Maintenance of body fluid is usually self-regulated through thirst. However, during illness, with or without abnormal hydration being present, children commonly require maintenance fluids. There are several reasons that this is often necessary, including the frequency of infections and fevers in young children, as well as their rapid respiratory rates when compared to adults. In addition to maintenance fluids, fluids may also be indicated to replace fluid deficit due to dehydration, as well as abnormal ongoing losses, such as from bleeding, diarrheal stools and drain sites. The amount and types of these losses may be altered by the age and size of the child, as well as certain conditions. For example, fluid requirements may be increased if a child has severe burns and decreased for the child who has congestive heart failure or increased intracranial pressure.

This newsletter will discuss water balance in children, including age-specific factors which can influence this balance. Fluid maintenance requirements for children of all ages will be examined, as well as essentials of accurate intake and output assessment.

**WATER BALANCE**

Water is the major component of body tissues. The distribution of body fluids, or total body water (TBW), involves the presence of intracellular fluid (ICF) - the water contained within the cells. TBW also includes extracellular fluids (ECF) - the fluids outside the cells, including intravascular (fluid within the blood vessels), interstitial (fluid surrounding the cells and the location of most ECF) and transcellular (fluid contained within specialized body cavities, such as cerebrospinal fluid). The largest proportion of body water in infants and young children is ECF.

As increasing amounts of bone, muscle and fat occur with growth, the proportion of ECF decreases. ECF accounts for approximately 50% of the body weight of newborns, and 30% of 2 year olds, as compared to 20% in adolescents and adults. A young child is more prone to ECF loss than ICF.

The younger the child, the less fluid imbalances can be tolerated. A 7 kg infant has an ECF volume of about 1750 ml. Daily, approximately 700 ml is ingested and excreted, exchanging about 40% of the fluid volume daily. With this high exchange rate, fluid imbalances occur quickly in young children. Each day, an adult typically ingests and excretes 2,000 ml of fluid, only a 14% exchange.

**INFLUENCING FACTORS:** Because of several factors, infants and young children are more vulnerable to fluid changes than any other age group. Fluid disturbances occur more frequently and rapidly, and infants and young children generally respond more slowly to such alterations.

**Body Surface Area:** Approximately two-thirds of insensible fluid loss occurs through the skin. Because infants have a greater body surface area, larger quantities of fluid are lost through the skin in the newborn and infancy periods. To understand surface area, consider slicing a piece of bread in half— not traditionally, but by cutting the slice of bread into two planes. Now there are not 2 sides to the bread, but 4 or a larger surface area.

**Increased Body Temperature:** Due to immature immune systems, infection and resulting fever are common in infants and young children. Fever increases insensible water loss by approximately 7ml/kg/24 hours for each 1° F rise in temperature above 99° F. Environmental heat and humidity can also increase fluid loss from sweating. Likewise, newborns under radiant warmers or being treated for jaundice with phototherapy are especially prone to insensible fluid loss.

**Respiratory System:** As respiratory rates decrease with age, the younger the child, the more insensible fluid loss occurs. Infants and young children automatically lose more fluid simply through breathing, and even more with respiratory distress.
GROWING UP WITH US...
Caring for Children

SAMPLE 2011

Competency: Demonstrates Age-Specific Competency by correctly answering 9 out of 10 questions related to Fluid Maintenance Requirements in Children.

FLUID MAINTENANCE REQUIREMENTS IN CHILDREN

Jake, 2 years old, weighs 31 pounds (14 kg). He has a one day history of vomiting and diarrhea and is not yet toilet trained.

1. The younger the child, the less fluid imbalances are tolerated.
   a. True
   b. False

2. Daily, infants exchange less fluid volume than older children.
   a. True
   b. False

3. The majority of Jake’s TBW is:
   a. interstitial.
   b. extracellular.
   c. transcellular.
   d. intracellular.

4. Jake is more susceptible to fluid disturbances than older children for all of the following reasons EXCEPT his:
   a. body surface area is greater.
   b. need for fluids is proportionately less than for older children.
   c. kidneys have a decreased ability to compensate for fluid changes.
   d. metabolic rate is higher.

This is only a sample! – Your subscription includes a two page newsletter, a two page test, and an answer key with each issue.