Objectives

■ Explain the importance of early identification of patients at risk for life-threatening illness or injury and the importance of early intervention.

■ Recognize the early signs and symptoms of critical illness.

■ Discuss the initial assessment and early stabilization and treatment of the critically ill or injured patient.

Case Study

A 54-year-old woman with diabetes was admitted with an intra-abdominal abscess following laparoscopic cholecystectomy. She underwent placement of a drain by the interventional radiology department. Two hours later, she developed a temperature of 39.4°C (103°F), heart rate of 128 beats/min, and blood pressure of 80/40 mm Hg.

– What do you detect?

– Which aspects of the physical examination would you concentrate on initially?

– Which laboratory and radiographic investigations would you order for this patient?
I. INTRODUCTION

“An ounce of prevention is worth a pound of cure” is a common idiom that often applies to the care of critically ill patients. Early identification of patients at risk for life-threatening illness makes it easier to manage them initially and prevents further deterioration. Many clinical problems, if recognized early, can be managed with simple measures such as supplemental oxygen, respiratory therapy interventions, intravenous fluids, or effective analgesia. The early identification of patients in trouble allows clinicians to identify the main physiological problem, determine its underlying cause, and begin specific treatments. The longer the interval between the onset of an acute illness and the appropriate intervention, the more likely it is that the patient’s condition will deteriorate, even to cardiopulmonary arrest. Several studies have demonstrated that physiological deterioration precedes many cardiopulmonary arrests by hours, suggesting that early intervention could prevent the need for resuscitation, admission to the ICU, and other sentinel events. Many hospitals are using rapid response systems to identify patients at risk and begin early treatment. (See Appendix 1 for further information on the organization and implementation of a rapid response systems.) The purpose of this chapter is to describe the general principles involved in recognizing and assessing acutely ill patients. This chapter also introduces the key Fundamental Critical Care Support course learning and management concept of DIRECT: detection, intervention, reassessment, effective communication, and teamwork (Figure 1-1).

Figure 1-1. DIRECT Methodology

Detection: Using the history, physical exam, and the behavioral, cardiovascular and respiratory system changes, the critical care team is alerted to the patient's physiological status. These items then guide the appropriate laboratory and radiographic evaluations to establish a working/presumptive diagnosis, differential diagnosis, and worst possible diagnosis.

Intervention: This is the process of treating and correcting the disease or injury while keeping in mind the critical care maxim to minimize morbidity and prevent mortality.

Reassessment: This ensures the treatment is appropriate for the severity of the disease and/or injury.

Effective Communication: The greatest source of injury and death in healthcare is communication error. The more complicated the patient, the more important it is for everyone to communicate their perspective to the team so that multiple and often time-sensitive tasks can be done expertly and promptly.

Teamwork: The patient does best when all members of the healthcare team bring their specialized training to work together synergistically to care for the needs of the critically ill or injured patient.

II. RECOGNIZING THE PATIENT AT RISK

Recognizing that a patient is seriously or critically ill is usually not difficult. It may be more challenging, however, if the patient is in the very early stages of the process. Young and otherwise healthy patients are usually much slower to exhibit the typical signs and symptoms of acute illness than elderly patients or those with comorbidities and/or impaired cardiopulmonary function. Individuals who are immunosuppressed or debilitated may not demonstrate a vigorous and clinically obvious inflammatory response. Some conditions, such as cardiac arrhythmias, do not evolve with progressively worsening and easily detectable changes in physiology but rather present as an abrupt change of state. In most circumstances, a balance exists between the patient’s physiologic reserve and the acute disease. Patients with limited reserve are more likely to be susceptible to severe illness and to experience greater degrees of organ-system impairment. Therefore, identifying patients at risk for deterioration requires assessment of their background health, their current disease process, and their current physiological condition.

A. Assessing Severity

“How sick is this patient?” is one of the most important questions a clinician must answer. Determining the response requires the measurement of vital signs and other specific physiological variables (Appendix 1). Acute illness typically causes predictable physiological changes associated with both disease-specific and general clinical signs. For example, a patient’s physiological response to a bacterial infection may result in fever, delirium, shaking chills, and tachypnea. The most important step is to recognize these signs and initiate physiologic monitoring in order to quantify the severity of disease and take appropriate action. Sick patients may present with confusion, irritability, impaired consciousness, or a sense of impending doom. They may appear short of breath and demonstrate signs of a sympathetic response, such as pallor, sweating, or cool extremities. Symptoms may be nonspecific, such as nausea and weakness, or they may identify the involvement of a particular organ system (for example, chest pain). Therefore, a high index of suspicion is required when measuring vital signs: pulse rate, blood pressure, respiratory rate, oxygenation, temperature, and urine output. Clinical monitoring helps to quantify the severity of the disease process, tracks trends and rates of deterioration, and directs attention to those aspects of physiology that most urgently need treatment. The goals at this stage of assessment are to recognize that a problem exists and to maintain physiological stability while pursuing the cause and initiating treatment.
B. Making a Diagnosis

Making an accurate diagnosis in the acutely ill patient often must take second place to treating life-threatening physiological abnormalities. It is important to ask the question, “What physiological problem needs to be corrected now to prevent further deterioration of the patient’s condition?” Correcting the problem may be as simple as providing oxygen or intravenous fluids. There may not be sufficient time for a lengthy pursuit of a differential diagnosis initially if the patient is seriously ill and needs to be stabilized. However, an accurate diagnosis is essential for refining treatment options once physiological stability is achieved. The general principles of taking an accurate history, performing a brief, directed clinical examination followed by a secondary survey, and organizing laboratory and radiographic investigations are fundamentally important. Good clinical skills and a disciplined approach are required to accomplish these tasks.

III. INITIAL ASSESSMENT OF THE CRITICALLY ILL PATIENT

A framework for assessing the acutely ill patient is provided in Table 1-1 and discussed below. Further information on specific issues and treatments can be found in later chapters of this text.

A. History

The patient’s history usually provides the greatest contribution to diagnosis. Often the current history, past medical history, and medication list must be obtained from family members, caregivers, friends, neighbors, or other healthcare providers. The risk of critical illness is increased in patients with the following characteristics:

- Emergency admission (limited information)
- Advanced age (limited reserve)
- Severe coexisting chronic illness (limited reserve, limited options for management)
- Severe physiological abnormalities (limited reserve, refractory to therapy)
- Need for, or recent history of, major surgery, especially an emergency procedure
- Severe hemorrhage or need for a massive blood transfusion
- Deterioration or lack of improvement
- Immunodeficiency
- Combination of these factors
A complete history includes the present complaint, treatment history, hospital course to the present (if applicable), past illnesses, past operative procedures, current medications, and any medication allergies. A social history, including alcohol, tobacco, or illicit drug use, and a family history, including the degree of physical, emotional, and psychosocial independence, are essential and often overlooked. The history of the present complaint must include a brief review of systems that should be replicated in the examination that follows.

Critical illness is often associated with inadequate cardiac output, respiratory compromise, and a depressed level of consciousness. Specific symptoms will typically be associated with the
underlying condition. Patients may complain of nonspecific symptoms such as malaise, fever, lethargy, anorexia, or thirst. Organ-specific symptoms may direct attention to the respiratory, cardiovascular, or gastrointestinal systems. Distinguishing acute from chronic disease is important at this point, as chronic conditions may be difficult to reverse and may act as rate-limiting factors during the recovery phase of critical illness.

B. Examination

Look, listen, and feel. The patient must be fully exposed for a complete examination. The initial examination must be brief, directed, and concentrated on the basic elements of airway, breathing, circulation, and level of consciousness. As the treatment proceeds, a more detailed secondary survey should be conducted to refine the preliminary diagnosis and assess the response to the initial treatment. A full examination must be performed at some point and will be guided by the history and other findings. Ongoing deterioration or development of new symptoms warrants repetition of the primary survey followed by a detailed secondary survey.

Remember the ABCs of resuscitation: airway, breathing, and circulation. The airway and respiratory system should be assessed first, as summarized in Table 1-2. Observe the patient’s mouth, chest, and abdomen. There may be obvious signs suggesting airway obstruction as vomitus, blood, or a foreign body. The patient’s respiratory rate, pattern of breathing, and use of accessory respiratory muscles will help to confirm and assess the severity of respiratory distress or airway obstruction (Chapter 2). Tachypnea is the single most important indicator of critical illness. Therefore, the respiratory rate must be accurately measured and documented. Although tachypnea may result from pain or anxiety, it may also indicate pulmonary disease, severe metabolic abnormalities, or infection. Look for cyanosis, paradoxical breathing, equality and depth of respiration, use of accessory muscles, and tracheal tug. An increase in the depth of respiration (Kussmaul breathing) may indicate severe metabolic acidosis. Periodic breathing with apnea or hypopnea (Cheyne-Stokes respiration) usually indicates severe brainstem injury or cardiac dysfunction. Atactic breathing (Biot respiration) indicates severe neuronal damage, which is associated with poor prognosis. Agitation and confusion may result from hypoxemia, whereas hypercapnia will usually depress the level of consciousness. Low oxygen saturation can be detected with pulse oximetry, but this assessment may be unreliable if the patient is hypovolemic, hypotensive, or hypothermic. Noisy breathing (eg, grunting, stridor, wheezing, gurgling) may indicate partial airway obstruction, whereas complete airway obstruction will result in silence.
Recognition and Assessment of the Seriously Ill Patient

Table 1-2  Assessment of Airway and Breathing

<table>
<thead>
<tr>
<th>Causes of Obstruction</th>
<th>Airway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct trauma, blood, vomitus, foreign body, central nervous system depression (with soft tissue or tongue blocking airway), infection, inflammation, laryngospasm</td>
<td></td>
</tr>
</tbody>
</table>

| LOOK for | Cyanosis, altered respiratory pattern and rate, use of accessory respiratory muscles, tracheal tug, paradoxical breathing, altered level of consciousness |
| LISTEN for | Noisy breathing (grunting, stridor, wheezing, gurgling); silence indicates complete obstruction |
| FEEL for | Decreased or absent airflow |

<table>
<thead>
<tr>
<th>Causes of Inadequate Breathing or Oxygenation</th>
<th>Breathing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depressed respiratory drive</td>
<td>Central nervous system</td>
</tr>
<tr>
<td>Decreased respiratory effort</td>
<td>Muscle weakness, nerve/spinal cord damage, chest wall abnormalities, pain</td>
</tr>
<tr>
<td>Pulmonary disorders</td>
<td>Pneumothorax, hemothorax, aspiration, chronic obstructive pulmonary disease, asthma, pulmonary embolus, lung contusion, acute lung injury, acute respiratory distress syndrome, pulmonary edema, rib fracture, flail chest</td>
</tr>
</tbody>
</table>

| LOOK for | Cyanosis, altered level of consciousness, tracheal tug, use of accessory respiratory muscles, altered respiratory pattern, altered respiratory rate, equality and depth of breaths, oxygen saturation |
| LISTEN for | Dyspnea, inability to talk, noisy breathing, dullness to percussion, auscultation of breath sounds |
| FEEL for | Symmetry and extent of chest movements, position of trachea, crepitus, abdominal distension |

Inadequate circulation may result from primary abnormalities of the cardiovascular system or secondary abnormalities caused by metabolic disturbances, sepsis, hypoxia, or drugs (Table 1-3). A decrease in the blood pressure may be a late sign of cardiovascular disturbance signaling failure of the compensatory mechanisms. Central and peripheral pulses should be assessed for rate, regularity, volume, and symmetry. Capillary or nail-bed refill exam may aid in detecting hypovolemia if delayed.

Patients with hypovolemia or low cardiac output will have weak and thready peripheral pulses. A bounding pulse suggests hyperdynamic circulation, and an irregular rhythm usually signifies atrial fibrillation. A ventricular premature beat is often immediately followed by a compensatory pause, and the subsequent beat often has a larger pulse volume. Pulsus paradoxus is seen as a greater than 10 mm Hg decrease in the systolic blood pressure with deep inspiration; it can occur with profound hypovolemia, constrictive pericarditis, cardiac tamponade, asthma, and chronic obstructive pulmonary disease. The location and character of the left ventricular impulse may suggest left ventricular hypertrophy, congestive heart failure, cardiac enlargement, severe mitral regurgitation, or severe aortic regurgitation. The turbulent flow of blood through a stenotic heart valve or a septal defect may produce a palpable thrill.
In addition to the ABCs, a quick external examination should look for pallor, cyanosis, diaphoresis, jaundice, erythema, or flushing. The skin may be moist or dry; appear thin, edematous, or bruised; or demonstrate a rash (ie, petechiae, hives). Fingernails may be clubbed or show splinter hemorrhages. The eyes might reveal abnormal pupils or jaundice. The conjunctiva may be pale, indicating an anemia. The patient may be alert, agitated, somnolent, asleep, or obtunded.

Palpation of the abdomen is an essential part of the examination of the critically ill patient. Areas of abdominal tenderness and palpable masses must be identified. The size of the liver and spleen must be noted as well as any associated tenderness. It is important to assess the abdomen for rigidity, distension, fluid wave, or rebound tenderness. Auscultation may reveal a vascular bruit or the absence of bowel sounds. Intrauterine or ectopic pregnancy must be considered in all women of childbearing age. The flanks and back should be examined, if possible.

The Glasgow Coma Scale score should be recorded during the initial assessment of central nervous system function and limb movement (Chapter 8). Pupillary size and reaction should be documented, and a more detailed assessment of central and peripheral sensory and motor functions should be undertaken when time permits.

C. Chart Review and Documentation

Critically ill patients have abnormal physiology that must be documented and tracked. Physiological monitoring provides parameters that are useful only when they are accurate and interpreted by trained personnel (Chapter 6). The values and trends of these data provide key information for the assessment of the patient’s status and guidance for treatment. Data must be charted frequently and correctly to ensure good patient care. Particular attention must be paid to the accuracy and reliability of the data. For example, a true and reproducible central venous pressure measurement depends upon patient position, equipment calibration, and proper zeroing of the instruments, as well as on heart rate and valvular function. The source of the
Recognition and Assessment of the Seriously Ill Patient

Data should also be noted. Is the recorded temperature a rectal measurement or an oral measurement? Was the blood pressure measured with a manual cuff or with a pressure transducer in an arterial line? The medication record is an invaluable source of information about prescribed and administered drugs.

Routine monitoring and charting should include heart rate, heart rhythm, respiratory rate, blood pressure, core temperature, fluid balance, and Glasgow Coma Scale score. The fluid balance should include loss from all tubes and drains. The inspired oxygen concentration should be recorded for any patient receiving oxygen, and oxygen saturation should be charted if measured with pulse oximetry. Patients in the ICU setting may have central venous catheters or continuous cardiac output catheters in place. These catheters can measure central venous pressure, various cardiac pressures, stroke volume variations, cardiac output, and mixed venous saturation. These complex monitoring devices require specific operational expertise. Likewise, the data must be interpreted by someone with clinical experience and expertise in critical care.

D. Investigations

Additional investigative tests should be based on the patient's history and physical examination as well as on previous test results. Standard biochemistry, hematology, microbiology, and radiology tests should be performed as indicated. The presence of a metabolic acidosis is one of the most important indicators of critical illness. In the evaluation of electrolyte results, decreasing total serum carbon dioxide and/or an increased anion gap are evidence of metabolic acidosis. An arterial blood gas analysis is one of the most useful tests in an acutely ill patient, providing information about blood pH, arterial oxygen tension, and arterial carbon dioxide tension. Additional tests, such as lactate, blood glucose, serum electrolytes, and renal function, can often be obtained from the same blood sample. The presence of lactic acidosis following cardiorespiratory resuscitation can be an ominous sign that should be closely monitored.

IV. TRANSLATING INFORMATION INTO EFFECTIVE ACTION

The framework in Table 1-1 lays out a course of action based on first ensuring physiological stability and then proceeding to treatment of the underlying cause. The basic principles are summarized as the ABCs of resuscitating the severely ill patient: airway—ensuring a patent airway; breathing—providing supplemental oxygen and adequate ventilation; and circulation—restoring circulating volume. These early interventions should proceed regardless of the situation, while the context of the clinical presentation (ie, trauma, postoperative situation, presence of chronic illness, advanced age) directs attention to the differential diagnosis and potential treatments. The clinical history, physical examination, and laboratory tests should aid in clarifying the diagnosis and determining the patient’s degree of physiological reserve. Because the typical features of critical illness may be more effectively disguised in young and previously healthy patients than in the elderly or chronically ill, an acute deterioration may seem to occur more abruptly in younger
individuals. Thus, it is particularly important to assess trends in vital signs and physiological parameters as the patient undergoes treatment. These trends can help determine a patient’s response and clarify the diagnosis.

More experienced help must be obtained if a patient’s condition is deteriorating and there is uncertainty about the diagnosis or treatment. Transfer to the most appropriate site for care is influenced by local resources, but transfer to a high-dependency unit or ICU must be considered.

**Key Points**

- Early identification of a patient at risk is essential to prevent or minimize critical illness.
- The clinical manifestations of impending critical illness are often nonspecific. Tachypnea and metabolic acidosis are two of the most important predictors of risk; they signal the need for more detailed monitoring and investigation.
- Resuscitation and physiological stabilization often precede a definitive diagnosis and treatment of the underlying cause.
- A detailed history is essential for making an accurate diagnosis, determining a patient’s physiological reserve, and establishing a patient’s treatment preferences.
- Frequent clinical and laboratory monitoring of a patient’s response to treatment is essential.

**Suggested Readings**

Current and updated resources for this chapter may be accessed by visiting [http://www.sccm.me/fccs6](http://www.sccm.me/fccs6).


