Eighth Edition

Clinical Nursing Skills

Basic to Advanced Skills

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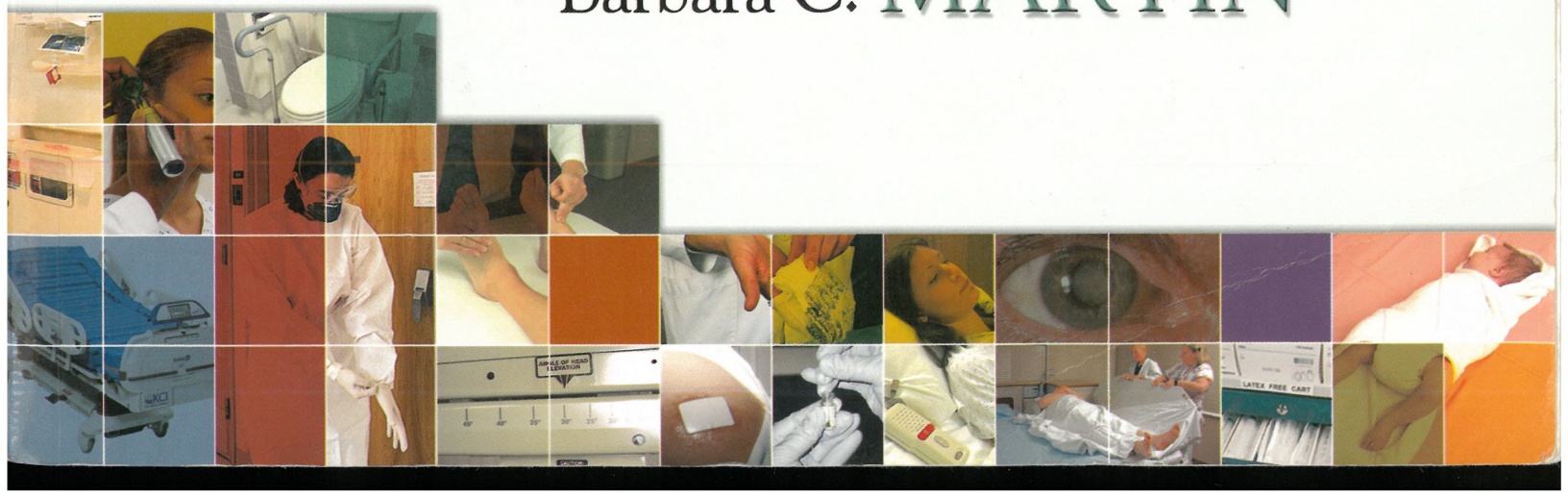

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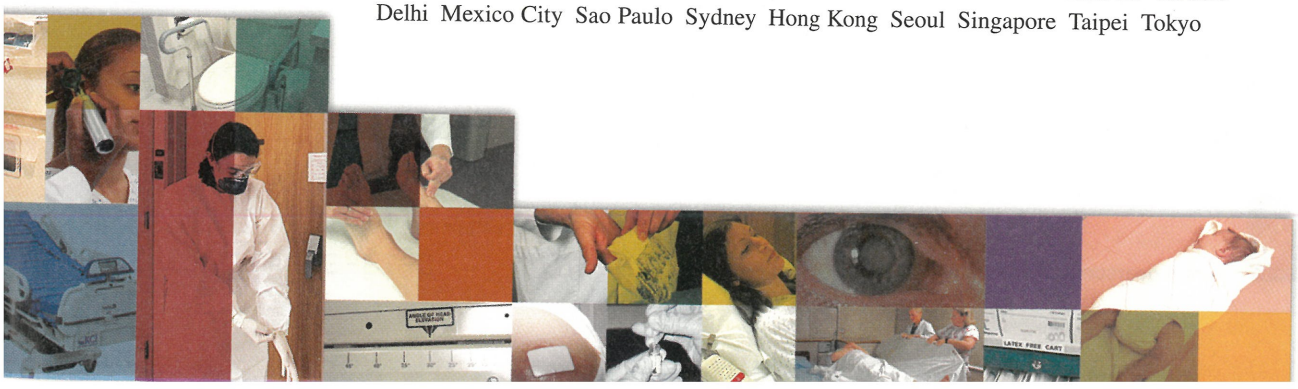

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determine whether the body is too hot or too cold, relay signals to the hypothalamus.

Regulatory Mechanisms

When the body becomes overheated, heat-sensitive neurons stimulate sweat glands to secrete fluid. This enhances heat loss through evaporation. The vasoconstrictor mechanism of the skin vessels is reduced, thereby conducting heat from the core of the body to the body surface. Heat loss occurs through radiation, evaporation, and conduction.

When the body core is cooled below 98.6°F (37°C), heat conservation is affected. Intense vasoconstriction of the skin vessels results. There is also piloerection and a decrease in sweating to conserve heat. Heat production is stimulated by shivering and increased cellular metabolism.

The "set point" is the critical temperature level to which the regulatory mechanisms attempt to maintain the body's core temperature. Above the set point, heat-losing mechanisms are brought into play, and below that level, heat-conserving and heat-producing mechanisms are set into action.

Disease can alter the set point of the temperature-regulating center to cause fever, a body temperature above normal. Inflammation, brain lesions, pyrogens from bacteria or viruses, or degenerating tissue (i.e., gangrenous areas or myocardial infarction) also increase the set point. Dehydration can cause fever due to lack of available fluid for perspiration and by increasing the set point, which brings more heat-conserving and heat-producing mechanisms into play. When the "thermostat" is suddenly set higher, the client complains of feeling cold, has cool extremities, shivers, and has piloerection. Hypoxia can occur due to increased oxygen use with the increased metabolism of heat production. When the thermostat returns to normal, heat-losing mechanisms again are activated. The client feels hot and starts perspiring. Other symptoms of fever the client may experience are perspiration over the body surface, body warm to touch, flushed face, feeling cold alternately with feeling hot, increased pulse and respirations, malaise and fatigue, parched lips and dry skin, and convulsions, especially with rapid temperature increase in children.

When the body temperature falls below the normal range, the client experiences hypothermia and complains of being cold, shivers, and has cool extremities. Hypothermia may be caused by accidental cold exposure, frostbite, or GI hemorrhage. Medically induced hypothermia is used for some cardiovascular and neurosurgical interventions. The ability of the hypothalamus to regulate body temperature is greatly impaired when the body temperature falls below 94°F (34.4°C) and is lost below 85°F (29.4°C). Cellular metabolism and heat production are also depressed by a low temperature.

Fever Signs

Fever is considered to be any abnormal elevation of body temperature (over 100.8°F). The most common signs and symptoms are:

- Perspiration over the body surface
- Body warm to the touch
- Chills and shivers
- Flushed face
- Client complaints of feeling alternately cold and hot
- Increased pulse and respirations
- Complaints of malaise and fatigue
- Parched lips and dry skin
- Convulsions, especially in children

Measuring Body Temperature

Oral or rectal temperatures reflect the body's core temperature. Tympanic and axillary temperatures are somewhat variable but are clinically acceptable for tracking important changes. The normal range of an oral temperature is 97° to 99.5°F, or 36° to 37.5°C. Rectal temperatures are approximately 1°F higher, ear canal 0.5° higher, and axillary temperatures are 1°F lower than oral readings. Body temperature may vary according to age (lower for the aged), time of day (lower in the morning and higher in the afternoon and evening), amount of exercise, or extremes in the environmental temperature.

The thermometer is the instrument used to measure body heat. Oral and rectal (also used for axillary temperature) thermometers in hospitals are commonly, as of 2002, digital, disposable, and electronic. Before 1998, when the American Hospital Association agreed to eliminate mercury from the healthcare environment, mercury thermometers were used in hospitals. The thermometer is marked in degrees and tenths of degrees with either a Fahrenheit or Celsius (centigrade) scale and a range of 93° to 108°F (34°–42.2°C).

Electronic thermometers are now widely used in hospitals. They have disposable covers, which promote infection control, and therefore should always be used. The electronic thermometer plugs into a receptacle and has a heat sensor that records the client's core temperature in seconds. The ear canal provides another noninvasive site for temperature measurement using infrared thermometers.

Heat-sensitive tapes are also used to record temperature. A chemical strip tape is applied to the skin, and color changes indicate the temperature level. A continuous-reading wearable tape can be used for 2 days; the temperature is also read by a change in color. These tapes are both disposable and nonbreakable. They are most appropriate for use with small children and in situations when proper cleaning of the thermometer is difficult.

A new type of thermometer, the temporal artery (sensor touch by Exergen), is now being used in hospitals. It is more cost effective and more accurate than the ear thermometer. It takes 0.1 second to respond and automatically self-calibrates. This device is configured to give either oral or arterial temperatures.

PULSE

The pulse is an index of the heart's rate and rhythm. The apical pulse rate is the number of heart beats per minute. With each beat, the heart's left ventricle contracts and forces blood into the aorta. Closure of the heart valves creates the sounds