



PIC QUESTION OF THE WEEK: 8/18/08

Q: Can you identify some of the currently available methods for estimating body temperature?

A: The body does not have a uniform *core* temperature. For this reason, assessment of body temperature only serves as an estimate of this clinical criterion. The highest temperature is recorded at the hypothalamus; however, since this site is inaccessible, values measured at the pulmonary artery are considered the gold standard for core temperature. Invasive methods of temperature measurement are used during anesthesia and while monitoring critically ill patients. Sample locations include the distal esophagus, bladder, and nasopharynx. Since deep tissue sites are not practical in community practice or the home, other methods are considered adequate for everyday use. The ideal thermometer for community use should be accurate as well as easy to use, comfortable for the patient, provide rapid results, not be influenced by ambient temperature, and not result in cross infection. Non-invasive sites for temperature assessment include axilla, skin (forehead), rectum, mouth (sublingual), tympanic membrane and temporal artery. Measurement of axillary temperature is safe and easily accomplished; however, it is notoriously inaccurate due to effects of diaphoresis and evaporation. It correlates poorly with core temperature. Reusable or single use thermophototropic liquid crystals for forehead application are available. The indicator in these products changes color in response to elevated skin temperature. Skin temperature may not be elevated with fever and may even be decreased due to vasoconstriction; therefore, this method is not recommended. Sublingual temperatures are often taken in children over 5 years of age. Oral temperature may be influenced by hot baths, exercise, hot or cold drinks, and mouth breathing and require cooperation of the child. Rectal temperature has long been considered the method of choice despite practical and hygienic limitations. Studies have shown that rectal temperature differs from pulmonary artery temperature due to poor blood flow to the rectum. Benefits to infrared ear thermometry (tympanic) include speed and ease of use without risk of cross infection. Tympanic measurements are not influenced by environmental factors and are considered safer than oral or rectal methods. However, recent studies have shown lack of both accuracy and precision. Measurement of temperature using the temporal method is relatively new and involves movement of an infrared lens across the forehead and behind the ear. The TAT-5000 Temporal Artery Thermometer has been shown to be accurate and precise when compared to measurement of pulmonary artery temperature. When choosing an appropriate thermometer for home use, a variety of factors must be taken into consideration. In addition, it is important to note the method and time that a temperature was taken when consulting with a health care professional.

References:

- Lawson L, Bridges EJ, Ballou I et al. Accuracy and precision of noninvasive temperature measurement in adult intensive care patients. *Am J Crit Care* 2007;16: 485-96.
- El-Radhi AS, Barry W. Thermometry in paediatric practice. *Arch Dis Child* 2006; 91: 351-6.

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