CONTINUING MEDICAL EDUCATION

Shortness of Breath and Cough in Patients in Palliative Care

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SUMMARY

Background: Shortness of breath and cough are common, disturbing symptoms in patients receiving palliative care. They arise in 10% to 70% of patients with advanced cancer and in 60% to nearly 100% of patients with non-malignant underlying diseases, depending on the type of disease.

Methods: This review is based on a selective literature search in the Medline, Embase, and PsycInfo databases and on current recommendations from Germany and other countries, as well as on the authors' personal experience.

Results: Some general measures to address these problems are reassurance, development of an emergency plan, physical activity, and relaxation exercises. Supportive non-pharmacological measures may include the use of a rollator (level of evidence [LoE] 1–), a cool draft of air as from a handheld fan (LoE 1–), physiotherapy, and respiratory therapy. There is good evidence (LoE 1+) to support the administration of opioids as the medications of choice; benzodiazepines are often used, but a meta-analysis did not reveal any statistically significant benefit (LoE 1+). Expectorants can help patients who cough with marked sputum formation. Antitussants suppress the cough reflex both peripherally and centrally (LoE 1+ to 3). Opioids, including morphine (LoE 1–) and dextromethorphan (LoE 1–), are effective antitussants with low toxicity.

Conclusion: In most patients, shortness of breath and cough can be relieved by a series of therapeutic measures.

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Shortness of breath and cough are common respiratory symptoms in patients with advanced cancer or non-malignant disease (1–3). These symptoms put a heavy burden on patients and their families.

Over the entire course of disease, shortness of breath affects (4):

- 10–70% of cancer patients;
- 60–95% of patients with cardiorespiratory diseases such as chronic congestive heart failure or chronic obstructive pulmonary disease (COPD);
- nearly all patients with amyotrophic lateral sclerosis (ALS).

Shortness of breath (dyspnea) has been called the “pain” of non-malignant disease. It becomes more common and severe in the final stage of progressive diseases (5). The American Thoracic Society defines shortness of breath as “a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity.” This experience is the combined effect of multiple physiological, psychological, social, and environmental factors and can itself induce both physiological and behavioral reactions (2). If shortness of breath persists despite optimal treatment of the underlying disease (e.g., chemotherapy for lung cancer, anti-obstructive drugs for COPD), then it is termed “refractory” and needs symptomatic treatment. In a study on 168 cancer patients with a mean survival time of approximately three weeks, shortness of breath was found to be one of the seven factors associated with a diminished will to live (6). In 10 of 22 studies involving patients with advanced disease and a survival time of less than six months, shortness of breath was found to be an indicator of shorter survival (7). In another study, cancer patients admitted to the hospital on an emergency basis because of shortness of breath were found to have a

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Definition

Shortness of breath (dyspnea) is a subjective experience of breathing discomfort that consists of qualitatively distinct sensations that vary in intensity.

BOX

The SIGN evidence-grading scheme*

- 1++ High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias
- 1+ Well conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
- 1– Meta-analyses, systematic reviews or RCTs, or RCTs with a high risk of bias
- 2++ High-quality systematic reviews of case-control or cohort studies or high-quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal
- 2+ Well-conducted case-control or cohort studies with a low risk of confounding, bias, or chance and a moderate probability that the relationship is causal
- 2– Case-control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal
- 3 Non-analytic studies, e.g., case reports, case series
- 4 Expert opinion

*Scottish Intercollegiate Guidelines Network

median survival time of twelve weeks (8). Cancer patients report that shortness of breath arises suddenly, without warning, and that it causes them greater worry than pain does (10). Some 80% of patients who suffer from shortness of breath have attacks of dyspnea, mainly under stress, that are brief (often shorter than ten minutes) and are perceived as dangerous (11). Patients should be instructed in self-management strategies, as the drugs given for shortness of breath often do not take effect till after the attack has subsided. Attacks of dyspnea can be triggered by a variety of factors, including physical stress (walking, climbing stairs), emotional stress (fear, panic, irritation), environmental influences (dust, temperature), and concurrent medical conditions (infections) (12). Shortness of breath is thus a multifactorial symptom that remains incompletely understood. Recent studies have shown that

the perception of shortness of breath is closely linked to the limbic system; this underscores the fact that it can be influenced by emotion (2).

Cough is the presenting symptom of more than 65% of patients with lung cancer (13). About 38% of patients with advanced cancer suffer from cough. Like pain, cough initially has a protective function, i.e., clearing the upper part of the tracheobronchial tree of mucus and foreign bodies (3). Chronic cough, however, is physically exhausting, impairs social relationships, and worsens other symptoms including pain, shortness of breath, incontinence, and sleep disturbance. It can also cause rib fractures (3, 14).

Learning objectives

This article is intended to acquaint the reader with:

- the need for standardized assessment of shortness of breath and cough in patients with advanced disease,
- the non-pharmacological treatment options for shortness of breath and cough,
- the most important medications for the treatment of shortness of breath and cough,
- the role of oxygen in the treatment of shortness of breath and its proper, judicious use.

Methods

A selective literature search was carried out in Medline (1966 to December 2012), Embase (1980 to December 2012), and PsycInfo (1980 to December 2012) with the search terms “dyspnea,” “cough,” “cancer,” “COPD,” “chronic heart failure,” and “motor neuron disease.” This article is also based on recommendations from Germany and other countries and on our personal experience.

Studies involving the symptomatic treatment of refractory shortness of breath and cough in patients with advanced cancer and non-malignant disease (e.g., chronic obstructive pulmonary disease, chronic congestive heart failure, ALS, and pulmonary fibrosis) were included in the analysis. We use the term refractory shortness of breath to designate shortness of breath that persists despite optimal treatment of its underlying cause.

The levels of evidence for the individual treatment options are given according to the grading scheme of the Scottish Intercollegiate Guidelines Network (SIGN) (www.sign.ac.uk/guidelines/fulltext/50/nextb.html) (Box).

The experience of shortness of breath

The experience of shortness of breath is the combined effect of multiple physiological, psychological, social, and environmental factors and can itself induce both physiological and behavioral reactions.

Potential triggers

Attacks of dyspnea can be triggered by various factors, including physical stress (walking, climbing stairs), emotional stress (fear, panic, irritation), environmental influences (dust, temperature), and concurrent medical conditions (infections).

The evaluation of shortness of breath and cough

In taking the history of a patient suffering from shortness of breath and/or cough, the physician should ask specifically about the intensity and quality of the symptom, its temporal onset, frequency, and course, precipitating, aggravating and alleviating factors, accompanying symptoms, and the resulting emotional stress. Physicians should also ask about the emotional effect of the symptom on the patient's family (but often neglect to do so).

Both shortness of breath and cough are subjective sensations even though cough can also be observed. Thus, in the end, it is only the patient's own assessment that counts. The subjective severity and intensity of these two symptoms should therefore be recorded regularly to evaluate the degree of suffering they cause and the effect of treatment. A numerical rating scale (NRS) from 0 to 10 has been found useful for this purpose (0 = no shortness of breath or cough, 10 = worst shortness of breath or cough imaginable). Objective findings such as the respiratory rate, blood oxygen content, or lung function values are only moderately correlated with patients' subjective feelings of shortness of breath. As for cough, physicians should note the distinction between productive and nonproductive cough. Patients with productive cough should be asked about the type, color, and amount of sputum they produce.

Aside from comprehensive history-taking and physical examination (most importantly, auscultation and percussion of the lungs), other tests including a chest x-ray, ultrasound of the abdomen and pleural space, and measurement of the arterial blood oxygen saturation (SaO₂) may be indicated to identify potentially reversible causes of shortness of breath and cough. It should always be remembered, however, that pulmonary function is only moderately correlated with the patient's subjective state; thus, laboratory tests cannot provide any reliable evidence about the patient's experience of shortness of breath.

The causes of shortness of breath and cough

Both symptoms have multiple causes, most of which can cause either symptom. In patients with cancer, shortness of breath and cough can arise because of compression of the large airways, pulmonary metastases, or pleural effusion; further causes of shortness of breath include cachexia with weakness of the

respiratory muscles, infection, and pulmonary embolism. Patients with COPD, other chronic lung diseases, and severe congestive heart failure suffer from shortness of breath and cough as principal manifestations of the disease. Nearly all patients with amyotrophic lateral sclerosis are severely short of breath in the last stage of their disease.

It is very important to determine, for each patient, which of the suspected causes of shortness of breath and cough are reversible, and whether all options for causally directed treatment of the underlying disease have been exhausted.

Moreover, in patients with shortness of breath, feelings of fear, loneliness, tension, and sadness play a major role and often make shortness of breath worse.

The treatment of refractory shortness of breath

Shortness of breath is a complex symptom that generally cannot be satisfactorily relieved with a single measure alone. Its treatment often requires a combination of general measures, non-pharmacological measures, and drugs. In particular, it is the non-pharmacological measures that reinforce patients' personal initiative and self-control, in turn increasing their independence and improving their quality of life.

All of the treatment measures to be discussed here should be taken after, or in parallel with, the causally directed treatment of shortness of breath. They are particularly important, however, when shortness of breath persists despite appropriate treatment of the factors that induced it.

General measures

Multiple approaches are needed to relieve shortness of breath effectively and enable the patient to deal adequately with this symptom. The patient should be shown ways to gain control over the situation whenever shortness of breath arises. To this aim, the physician should first listen to the patient's (and family's) account of the symptom and then work out a "dyspnea plan," including both drugs and non-pharmacological measures, so that the patient and family know precisely what to do when necessary (15). The physician should inform the patient and family about the following:

- adapting the rhythm of daytime activity so that there will be sufficient intervals of rest in between,

Important elements of the clinical history

Ask about the intensity and quality of the symptom, its temporal onset, frequency, and course, precipitating, aggravating and alleviating factors, accompanying symptoms, and the resulting emotional stress on the patient and family.

General measures

Reassurance, information, and an emergency plan promote individual initiative and self-management on the part of the patient and family.

- optimizing energy consumption during activities such as walking and climbing stairs.

It may also be helpful for the patient to practice specific rituals to be carried out when attacks of dyspnea arise.

Calming measures are an important part of the treatment of shortness of breath, which always has an emotional component (2) and is made much worse by fear and panic (2). The presence of persons who are emotionally near to the patient has a calming effect when acute shortness of breath arises. Many patients fear death from suffocation during an acute attack of shortness of breath, but such events are actually very rare. The simple reassurance that an attack will come to an end and that normal breathing will be possible again lessens anxiety and helps the patient cope with shortness of breath.

Patients should always be encouraged to stay physically active and get adequate exercise to counteract progressive deconditioning and fatigue.

Non-pharmacological treatment of shortness of breath

Various non-pharmacological measures are available, some of which are supported by good evidence (16).

Fans generate a draft of air, which, when directed to the nose and central part of the face, can alleviate shortness of breath in many patients. Either a table fan or a standing fan can be used for this purpose. There is also good evidence from a randomized trial (LoE 1–) supporting the use of a small, inexpensive, portable handheld fan (17). The draft of air presumably activates trigeminal receptors and relieves shortness of breath via central trigeminal connections. The use of a rollator or other walking aids not only prolongs the distance the patient can walk, but also relieves shortness of breath, presumably by stabilizing the thoracic outlet and thereby lessening the load on the auxiliary respiratory muscles (LoE 1–) (16).

Physiotherapists and respiratory therapists can show the patient useful exercises, positions, and breathing-control techniques to be performed at home, enabling the patient to take an active role in symptom control. In addition, relaxation exercises alleviate fear and panic, and all patients should be given an opportunity to learn them (18). Relaxation exercises that patients can perform themselves are an essential and effective component of treatment, especially in acute emergencies, and can improve the quality of life for patients and their families.

Another treatment option that is not yet widely known is neuromuscular electric stimulation (NMES) of the leg muscles; this was found to relieve shortness of breath significantly in three different randomized, controlled trials on COPD patients (LoE 1+) (19–21). Stimulation increases muscle bulk and thereby relieves shortness of breath. This type of treatment is particularly useful for patients who can no longer actively participate in physical exercise. Its beneficial effect, however, appears only after four to six weeks of regular application (3–5 sessions per week for 15–30 minutes each).

Drugs

Opioids

Among all types of drugs used to treat refractory dyspnea, the use of opioids is supported by the best evidence (LoE 1+) (22). In a Cochrane review published ten years ago, a meta-analysis of nine clinical trials revealed a small, but statistically significant effect of oral and parenteral opioids (22). Further evidence comes from a randomized, double-blind crossover trial involving 48 patients with various types of advanced disease (43% of them had COPD), which revealed a statistically significant improvement of morning and evening dyspnea (22, 23). Nonetheless, many physicians avoid giving opioids to patients in palliative care, fearing respiratory depression. The current treatment recommendations of many different specialty societies unequivocally endorse the use of opioids to treat shortness of breath (2). Randomized controlled trials (RCTs) have shown a not just statistically significant, but also clinically relevant benefit of both oral and parenteral opioids on shortness of breath, and not only in cancer patients, but in those with COPD and chronic congestive heart failure as well (22, 23). Respiratory depression was not encountered in any of these trials and is not to be expected if opioids are properly used. An opioid-induced lowering of the respiratory rate, from tachypnea (which often accompanies dyspnea) back to a normal respiratory rate, is expressly desired; it helps economize breathing and thereby raises the oxygen saturation of the blood.

The efficacy and safety of the new fast-acting fentanyl (buccal, nasal, and sublingual fentanyl preparations) in treating attacks of pain have been well documented, and clinical trials of these drugs for attacks of dyspnea are now underway. Of the thirteen published trials covered by a recent systematic review, only two

Nonpharmacological treatment of dyspnea

Table fans and handheld fans generate a draft of air, which, when directed to the nose and central part of the face, can alleviate shortness of breath, as can the use of a rollator.

Neuromuscular electrical stimulation

One treatment option that is not yet widely known is neuromuscular electric stimulation (NMES) of the leg muscles; this was found to relieve shortness of breath significantly in three different randomized controlled trials on COPD patients.

FIGURE

Treatment algorithm for shortness of breath

COPD, chronic obstructive pulmonary disease; SVCS, superior vena cava syndrome

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were randomized controlled trials, one of which included only two patients (24). The other RCT was a pilot study that revealed no statistically significant difference between fentanyl and placebo (25).

The following are important considerations for the treatment of shortness of breath with opioids:

- Lower opioid doses are needed to treat shortness of breath than to treat pain. The usual initial dose is 2.5 mg of morphine every four hours in cancer patients and only 1 mg every four hours in patients with non-malignant disease. In one trial, more than 60% of patients who received 30 mg of morphine every 24 hours had good relief of shortness of breath (26).
- Many patients are reluctant to take opioids for fear of excessive sedation. Physicians should actively address this issue with patients before starting opioid treatment, reassuring them that this should not happen at the low doses that will be given.
- Patients who have attacks of shortness of breath (e.g., on physical activity) that usually last less than 10 minutes should either be given opioid medication before the precipitating physical activity (if possible) or else be treated mainly by non-pharmacological means. Current evidence does not permit any recommendation about the fast-acting nasal fentanyl preparations.

Benzodiazepines—Benzodiazepines such as lorazepam and midazolam have long been used to treat shortness of breath in patients with advanced disease and are recommended in many treatment guidelines. Nonetheless, a systematic literature review and meta-analysis did not document any statistically significant efficacy, but merely a trend in the direction of symptom relief (LoE 1+) (27). One reason for this may be that the main benefit of these drugs is not so much that they lessen the intensity of shortness of breath (which was the concern of the published clinical trials), but rather that they improve patients' ability to cope with it emotionally. A further important consideration is that benzodiazepines, if given over the long term, may worsen the respiratory situation through excessive muscle relaxation. On the other hand, there is a close clinical relationship between shortness of breath and anxiety, and the successful treatment of anxiety often improves shortness of breath as well. This is further confirmed by the efficacy of relaxation techniques to treat attacks of dysp-

nea. Many patients spontaneously report that shortness of breath and anxiety tend to reinforce each other. It may thus be useful to break the vicious circle by treating shortness of breath with opioids and anxiety with benzodiazepines at the same time.

Steroids—Cancer patients with shortness of breath are often given steroids, such as dexamethasone, particularly when they suffer from tumor progression with tissue changes in the pleura, pulmonary interstitial space, or airways (e.g., in carcinomatous lymphangitis) (28). No randomized trials of steroids for dyspnea in cancer patients have been published to date, so no definitive statement can be made as to their efficacy.

Antidepressants—The little evidence now available (LoE 3) on the use of antidepressants to treat shortness of breath comes mainly from a case series in which sertraline improved shortness of breath in seven patients with COPD (29). Selective serotonin reuptake inhibitors (SSRI) might alleviate the subjective experience of shortness of breath through direct serotonergic modulation of respiration in the medulla and/or perception in the cerebral cortex, even in patients who are not suffering from anxiety or depression (29). Although there is not yet enough evidence to support the routine use of antidepressants against shortness of breath, dyspneic patients should always be evaluated for anxiety and depression as well and treated for these problems if present.

Oxygen—Oxygen administration can be useful in the long-term treatment of COPD and for patients with marked hypoxemia. Overall, however, supplemental oxygen is now still being given too widely and uncritically. A large-scale, multicenter, international trial has shown that non-hypoxic patients with refractory shortness of breath do not gain any additional benefit from supplemental oxygen in comparison to room air (LoE 1+) (30).

Stringent criteria should be used to determine the indication for treatment with supplemental oxygen, as such treatment may have adverse effects, including:

- dryness of the respiratory mucosa,
- restriction of mobility,
- unnecessary hospitalization.

The authors of the randomized controlled trial referred to above therefore recommend that simpler and less burdensome treatments, such as the use of a fan, should be tried first and that oxygen treatment, if given, should be tested individually in every patient (30).

Opioids

Opioids are the drugs of choice for otherwise medically intractable dyspnea. Respiratory depression has not been observed in any clinical trial. The dose needed to treat dyspnea is much lower than that needed to treat pain.

Antidepressants

Very little evidence is available to date about the administration of antidepressants to treat shortness of breath.

The treatment of shortness of breath in dying patients

In dying patients, shortness of breath is mainly treated with drugs. Often, opioids and benzodiazepines are given in combination. If the patient can no longer swallow, these drugs can be given parenterally, e.g., by a continuous infusion pump containing morphine and midazolam. The doses of these drugs should be repeatedly titrated by clinical observation. Some patients in this phase have a marked fear of suffocation and may therefore need more intense palliative sedation.

The treatment of refractory cough

Fewer treatment options are available for refractory cough than for shortness of breath, and there is limited evidence about the treatment of cough in patients with advanced disease (3). In general, treatable underlying causes should be the target of initial therapy.

Expectorants

In patients with large amounts of mucus, expectorants can help by making the mucus less viscous, liquefying it and promoting its expulsion. The simplest variants of this type of treatment are with nebulized saline solution and substances that lessen irritation, such as thyme cough syrup; other available drugs are acetylcysteine and ambroxol hydrochloride. Additional fluid ingestion may be a major factor in the potential efficacy of expectorants, particularly if the patient is dehydrated. Expectorants should be used with caution in patients with neuromuscular diseases such as ALS, many of whom will not be able to cough out the liquefied mucus.

Antitussants

Antitussants suppress the cough reflex either peripherally or centrally. Among centrally active antitussants, opioids—codeine and morphine are the main ones in use for this purpose—bind to the μ receptor and suppress the cough center in the brainstem. The role of codeine as the supposedly best antitussant was recently put in question (31) because, among other reasons, two randomized trials failed to demonstrate any advantage of codeine over placebo (LoE 1+) (32, 33). A small-scale randomized controlled trial of morphine did, however, reveal benefit compared to placebo (LoE 1–) (34). Dextromethorphan is an opioid derivative with good antitussive efficacy (LoE 1–) and low toxicity. Because of its

additional effect at the N-methyl-D-aspartate (NMDA) receptor, dextromethorphan is also used to treat pain (3, 35, 36).

The most commonly used peripherally active antitussants are inhaled local anesthetics, e.g., bupivacaine 0.25% or lidocaine 2%. The published data on this form of treatment are scant, however (LoE 3), and there is no published trial of it for cancer patients. Case reports of individual patients with chronic lung disease, sarcoidosis, or cancer have indicated that a single nebulized lidocaine treatment can relieve cough for 1–8 weeks (37, 38).

The use of inhaled local anesthetics is limited by bronchospasm as a potential adverse effect and by the loss of oropharyngeal sensation after inhalation, increasing the risk of aspiration. Levodropropizine, a further peripherally active antitussant, has been little studied to date (39).

Summary

Shortness of breath can be treated effectively with a combination of general measures, drugs, and non-pharmacological therapies. Opioids are considered the drugs of first choice because their effect is better documented than that of any other type of drug. Benzodiazepines should be given only as drugs of second choice, in combination with opioids. Supplemental oxygen is only rarely indicated for non-hypoxic patients. Among the simpler measures, a table fan or a handheld fan can create a draft of air that alleviates shortness of breath. The various treatment options are summarized in the *Figure*.

Drugs are the mainstay of treatment for cough. Productive and nonproductive cough are treated differently. For nonproductive cough, peripherally and centrally active antitussants are the drugs of choice and can be given in combination.

Conflict of interest statement

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Dr. Simon has received funding from TEVA for a research project that he initiated.

Supplemental oxygen

Stringent criteria should be used in treating dyspnea with supplemental oxygen. A large-scale clinical trial showed that dyspneic patients who are not hypoxic gain no additional benefit from supplemental oxygen in comparison to room air.

Expectorants

In patients with large amounts of mucus, expectorants can help by making the mucus less viscous, liquefying it and promoting its expulsion.

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Antitussants

Centrally active antitussants such as dextromethorphan, morphine, and codeine suppress the cough center. Inhaled local anesthetics have a peripheral antitussant effect but can cause bronchospasm.

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Further information on CME

This article has been certified by the North Rhine Academy for Postgraduate and Continuing Medical Education.

Deutsches Ärzteblatt provides certified continuing medical education (CME) in accordance with the requirements of the Medical Associations of the German federal states (Länder). CME points of the Medical Associations can be acquired only through the Internet, not by mail or fax, by the use of the German version of the CME questionnaire. See the following website: cme.aerzteblatt.de

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The present CME unit can be accessed until 17 November 2013.

The CME unit “Growing up is hard—mental disorders in adolescence” (issue 25/2013) can be accessed until 22 September 2013.

The CME unit “The treatment and natural course of peripheral and central vertigo” (issue 29–30/2013) can be accessed until 20 October 2013.

In the upcoming issue 37/2013, we plan to offer the topic “Degenerative lumbar spinal stenosis in older people.”

Please answer the following questions to participate in our certified Continuing Medical Education program. Only one answer is possible per question. Please select the answer that is most appropriate.

Question 1

Which of the following measures has been found useful for assessing shortness of breath?

- a) cardiac ejection fraction
- b) numerical rating scale (NRS)
- c) one-second respiratory capacity (FEV₁)
- d) Fitch rating scale
- e) respiratory rate

Question 2

Which of the following conditions can cause cough?

- a) pulmonary metastases
- b) ascites
- c) anemia
- d) bone metastases
- e) elevated intracranial pressure

Question 3

What non-pharmacological treatment can be used to relieve shortness of breath?

- a) dietary counseling
- b) handheld fan
- c) aroma therapy
- d) exercise pool
- e) anticoagulation

Question 4

What is true about using opioids for the symptomatic treatment of shortness of breath?

- a) They are contraindicated because of respiratory depression.
- b) They should be used at high doses.
- c) They are the drugs of choice.
- d) Their use is unsupported by scientific evidence.
- e) They are contraindicated in patients with COPD.

Question 5

A patient with colon cancer that has metastasized to the lungs complains of transient attacks of shortness of breath but does not have shortness of breath as a permanent symptom. What should this patient be told?

- a) Attacks of shortness of breath are rare.
- b) Attacks of shortness of breath can be triggered by physical and emotional stress.
- c) Attacks of shortness of breath can be treated adequately with drugs.
- d) Attacks of shortness of breath tend to last a long time.
- e) Attacks of shortness of breath are dangerous and require hospitalization for their proper evaluation.

Question 6

What is the recommended initial dose of morphine for treating shortness of breath in a cancer patient?

- a) 2.5 mg every 4 hours
- b) 4.5 mg every 12 hours
- c) 5 mg every 4 hours
- d) 5 mg every 12 hours
- e) 10 mg every 12 hours

Question 7

What is the role of benzodiazepines in the treatment of shortness of breath?

- a) They are always indicated.
- b) There is little evidence for their use.
- c) They are the treatment of first choice.
- d) They are contraindicated, as they depress respiration.
- e) They should not be given in combination with opioids.

Question 8

What is true about supplemental oxygen administration for nonhypoxic patients with shortness of breath?

- a) It has no side effects.
- b) It is always indicated.
- c) It is given too rarely.
- d) It is no better than room air.
- e) It is the first treatment that should be given.

Question 9

Which of the following drugs is an expectorant?

- a) codeine
- b) dextrometorphan
- c) inhaled local anesthetics
- d) morphine
- e) thyme cough syrup

Question 10

You are a general practitioner taking care of a patient with advanced lung cancer who comes to your office complaining of progressively severe exertional dyspnea. He has taken no medications for this problem yet. What do you recommend as the next step?

- a) oxygen supplementation
- b) high-dose morphine
- c) restriction of physical activity
- d) evaluation of possible treatable causes
- e) hospital admission