage, route, and frequency of the medication?
    b. When was the last dose?
10. Does the patient have allergies to drugs or foods?
    a. What is the name of the allergen?
    b. What was the reaction?
11. When was the patient's last tetanus immunization?
12. If the patient is female and between the ages of 12 to 50 years, when was the first day of her last menstrual period?

Caregiver Diagnoses

- □ Impaired gas exchange
- □ Ineffective airway clearance
- □ Pain
- □ Knowledge deficit
- □ Anxiety
- □ Fear

Anticipated Medical Care

Review of the Anticipated Medical Care of Drowning and Near Drowning	
Exam	Full body
Urine tests	None
Blood tests	CBC, electrolytes, renal function studies, ABG
X-ray	Chest x-ray
ECG	ECG for females over 45 years and males over 35 years
Diet	NPO

IV	Normal saline or Ringer's solution
Medications	Diuretics, bronchodilators, antibiotics, steroids
Other	Anticipate C-spine immobilization until the cervical spine is cleared by x-ray, respiratory support may include hyperventilation with mechanical ventilation and PEEP or CPAP, warming, irrigation of eyes and instillation of prophylactic antibiotic ointment, irrigation of ears, and irrigation of body orifices where debris is present.
Disposition	A hospital admission may be required.
Worse case scenario	The worse case scenario is partial or total vision loss due to severe eye damage from debris or infection that could have been avoided with irrigation and prophylactic antibiotics.

Initial Patient Examination

1. Ask the patient to undress, remove all jewelry that might interfere with the examination, and put on an exam gown. Assist as needed.
2. Position to improve ventilation, e.g., a reclining-chair position (laying on stretcher with the head of the stretcher elevated, arms supported at sides, foot of stretcher slightly elevated to prevent sliding down and to allow the patient's back to be supported against the back of the stretcher thus expanding the chest).
3. Get initial vital signs including pulse saturation or test capillary refill.
    a. Attach heart monitor leads, automatic blood pressure cuff, and pulse oximetry for continuous monitoring. Document the initial heart monitor strip and document changes of rhythm.
    b. Consider obtaining a rectal temperature if hypothermia is suspected or the patient is unable to cooperate.
4. Place on oxygen. Consider administering high flow 100% oxygen by non-rebreather mask even if pulse oximetry saturation is within normal limits.
5. Perform a physical examination focused on the respiratory system.
    a. Auscultate the lungs.
    b. Perform a cursory head to toe inspection and look for evidence of injuries.
    c. Evaluate the level of consciousness to use as a base line. Use the mnemonic **AVPU**.
    A for alert signifies that the patient is alert, awake, responsive to voice and oriented to person, time, and place.
    V for verbal signifies that the patient responds to voice, but is not fully oriented to person, time, or place.
    P for pain signifies that the patient does not respond to voice, but does respond to painful stimulus such as a squeeze to the hand.
    U for unresponsive signifies that the patient does not respond to painful stimulus.

6. Clean and dress any wounds. Consider obtaining routine and marine (saline medium) cultures.
7. Irrigate the eyes if debris is present. Consider instillation of prophylactic antibiotic eye ointment. Consider irrigation of ears and body orifices if debris is present.
8. Keep the patient warm.
    a. Use warming techniques, e.g., warmed oxygen, warmed intravenous fluids, and heated blankets to reduce the risk of hypothermia.
    b. Shawl; warmed blanket around the head, neck, and shoulders. Place another blanket over the body and tightly tuck it around the patient.
    c. Consider the use of warming lights or a mechanical warming blanket.
9. Establish intravenous access. Draw laboratory blood specimens. Draw a variety of tubes that will allow the lab to perform hematology, chemistries, and coagulation studies if the patient is on anticoagulants or is cirrhotic. Consider blood cultures.
10. Obtain an arterial blood gas and consider placement of an arterial line if frequent blood draws are expected. Correct acid-base imbalances.
11. Consider placement of a Swan Ganz catheter to monitor fluid resuscitation.
12. Consider placing an indwelling Foley catheter to hourly monitor urinary output.
13. Consider placing a nasogastric tube to reduce the risk of gastric dilation, vomiting, and aspiration.
14. Inform the patient not to eat or drink and teach the rationale for the NPO status.
15. Elevate the siderails and place the stretcher in the lowest position.
16. Inform the patient, family, and caregivers of the usual plan of care. Include time involved for each aspect of the stay and the anticipated time before disposition.
17. Provide the patient with a device to reach someone for assistance and explain how to use it. Ask the patient to call for help before getting off the stretcher.

Ongoing Evaluations and Interventions

Inform the physician of adverse changes noted during ongoing evaluation. Document that the physician was notified of the adverse change and what orders, if any, were received.

1. Monitor heart rate and rhythm, blood pressure, effectiveness of breathing, and core temperature.
2. Monitor the level of consciousness using the **AVPU** mnemonic.
3. Monitor therapy closely for the patient's therapeutic response.
    a. The usual time for a medication effectiveness check is 20 to 30 minutes after giving the drug.
    b. If therapy is not effective, ask the physician for a repeat dose or an alternative.
4. Monitor closely for the development of adverse reactions to therapy.
    a. Perform interventions to relieve the adverse reaction.
    b. Ask the physician for a remedy.
5. If not NPO, provide the patient with food at mealtimes and fluids during the stay.
6. Keep the patient, family, and caregivers well informed of the plan of care and the remaining time anticipated before disposition.

7. Monitor the patient's laboratory and x-ray results and notify the physician of critical abnormalities. Remedy abnormalities as ordered.
8. Notify the physician when all diagnostic results are available for review. Ask for establishment of a medical diagnosis and disposition.

Discharge Instructions

1. Provide the patient with the name of the nurse and doctor in the emergency room.
2. Inform the patient of their diagnosis or why a definitive diagnosis couldn't be made. Explain what caused the problem if known.
3. Teach the patient how to take the medication as prescribed and how to manage the common side effects. Instruct the patient not to drive or perform any dangerous tasks while taking narcotic pain medications.
4. Recommend a physician for follow-up care. Provide the name, address, and phone number with a recommendation of when to schedule the care.
5. Instruct the patient to call the follow-up physician immediately or return to the emergency room if breathing problems or any unusual symptoms develop. Encourage the patient NOT to IGNORE WORSENING OR PERSISTENT SYMPTOMS.
6. Ask for verbal confirmation or demonstration of understanding and reinforce teaching as needed.

Commonly Used Medications

Bumex

Bumex (bumetanide)	
Indications	Fluid overload
Dose	1 to 2 mg IV, maximum 20 mg/day
Onset	IV onset 5 min., peak ½ hour, duration 2 to 3 hours
Side effects	Orthostatic hypotension, hypokalemia, hyperglycemia
Monitor	Urinary output, blood pressure

Dopamine

Dopamine	
Indications	Hypotension with signs and symptoms of shock, secondary drug for symptomatic bradycardia
Adult dose	IV Titration **Dopaminergic:** 1-3 mcg/kg/min. IV **Inotrophic:** 3-10 mcg/kg/min. IV **Alpha adenergic:** >10 mcg/kg/min., maximum 20 mcg/kg/min. IV
Pediatric dose	2 to 20 mcg/kg IV
Onset	IV onset 5 minutes, ½ life 2 minutes, duration less than 10 minutes
Side effects	Tachycardia, arrhythmias
Note	Increase and decrease by 1 to 2 mcg/kg/min. Swan Ganz or central line is recommended. For extravasations, use Regitine. Do not mix with alkaline solutions.

Dobutrex

Dobutrex (dobutamine)	
Indications	Cardiac decompensation from pump (heart) problems
Adult dose	2.5 to 15 mcg/kg/min. IV, maximum of 40 mcg/kg/min. IV
Pediatric dose	2 to 20 mcg/kg per min. IV, titrate to the desired effect
Compatibility	Compatible at Y-site with Dopamine, epinephrine, Inocor, Isuprel, Lidocaine, Neosynephrine, Nitroglycerin, Levophed, Pronestyl, NOT compatible with KCl
Note	Increase by 2-3 mcg/kg/min. A Swan Ganz is recommended to monitor cardiac output and PCWP. Do not mix in alkaline solutions. Use with extreme caution post MI. Correct volume depletion before use.

Lasix

Lasix (furosemide)	
Indications	Fluid overload with systolic blood pressure >90 without signs and symptoms of shock
Dose	0.5 to 1 mg/kg IV over 1 to 2 minutes, if no response double the dose to 2 mg/kg IV over 1 to 2 minutes
Onset	IV onset 5 minutes, peak ½ hour, duration 2 hours
Side effects	Circulatory collapse, hypokalemia, loss of hearing, nausea
Monitor	Urinary output, blood pressure

Morphine

Morphine (MSO_4)	
Indications	Moderate to severe pain
Dose	1 to 10 mg IV given over 1 to 5 minutes, every 5 to 30 min.
Pediatric dose	50 to 100 mcg/kg IV, maximum 10 mg/dose IV
Onset	IV onset rapid, peak 20 minutes, duration 4 to 5 hours
Side effects	Confusion, sedation, hypotension, respiratory depression
Note	May reverse with Narcan 0.4 to 2 mg IV. If more than 10 mg is needed, the diagnosis of a narcotic overdose must be questioned.
Monitor	CNS changes, sedation level, effectiveness of respirations

Nitroglycerin

Nitroglycerin	
Indications	Chest pain, acute myocardial infarction, left ventricular failure, hypertension

Adult dose	Titration, the usual dose is 10 mcg/min. to 20 mcg/min. IV, increase by 5 mcg/min. every 5 minutes. No maximum dose has been established. The dose is limited by the onset of adverse reactions such as hypotension.
Onset	IV onset immediate, duration is variable
Compatibility	Compatible at Y-site with Aminophylline, Bretylium, dobutamine, Dopamine, Inocor, Lidocaine, potassium chloride
Side effects	Headache, hypotension
Note	Non-latex or glass bottle with special tubing is recommended to avoid absorption of the medicine into the bag and tubing. The fact that the latex absorbs the NTG has no clinical significance because the dose is titrated to effect and not given as a fixed dose. Some hospital protocols allow the nurse to increase the NTG to relief of pain, but not to decease unless an order to wean is received from the physician. Some hospital protocols require the nurse to check with the physician if a dose of over 200 mcg/min. is required for pain relief.

Proventil, Albuterol, Ventolin

Proventil, Albuterol, Ventolin	
Indications	Bronchospasm, asthma
Adult Dose	2.5 to 5 mg nebulized
Pediatric dose	Nebulized Age < 1 year .05 to .15 mg/kg/dose Age 1 to 5 years 1.25 to 2.5 mg/dose Age 5 to 12 years 2.5 mg/dose Age > 12 years 2.5 to 5 mg/dose
Onset	Inhaled onset 5 to 15 minutes, peak 1 to 1 ½ hour, duration 4 to 6 hours
Side effects	Anxiety, tremors, tachycardia
Monitor	Oxygen saturation, heart rate

Other Bronchodilators	
Bronkosol	A bronchodilator used for patients with cardiac arrhythmias. Usual adult nebulized dose is 0.5 mg in 2.5 ml NS.
Alupent	A long acting bronchodilator. Usual adult nebulized dose is 0.3 ml of a 5% solution in 2.5 ml NS.

Related Information

ABG Critical Values

ABG Critical Values	
PH	< 7.25 or > 7.55
pCO_2	> 55
O_2	< 55
SpO_2	< 85 (equals a pO_2 of 46 to 56)

ABG Oxygen Saturation

ABG Oxygen Saturation	
Arterial blood	Oxygen saturation >75%
Venous blood	Oxygen saturation <75%
Mixed arterial and venous blood	For oxygen saturation in the 80s% on an ABG, check patient's saturation with a pulse oximetry and if ABG saturation is less than the pulse oximetry saturation, redraw the ABG. It is probably mixed arterial and venous blood.

Asphyxiation

A condition in which an extreme decrease of oxygen in the body accompanied by an increase of carbon dioxide leads to loss of consciousness or death. Drowning, choking, electric shock, traumatic injury, or the inhalation of toxic gases can induce asphyxia.

Aspirations

Both freshwater and saltwater aspirations lead to severe hypoxemia due to a ventilation perfusion imbalance and significant pulmonary venous admixture. In victims who do not aspirate, hypoxemia results from apnea. Ninety percent of drowning victims aspirate water into their lungs. Ten percent do not aspirate and death is secondary to laryngospasms and hypoxia (dry drowning).

Drowning

Review of Drowning and Near Drowning	
Dry drowning	Dry drowning is asphyxiation caused by decreased oxygen and is a result of laryngotracheal spasm that prevents both water and oxygen to enter the lungs.
Wet drowning	Wet drowning is asphyxiation caused by decreased oxygenation because the lungs filled with water instead of air as the victim takes a breath.
Secondary drowning	Secondary drowning is death caused by respiratory failure commonly from ARDS, pulmonary edema, or aspiration pneumonia that occurs following successful resuscitation. Secondary drowning can occur from hours to several days after the near drowning event.
Seawater drowning	Seawater is a hypertonic solution. Fluid traverses into the alveoli because of osmotic pull across the alveolar capillary membrane and results in pulmonary edema, hemoconcentation, and hypovolemia.
Fresh water drowning	Fresh water is a hypotonic solution. Fluid transverses rapidly out of the alveoli into the blood by diffusion. The water may contain contaminants (chlorine, algae, mud particles) that break down the surfactant. Fluid seeps into the alveoli and results in pulmonary edema, hemodilution, and hypervolemia.

Irrigation of the Eye

Review of the Technique for Eye Irrigation
1. Wash the entire area about the eye. Anesthetize the eye. Saline bullets can be used to irrigate the eyes until the equipment can be assembled.
2. Assemble the equipment: Warmed irrigating solution of normal saline IV tubing IV cannula with the needle removed attached to the tubing
3. Place the patient on the affected side or on their back for bilateral irrigation. Pad well with towels.
4. Run a gentle stream of solution over the eye from the inner canthus to the outer.
5. Ask the patient to occasionally blink, look up, down, and from side-to-side to assure that the irrigating solution reaches all surfaces of the eye.
6. Evert (turn inside out) the upper eyelid by placing a cotton swab over the eyelid, pulling the eyelashes down and then up over the swab to irrigate under the upper lid.
7. Use copious amounts of fluids. Four liters is common.

Infections

Aspiration of contaminated water poses additional risks of infection and obstruction of small bronchioles by particulate substances.

Pulmonary Edema

Pulmonary Edema	
Description	Pulmonary edema is an effusion of serous fluids into the air vesicles and into the interstitial tissues of the lungs.
Signs and symptoms	Signs and symptoms may include severe dyspnea, decreased oxygenation, metabolic acidosis, crackles, wheezes, and productive cough of foam or pink-tinged sputum.
Tests	Chest x-ray may show bilateral interstitial and alveolar

	infiltrates.
Treatment	Treatment may include strict fluid restriction, high flow oxygen, bronchodilators, bipap or mechanical ventilation, diuretics, dobutamine, nitroglycerin, and intravenous morphine.
Note	Patients who require mechanical ventilation have a 50% mortality rate. Pulmonary edema can be the result of water aspiration. Both fresh and salt water drowning present with similar clinical pictures. There is a difference in how the pulmonary edema develops in fresh and salt water. However, the treatment is the same. Pulmonary edema can develop up to 72 hours after a near drowning event and close observation is essential.

Pulse Oximetry Saturation and Corresponding pO_2

Saturation	Oxygen Levels (pO_2)
80% SpO_2	40 to 49 pO_2
85% SpO_2	46 to 56 pO_2
87% SpO_2	49 to 60 pO_2
90% SpO_2	55 to 67 pO_2
93% SpO_2	63 to 78 pO_2
95% SpO_2	72 to 89 pO_2

Respiratory Acidosis

Review of Respiratory Acidosis	
Definition	Respiratory acidosis is CO_2 retention due to respiratory failure.
Symptoms	Symptoms may include confusion and a lowered level of consciousness.

Causes	Causes include sedatives, stroke, chronic pulmonary disease, airway obstruction, severe pulmonary edema, and cardiopulmonary arrest.
Management	Management is aimed at improvement of ventilation with pulmonary toilet and reversal of bronchospasm. Intubation may be required.

Respiratory Alkalosis

Review of Respiratory Alkalosis	
Definition	Respiratory alkalosis is excessive ventilation causing a primary reduction in CO_2 and increase in pH.
Symptoms	Symptoms may include a fast respiratory rate and a pH > 7.45. Severe alkalosis can cause seizures, tetany, cardiac arrhythmia, and loss of consciousness.
Causes	Pain and psychogenic causes are common. Others causes include pneumonia, pulmonary edema, interstitial lung disease, asthma, fever, hypoxemia, sepsis, delirium tremors, salicylates, hepatic failure, mechanical over ventilation, and central nervous system lesions.
Management	Management is directed towards correcting the underlying disorder. For psychogenic cases, sedation or a rebreathing bag may be used.

Statistics

Annually, approximately 9,000 people drown and an additional 50,000 have a near drowning incident. Drowning is the third leading cause of accidental death. Forty percent of drowning victims are under the age of 5 years. Drowning can be the result of a heart attack, seizure, trauma, fatigue, or suicide.

Warming

Review of ACLS Hypothermia Algorithm	
Mild hypothermia 34º to 36º C 93º to 96.8º F	Institute passive rewarming techniques by moving the patient to a warm environment, wrapping with warmed blankets, giving warmed oxygen, and warm oral liquids high in glucose to provide calories. Passive rewarming raises the temperature 0.5º to 2.0º C/hr (1.4º to 3.3º F/hr). Discontinue when core temperate is > 35º C (95º F) to avoid hyperthermia.
Moderate hypothermia 30º to 34º C 86º to 93º F	Institute passive rewarming techniques by moving the patient to a warm environment, wrapping with warmed blankets, giving warmed oxygen, and warm oral liquids high in glucose to provide calories. Initiate active external rewarming to the truncal areas only with the Bear Hugger, radiant heating lamps, heating pads, and a warming bed.
Severe hypothermia < 30º C < 86º F Death usually occurs below 25.6º C (78º F)	Active internal warming efforts are essential. The heart is resistant to drug therapy and to electroconversion at a core temperature of less than 86 degrees. Active internal rewarming may include warmed intravenous fluids to 43º C (109.4º F), warmed humidified oxygen 42º to 46º (107.6º to 114.8º F), warm fluids for peritoneal lavage, extra corporeal rewarming, hemodialysis, and esophageal rewarming tubes.
Complications	Moderate and severe hypothermia carry a risk of rewarming shock. Shock occurs when the peripheral areas are warmed faster than the core causing a large amount of lactic acid from the extremities to be rapidly shunted to the heart. Fibrillation can occur. Discontinue when core temperate is > 35º C (95º F) to reduce the risk of hyperthermia.

PART FOUR: CARBON MONOXIDE INHALATION AND HAZARDOUS MATERIAL

The organized systematic care process in this section optimally manages the patient with carbon monoxide inhalation and patients exposed to hazardous material. The sequential steps outlined include assessment, problem identification, planning, interventions, ongoing evaluations, and disposition. Detailed information is included for the common medications. The related information at the end of the section provides an overview of the terms, concepts, and pathophysiology related to carbon monoxide inhalation and hazardous material exposure.

Topics reviewed include:

- Carbon monoxide poisoning with reliance placed on ABG analysis and not SpO_2
- Chemical burns from caustic chemicals including alkaline products
- COHb levels correlated with symptoms and treatment

Rapid ABC Assessment

1. Is the patient's airway patent?
    a. The airway is patent when speech is clear and no noise is associated with breathing.
    b. If the airway is not patent, consider clearing the mouth and placing an adjunctive airway.
2. Is the patient's breathing effective?
    a. Breathing is effective when the skin color is within normal limits and the capillary refill is < 2 seconds.
    b. If breathing is not effective, consider administering oxygen and placing an assistive device.
3. Is the patient having any pain or tenderness of the spine?
    a. Immobilize the C-spine for neck pain or tenderness if injury is less than 48 hours old.
    b. Place a hard C-collar on the neck and immobilize the back by laying the patient on a stretcher.
4. Is the patient's circulation effective?
    a. Circulation is effective when the radial pulse is present and the skin is warm and dry.
    b. If circulation is not effective, consider placing the patient in the recumbent position, establishing intravenous access, and giving a 200 ml fluid bolus.

Decontamination is the first priority for a contaminated patient. The patient and the emergency staff are in danger when chemical contamination is present. Initial decontamination at the scene often is not effective. Most hospitals have a decontamination area accessible directly from the outside of the ER. Patients contaminated with chemicals

should not enter through the usual entrance. The decontamination area includes a shower and an area for removal of contaminated clothing. Articles removed must be bagged for proper disposal.
Radiation exposure requires a lead-lined room such as an x-ray room. The floor must be covered with newspaper or nonskid plastic and the air circulation system turned OFF. Equipment needed includes a Geiger counter, water, scrub brushes, soap, lead-lined disposal containers, and protective garb for personnel. The hospital has a written disaster plan that must be followed.
The patient's identity, chief complaint, and history of present illness are developed by interview. The standard questions are ***who, what, when, where, why, how, and how much***. ***Who*** identifies the patient by demographics, age, sex, and lifestyle. ***What*** develops the chief complaint that prompted the patient to seek medical advice. ***When*** determines the onset of the symptom. ***Where*** identifies the body system or part that is involved and any associated symptoms. ***Why*** identifies precipitating factors or events. ***How*** describes how the symptom affects normal function. ***How much*** describes the severity of the affect.

Patient Identification

1. Who is the patient?
    a. What is the patient's name?
    b. What is the patient's age and sex?
    c. What is the name of the patient's current physician?
    d. Does the patient live alone or with others?

Chief Complaint

The chief complaint is a direct quote, from the patient or other, stating the main symptom that prompted the patient to seek medical attention. A symptom is a change from normal body function, sensation, or appearance. A chief complaint is usually three words or less and not necessarily the first words of the patient. Some investigation may be needed to determine the symptom that prompted the patient to come to the ER. When the patient, or other, gives a lengthy monologue, a part of the whole is quoted.

1. In one to three words, what is the main symptom that prompted the patient to seek medical attention?
    a. Use direct quotes to document the chief complaint.

b. Acknowledge the source of the quote, e.g., the patient states; John Grimes, the paramedic states; Mary, the granddaughter, states.

History of Present Illness

Carbon Monoxide Inhalation

1. When did the incident occur?
2. Are the symptoms confined to the respiratory system?
3. What were the circumstances of the exposure?

> If the inhalation was a suicide attempt, incorporate appropriate aspects from chapter #27 Psychiatric Emergency and Suicide Attempt.

4. How does the incident affect the patient's normal function?
5. Has any treatment been initiated and has it helped?

Hazardous Material Exposure

1. When was the exposure?
2. Where are the injuries or what body system is involved and are any associated symptoms present?
3. What caused the injury?
    a. What chemicals were involved?
    b. Does the patient or emergency personnel know the warning placard number or the chemical ID number?
4. How does the injury or symptoms affect the patient's normal function?
    a. Is neurovascular function normal distal to the injuries?
    b. Does the patient have normal use of the injured area?
5. Was the patient decontaminated at the scene?
    a. What was the process of decontamination, e.g., a water rinse or a soap and water scrub?

Standard Questions for History of Present Illness

1. Does the patient have any pertinent past history?
2. Does the patient take any routine medications?
    a. What is the name, dosage, route, and frequency of the medication?
    b. When was the last dose?
3. Does the patient have allergies to drugs or foods?
    a. What is the name of the allergen?
    b. What was the reaction?
4. When was the patient's last tetanus immunization?
5. If the patient is female and between the ages of 12 to 50 years, when was the first day of her last menstrual period?

Caregiver Diagnoses

- □ Ineffective airway clearance
- □ Knowledge deficit
- □ Fear
- □ Anxiety
- □ Impaired gas exchange
- □ Altered tissue perfusion

Anticipated Medical Care

Review of the Anticipated Medical Care of Carbon Monoxide Inhalation and HAZMAT	
Exam	Full body
Urine	None
Blood	STAT ABG for carbon monoxide poisoning Hematology, chemistries, coagulation studies, type and screen for a hazardous material exposure
ECG	ECG for females over 45 years, males over 35 years, all ages with a cardiac history
X-ray	Chest
Other	Strict adherence to the HAZMAT policy
Diet	NPO
IV	Normal saline or Ringer's solution
Medications	Morphine
Other	Treatment as outlined on the chemical ID placard in the hospital HAZMAT protocol manual
Worse case scenario	The worse case scenario is an unsuspected airway compromise from a chemically burned larynx, bronchus, or lung. Treatment may include intubation or tracheotomy and mechanical ventilation with PEEP.
Disposition is Dependent on the Severity of the Burn	

Disposition of chemical burns are the same as thermal burns.	
Minor burns Treatment as an outpatient or 23 hour observation	Adults deep partial-thickness (DPT) <15% of the total body surface area (TBSA) Child DPT <10% TBSA Adult or child <3% TBSA of full thickness (FT) burns not involving the face, hands, feet, or perineum
Moderate burns Community hospital	Adults DPT 15% to 25% TBSA Child DPT 10% to 20% TBSA Adult or child FT 3% to 10% TBSA not involving face, hands, feet, or perineum.
Major burns Burn center	Adult DPT >25% TBSA Child DPT >20% TBSA Adult or child FT >10% TBSA Any burns of the face, hands, feet, and perineum. Any burns complicated by inhalation injury, major associated trauma, preexisting illness, and all major electrical injuries.

Initial Assessments and Interventions

Carbon Monoxide Inhalation

1. Ask the patient to undress, remove jewelry that might interfere with the examination, and put on an exam gown. Assist as needed.
2. Obtain vital signs and an arterial blood gas analysis.

The SpO_2 on a pulse oximetry may be misleading. On arterial blood gases, the patient will have a below normal SaO_2 and the PaO_2 will remain normal. Since the PaO_2 is normal, the patient does not increase ventilation and the patient sustains tissue hypoxia. The carbon monoxide (CO) is excreted by the lungs with a half-life of four to six hours once the patient is removed from the exposure, The half-life decreases to 40 to 80 minutes with 100% oxygen therapy and to 15 to 30

minutes with hyperbaric oxygen. The patient may present with the characteristic cherry-red skin and mucous membranes. Treatment includes administration of oxygen by tight fitting mask until CO levels are less than 10% and all symptoms have resolved. Hyperbaric oxygen is recommended for patients with CO levels of $\geq$ 40% with coma and for patients with CO levels of $\geq$ 25% with seizures, arrhythmias, or other sequelae.

3. Place the patient on 100% oxygen by a non-rebreather mask or use hyperbaric oxygen therapy.

COHb Levels	Symptoms and Treatment
5 to 10%	No symptoms to mild headache and vertigo. Oxygen therapy at 100% with a tight fitting mask.
10 to 20%	Symptoms include headache, nausea, vomiting, and loss of coordination. Oxygen therapy at 100% with a tight fitting mask.
20 to 30%	Symptoms include confusion, ST depression, and visual disturbances. Oxygen therapy at 100% with a tight fitting mask.
40 to 60%	Symptoms include coma, seizures, and cardiac arrhythmias. Hyperbaric oxygen therapy is recommended.
> 60%	Death

4. Perform a focused physical examination.

   a. Auscultate the lungs.
   b. Listen to heart sounds.
   c. Evaluate the level of consciousness using the **AVPU** scale.
      A for alert signifies that the patient is alert, awake, responsive to voice and oriented to person, time, and place.
      V for verbal signifies that the patient responds to voice, but is not fully oriented to person, time, or place.
      P for pain signifies that the patient does not respond to voice, but does respond to painful stimulus such as a squeeze to the hand.
      U for unresponsive signifies that the patient does not respond to painful stimulus.

Hazardous Material Exposure

1. Remove ALL clothes and ALL jewelry. Place in a biohazard bag.
2. Decontaminate the patient as outlined in the hospital's HAZMAT policy. After the patient is decontaminated, place the patient in a hospital gown.
3. Get vital signs; attach heart monitor leads, automatic blood pressure cuff, and pulse oximetry for continuous monitoring. Document the initial heart monitor strip and document changes of rhythm.
4. Administer oxygen if saturation is $\leq$ 94%.
5. If the patient has sustained serious chemical exposure, evaluate the level of consciousness to use as a base line. Practice the mnemonic **AVPU**.
   A for alert signifies that the patient is alert, awake, responsive to voice and oriented to person, time, and place.
   V for verbal signifies that the patient responds to voice, but is not fully oriented to person, time, or place.
   P for pain signifies that the patient does not respond to voice, but does respond to painful stimulus such as a squeeze to the hand.
   U for unresponsive signifies that the patient does not respond to painful stimulus.
6. Perform a head to toe physical examination.

If two caregivers are at the bedside, one can ask the questions and document the answers of the other who performs the exam.

   a. What is the size and reaction of the pupils?
   b. Does the patient have any head pain or injuries to the head?
      Is the tongue or mouth injured?
      Is any drainage present from the nose or ears?
   c. Is the trachea midline?
      Is jugular venous distention present (unable to detect under fluorescent light)?
   d. Does the chest expand equally?
      Is subcutaneous emphysema present?
      Are the heart tones within normal limits?
      Are the heart tones diminished?
      Are any murmurs present?
      Does the patient complain of chest pain?
      Is the chest tender to palpation?
   e. Are the lung sounds clear on the right and left?
      Are wheezes or crackles present?
      Are the lung sounds decreased or absent in any area of the lungs?
   f. Is the abdomen soft, flat, rigid, or distended?
      Are bowel sounds normal, hypoactive, hyperactive, or absent?
      Does the patient complain of abdominal pain?
      Is the patient's abdomen tender to palpation?
   g. Is the patient incontinent?
      Examination of the genitalia may be deferred if trauma is not suspected.

Do the genitalia appear normal?
Does the patient have bleeding from the urethral meatus or vagina?
Is priapism present?
Does the patient complain of genital pain?
Is the perineal area or genitalia tender to palpation?

h. Does the patient complain of pain when light pressure is applied to the iliac crests?
Is the pelvis stable or unstable?

i. Does the patient have normal motion and sensation in the upper and lower extremities?
Are distal pulses present in the upper and lower extremities?

j. Does the patient have normal movement of his back?
Does the patient complain of back pain?
While keeping the back immobilized, turn the patient.
Inspect the posterior surfaces.
Does the patient have obvious back injuries?
Is the back tender to palpation?

k. Does skin inspection reveal any damage to the skin, e.g., abrasions, lacerations, bruises, needle tracks, or petechiae?

7. For burns from a chemical exposure, draw a human figure on the chart, document the areas of burn, and classify them.

Burn Classification		
1st Degree Epidermis and superficial dermis	Painful	Erythema
2nd Degree Moderate dermis Deep dermis	Painful	Pink moist blisters
3rd Degree Through the dermis and into the fat, muscle, or bone	Not painful	White, brown, or black dry leathery tissue

Standard Interventions

1. Establish intravenous access and draw laboratory blood specimens.
2. Draw a variety of tubes that will allow the lab to perform hematology, chemistry, and coagulation studies. Patients on anticoagulants need a prothrombin time. Consider drawing other labs, e.g., type and screen, blood cultures.
3. Administer medications covered by hospital protocols, e.g., diphtheria tetanus toxoid.
4. Inform the patient not to eat or drink and teach the rationale for the NPO status.

5. Elevate the siderails and place the stretcher in the lowest position.
6. Inform the patient, family, and caregivers of the plan of care and the anticipated time until disposition.
7. Provide the patient with a device to reach someone for assistance and explain how to use it. Ask the patient to call for help before getting off the stretcher.

Ongoing Evaluations and Interventions

Inform the physician of adverse changes noted during ongoing evaluation. Document that the physician was notified of the adverse change and what orders, if any, were received.

1. Monitor vital signs and effectiveness of breathing.
2. Monitor for signs and symptoms of worsening. Observe for restlessness, difficulty swallowing, dyspnea, and hoarseness that indicate airway compromise.
3. Monitor ABG results for patients with carbon monoxide inhalation. Consider placing an arterial line for frequent blood draws.

COHb Levels	Symptoms and Treatment
5 to 10%	No symptoms to mild headache and vertigo Oxygen therapy at 100% with a tight fitting mask
10 to 20%	Symptoms include headache, nausea, vomiting, and loss of coordination. Oxygen therapy at 100% with a tight fitting mask
20 to 30%	Symptoms include confusion, ST depression, and visual disturbances. Oxygen therapy at 100% with a tight fitting mask.
40 to 60%	Symptoms include coma, seizures, and cardiac arrhythmias. Hyperbaric oxygen therapy is recommended.
> 60%	Death

4. Monitor pain management therapy closely for burned patients to assess therapeutic response.

a. Burn patients need pain medication frequently. The usual time for a medication effectiveness check is every 10 to 20 minutes.

b. Morphine is the drug of choice.

c. Regional blocks can be used for extremity burns. If therapy is not effective, ask the physician for a repeat dose or an alternative.

5. Monitor closely for the development of adverse reactions to therapy.

a. Perform interventions to relieve the adverse reaction.

b. Ask the physician for a remedy.

6. If not NPO, provide the patient with food at mealtimes and fluids during the stay.

7. Keep the patient, family, and caregivers well informed of the plan of care and the remaining time anticipated before disposition.

8. Monitor the patient's laboratory and x-ray results and notify the physician of critical abnormalities. Remedy abnormalities as ordered.

9. Notify the physician when all diagnostic results are available for review. Ask for establishment of a medical diagnosis and disposition.

Discharge Instructions

1. Provide the patient with the name of the nurse and doctor in the emergency room.
2. Inform the patient of their diagnosis or why a definitive diagnosis couldn't be made. Explain what caused the problem if known.
3. Teach the common side effects or adverse effects of the prescribed medications and what to do if any of these occur. Instruct the patient not to drive or perform any dangerous tasks while taking narcotic pain medications.
4. Recommend a physician for follow-up care. Provide the name, address, and phone number with a recommendation of when to schedule the care.
5. Instruct the patient to call the follow-up physician immediately or return to the emergency room if problems persist for over eight hours, worsen in anyway, or any unusual symptoms develop. ENCOURAGE the patient NOT to IGNORE WORSENING OR PERSISTENT SYMPTOMS.
6. Ask for verbal confirmation or demonstration of understanding and reinforce teaching as needed.

Medications

Morphine

Morphine (MSO_4)	
Indications	Moderate to severe pain

Dose	4 to 10 mg IV over 5 minutes
Pediatric dose	50 to 100 mcg/kg IV, maximum 10 mg/dose
Onset	IV onset rapid, peak 20 minutes, duration 4 to 5 hours
Side effects	Confusion, sedation, hypotension, respiratory depression
Monitor	CNS changes, sedation level, effectiveness of respirations

Narcan

Narcan (naloxone)	
Indications	Opioid overdose
Dose	0.4 to 2 mg IV every 2 to 3 min. A maximum dose has not been established. However, if the patient does not respond after 10 mg of Narcan, the diagnosis of an opioid overdose must be questioned.
Pediatric dose	0.01 mg/kg IV every 2 to 3 minutes
Onset	IV onset 1 min., duration 45 min.
Side effects	Nervousness, ventricular tachycardia, increased systolic blood pressure in high doses
Monitor	Anticipate the return of the narcotic sedation level. The life of the morphine is 4 to 5 hours and the life of the Narcan is 45 minutes.

Related Information

Carbon Monoxide COHb Levels

COHb Levels	Symptoms and Treatment
5 to 10%	No symptoms to mild headache and vertigo

	Oxygen therapy at 100% with a tight fitting mask
10 to 20%	Symptoms include headache, nausea, vomiting, and loss of coordination. Oxygen therapy at 100% with a tight fitting mask
20 to 30%	Symptoms include confusion, ST depression, and visual disturbances. Oxygen therapy at 100% with a tight fitting mask.
40 to 60%	Symptoms include coma, seizures, and cardiac arrhythmias. Hyperbaric oxygen therapy is recommended.
> 60%	Death

Carbon Monoxide Poisoning

Carbon monoxide (CO) is a tasteless, odorless, and colorless gas that is present in the smoke from organic materials such as wood, coal, and gasoline. When inhaled, it binds to the oxygen binding sides on the hemoglobin molecule and the oxygen is reduced. The amount of oxygen left is not readily available to the tissues and hypoxia results. The SpO_2 on a pulse oximetry may be misleading. On arterial blood gases, the patient will have a below normal SaO_2 and the PaO_2 will remain normal. Since the PaO_2 is normal, the patient does not increase ventilation and the patient sustains tissue hypoxia. The carbon monoxide (CO) is excreted by the lungs with a half-life of four to six hours once the patient is removed from the exposure. The half-life decreases to 40 to 80 minutes with 100% oxygen therapy and to 15 to 30 minutes with hyperbaric oxygen. The patient may present with the characteristic cherry-red skin and mucous membranes. Treatment includes administration of oxygen by tight fitting mask until CO levels are less than 10% and all symptoms have resolved. Hyperbaric oxygen is recommended for patients with CO levels of $\geq$ 40% with coma and for patients with CO levels of $\geq$ 25% with seizures, arrhythmias, or other sequelae.

Chemical Burns

Chemical burns are caused when the body comes into direct contact with caustic chemicals (hazardous material). The chemical causes a denaturing of protein within the tissues or a desiccation (drying out) of the cells. The damage to the tissue is directly related to the time of exposure and the concentration of the chemical. Alkaline products (pH > 7) such as soda and anhydrous ammonia cause more tissue damage than acids. Successful treatment requires fast removal of the chemical. Not all chemicals are removed successfully with water, some require soap, and others are intensified with soap and water. Every hospital is required to have a HAZMAT (hazardous material) manual that covers decontamination procedures for most chemicals. The patient and staff are in

danger as long as the chemicals are present. The medical care of burns from chemicals is managed by the same techniques as thermal burns.

Radiation Exposure

Ionizing radiation has the ability to penetrate cells and randomly deposit energy within them. It is unaffected by the usual cellular barriers. When sufficiently intense, the energy kills cells by inhibiting their division. The United States Energy Research and Development Administration have regional offices for information and assistance on radiation emergencies.

Radiation Exposure Standard Emergency Process

Review of Standard Emergency Process for Radiation Exposure
1. Notify administrative personnel and refer to HAZMAT policy.
2. Notify trained health physicists from the nuclear medicine department.
3. Obtain the necessary survey meter (Geiger counter) to measure the intensity of the radiation.
4. Notify the law enforcement agency with jurisdiction.
5. Prepare a room that is lead lined and lends itself to washing, such as the morgue or x-ray.
6. Turn off air circulation to the area to avoid spread of the contamination.
7. Check the patient, stretcher, and EMS personnel for contamination with the survey meter on arrival to the hospital. Record the measurements. Mild to severe nausea and vomiting are associated with most cases of radiation exposure. Seizures and death are associated with severe contamination (exposure to > 2,000 rad).
8. Give lifesaving measures as needed. Emergency personnel need to wear protective clothing, e.g., gown, gloves, cap, and mask.
9. SAVE ALL LIQUID USED IN WASHING. DO NOT ALLOW CONTAMINATED LIQUID TO ENTER THE SEWERAGE. Save all material contaminated with blood, urine, stool, vomitus, and all metal objects such as jewelry and dental plates. Label with name, date, and time. Mark clearly "RADIOACTIVE — DO NOT DISCARD."

10. Start decontamination by cleansing and scrubbing the patient with soap and warm water. Showering may be necessary. Provide extra friction to hair-covered areas, body orifices, and body folds. Wounds can be decontaminated with irrigation, débridement, and covered with a self-adhering drape during the rest of the scrubbing process.
11. Re-measure radiation contamination and record measurements after each washing or showering. If the radiation is not reduced after external decontamination, internal contamination must be suspected.
12. Gastric lavage, cathartics, and chelating or blocking agents that prevent the uptake of the radioactive iodine manages internal contamination.
13. Leukopenia and thrombocytopenia occur in patients exposed to radiation. The onset of symptoms is dependent on the amount of exposure. Symptoms manifest themselves 4 to 5 weeks after an exposure of 100 to 300 rad, 3 weeks after an exposure of 300 to 600 rad, and 1 to 3 weeks after an exposure of more than 600 rad.

Respiratory Crisis Exam

Select the ***best*** answer to each of the following items. Mark your responses on the Answer form.

21. The ____steps of the emergency care process outlined in this class are the organized part of the organized chaos that can be seen in the emergency room.

a. three
b. six
c. nine
d. twelve

22. The first of those steps is _____.

a. planning
b. assessment
c. intervention
d. problem identification

23. The indication(s) for the use of Versed (midazolm hydrochloride) is(are) _____.

a. pulmonary acidosis
b. pulmonary embolism
c. conscious sedation
d. respiratory arrest

24. The indication(s) for the use of Bumex (bumetanide) is(are) _____.

a. pulmonary acidosis
b. pulmonary embolism
c. conscious sedation
d.. Fluid overload

25. In assessing a patient's breathing, it is considered effective when the skin color is within normal limits and the capillary refill is _____.

a. < 1 minute
b. < 1 second
c. < 2 seconds
d. < 6 seconds

26. In the emergency room, the _____ is a direct quote, from the patient or other, stating the main symptom that prompted the patient to seek medical attention.

a. evaluation
b. chief complaint
c. "what"
d. All of the above

27. When evaluating the history of the patient's illness in the emergency room, the first item of concern is _____

a. Was any treatment started before coming to the hospital and has it helped?
b. Is the patient able to tolerate normal activity?
c. When was the onset of the breathing problem?
d. Has the patient had similar problems before?

28. During the initial assessments and interventions, the patient should be placed on oxygen to maintain an oxygen saturation of ≥_____

a. 94%.
b. 81%
c. 100%
d. 55%

29. When evaluate the patient's level of consciousness to use as a base line, use the mnemonic _____.

a. ACUT
b. ABCD
c. AVPU
d. AVIE

30. Regarding medications, the indication(s) for using Aminophyllin is(are) _____.

a. fluid overload
b. asthma, wheezing, bronchospasm
c. peripheral edema, congestive heart failure, pulmonary edema
d. Severe inflammation, shock, contact dermatitis, pruritus

31. Regarding medications, the indication(s) for using Lasix (furosemide) is(are) _____.

a. fluid overload
b. Bronchospasm, asthma
c. peripheral edema, congestive heart failure, pulmonary edema
d. Severe inflammation, shock, contact dermatitis, pruritus

32. Regarding medications, the indication(s) for using Proventil, Albuterol, or Ventolin is(are) _____.

a. peripheral edema, congestive heart failure, pulmonary edema
b. fluid overload
c. Bronchospasm, asthma
d. Severe inflammation, shock, contact dermatitis, pruritus

33. When reviewing patient's ABG Oxygen Saturation Levels in Arterial Blood, which of the following statements is true?

a. Oxygen saturation is usually <89%.
b. Oxygen saturation is usually >75%.
c. Oxygen saturation is usually >85%
d. Oxygen saturation really has no "usual" level

34. The most common cause of airway obstruction is a _____ that falls over the back of the throat obstructing the pharynx and larynx.

a. relaxed tongue
b. piece of food
c. roundish object
d. rush of water

35. When a patient goes into respiratory arrest, the first priority is to open the airway with a _____.

a. bronchodilating spray medication
b. heimlich maneuver
c. head-tilt-chin-lift or a jaw-thrust maneuver
d. sharp blow to the back of the chest

36. Endotracheal intubation _____.

a. is the initial procedure for ventilation in respiratory arrest
b. is attempted only after other methods of oxygenation have failed
c. requires a signed consent of both the patient and family member
d. None of the above

37. Upon discharge from the emergency room, the patient should be informed of _____.

a. the name of the attending nurse and doctor in the emergency room
b. their diagnosis or why a diagnosis could not be made
c. Both of the above
d. Neither of the above

38. _____ causes obstruction of arterial pulmonary blood flow to the distal lung commonly resulting in ischemia and infarction of the lung

a. Pulmonary edema
b. A pulmonary embolus
c. Respiratory arrest
d. Respiratory acidosis

39. _____ is the collapse of a lung and most commonly occurs in patients between the ages of 20 and 40 years.

a. Pneumothorax
b. Pulmonary embolism
c. Respiratory arrest
d. Respiratory acidosis

40. The indication(s) for the use of Glucagon is(are) _____.

a. pulmonary embolism
b. esophageal foreign body obstruction
c. respiratory acidosis
d. respiratory arrest

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2. Login and go to "My Account".
3. On the page that opens, select an option from the "My Courses" menu.
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