contract and shorten on expiration, the respiratory difficulty is more pronounced during the expiratory phase of respiration.

Increased resistance in the airway causes forced expiration through the narrowed lumen. The volume of air trapped in the lungs increases as airways are functionally closed at a point between the alveoli and the lobar bronchi. This trapping of gas forces the individual to breathe at higher and higher lung volumes. Consequently, the person with asthma fights to inspire sufficient air. This expenditure of effort for breathing causes fatigue, decreased respiratory effectiveness, and increased oxygen consumption. The inspiration occurring at higher lung volumes hyperinflates the alveoli and reduces the effectiveness of the cough. As the severity of obstruction increases, there is a reduced alveolar ventilation with carbon dioxide retention; hypoxemia; respiratory acidosis; and, eventually, respiratory failure.

Chronic inflammation may also cause permanent damage (airway remodeling) to airway structures, which cannot be prevented by and is not responsive to current treatments (Sferrazza Papa, Pellegrino, and Pellegrino, 2014).

Diagnostic Evaluation

The classic manifestations of asthma are dyspnea, wheezing, and coughing. An attack may develop gradually or appear abruptly and may be preceded by a URI. The age of the child is often a significant factor because the first attack frequently occurs before 5 years old, with some children manifesting clinical signs and symptoms in infancy. In infancy, an attack usually follows a respiratory infection. Some children may experience a prodromal itching at the front of the neck or over the upper part of the back just before an attack, especially if the attack is related to allergies (Box 21-16).

Nursing Alert

Shortness of breath with air movement in the chest restricted to the point of absent breath sounds (silent chest) accompanied by a sudden rise in respiratory rate is an ominous sign indicating ventilatory failure and imminent respiratory arrest.

Box 21-16