the V_A/Q inequalities. Continuous positive airway pressure delivered through a face mask increases end-expiratory lung volume. Gas delivery to well-perfused, but atelectatic or poorly ventilated lung areas, is improved, and arterial oxygen saturation increases. However, venous return to the heart may be impaired, and cardiac output may fall, as a result of the increase in intrathoracic pressure.

Endotracheal intubation and mechanical ventilation is indicated to protect the airway when consciousness is decreased or when severe respiratory distress or acute respiratory acidosis is present. Controlled studies that specifically compare different ventilatory techniques in ventilatory failure inhalation injury are lacking. Ventilator settings are chosen so that SaO_2 exceeds 90% and so that pH is within an acceptable range. Positive end-expiratory pressure is used to improve oxygenation and reduce the need for fractional concentrations of inspired oxygen (F_IO_2) of more than 0.6. If there is significant airway obstruction, inspiratory time may have to be shortened to allow for complete expiration.

It is important to recognize that mechanical ventilation is a supportive measure, and not curative in itself. Moreover, mechanical ventilation is associated with many side effects. It can be shown experimentally that ventilation with high-tidal volumes or high-peak inspiratory pressure induces lung injury. It is essential to minimize the risks of such complications during mechanical ventilation. Close monitoring of hemodynamic and pulmonary function identifies adverse effects, such as excessive alveolar pressure, dynamic hyperinflation, and compromised cardiac function, and permits prompt action to be taken against these complications.

III.7
Pharmacological Treatment of Lung Injuries After Exposure to Irritant Gases

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Management of victims exposed to irritant gases (e.g., ammonia, chlorine, nitrogen oxides, phosgene, sulfur dioxide) includes symptomatic therapy (including oxygen), assisted or controlled ventilation, and bronchodilatory therapy. B_2-adrenergic agonists should be given primarily via inhalation. Administration of xanthine derivates also may be indicated.

The use of corticosteroids in these situations is controversial. There are animal studies indicating both the positive and negative effects of corticosteroids. However, clinical experience suggests that the use of topical or systemic corticosteroid therapy may be helpful in relieving symptoms of irritation, although controlled clinical trials are lacking. The damage seen after exposure to irritant gases can be described as decimation of the epithelial layer, alveolar damage, endothelial damage, alveolar-capillary congestion, inflammatory reaction, capillary hyperpermeability, and eosinophilic hyaline membrane formation. Some of these effects are, at least theoretically, possible to treat with corticosteroids. Corticosteroids affect every stage of inflammatory and immunological reactivity, influence movement and distribution of lymphocytes, neutrophils, and eosinophils. They also decrease the accumulation of these cells at inflammatory sites, and inhibit the leakage of fluid and cells from capillary beds. Furthermore, they stimulate the synthesis of lipomodulin, which inhibits the activity of phospholipase A_2, and decreases neurophil and macrophage chemotaxis, histamine release from mast cells and basophils, and bronchospasm and inflammatory oedema mediated by leukotrienes. It seems logical that at least topical (inhalation) corticosteroid therapy might be indicated in victims with signs of respiratory tract irritation, or in cases of heavy exposure to phosgene and nitrogen oxides without any immediate symptoms.

In cases with concomitant thermal or corrosive burns, systemic corticosteroid therapy might be contraindicated.

III.8
Do You Know What's Happening Inside?

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An illegal chemical industry poured a cyanide compound into the sewer system. The hydrogen cyanide passed into the collector sewer, which had a pH = 3.1. Because of the value, it formed a hydrogen cyanide bubble.

The victim's house did not have a gas trap connected to the rain-water sewer, and the hydrogen cyanide entered through this route causing the immediate death of the four occupants of the building.

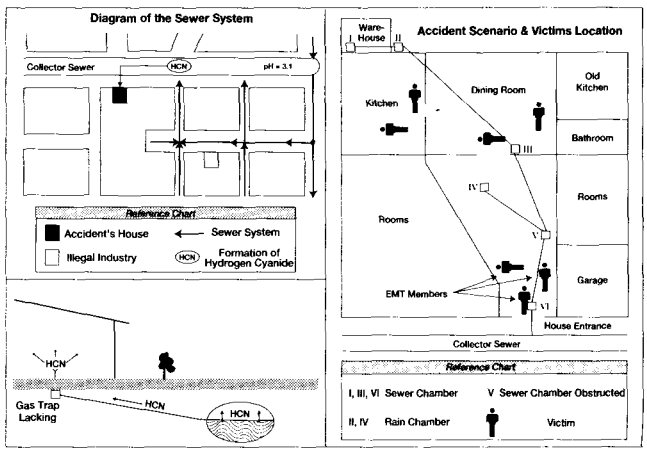
A neighbor who always visited the victim's house in the afternoon notified the emergency medical services because she knew there were people inside, yet nobody responded. A medical provider forced the street door open, and then fell into a coma state. Two minutes later, a fire brigade arrived. A firefighter was poisoned when he tried to revive the victims by mouth-to-mouth resuscitation.

Immediately, the officer of the brigade ordered the isolation of the area until the situation was controlled.

The zonal hospital reported nine cases of intoxication about two hours after the accident had occurred.

Effects on Population:

Deaths	7 people
Poisoned	10 people



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