

COMPARISON OF TEMPORAL ARTERY VERSUS RECTAL TEMPERATURE IN EMERGENCY DEPARTMENT PATIENTS WHO ARE UNABLE TO PARTICIPATE IN ORAL TEMPERATURE ASSESSMENT

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Contribution to Emergency Nursing Practice

- Temporal artery temperature (TAT) readings used for patients presenting to the emergency department must be adjusted and used with caution and attention to their limitations.
- Adjusted TAT readings should not be used with patients for whom an accurate reading is imperative for clinical decision making.
- Adjusted TAT readings may be used to detect fever.
- Group average adjusted TAT readings may be used in research.

Abstract

Introduction: In the emergency department, pediatric and geriatric patients who present with illnesses and are unable to participate in oral evaluation of temperature must undergo a rectal temperature (RT) assessment. This study asks if a temporal artery temperature (TAT) measure can supplant the RT measure.

Methods: A convenience sample, using a within-subject design, was used to evaluate the efficacy of TAT compared with

RT in patients ≤ 3 and ≥ 65 years of age, who were unable to participate in oral temperature assessments.

Results: Instrument reliability of the TAT is adequate for both the pediatric and geriatric populations. An unadjusted TAT did not provide acceptable temperature measurements. We also found that adjusting a TAT reading by adding -17.22°C (1°F) rendered the TAT average (either mean or median) adequately similar to RT averages for research purposes for both pediatric and geriatric groups.

Discussion: No influence was detected on the differences between RT and TAT due to age, sex, or emergency severity index (ESI) score in patients or due to profession, years of education, or years of experience in caregivers for either the pediatric or geriatric groups. Furthermore, the adjusted TAT reading could detect fever in individual patients adequately in both the pediatric and geriatric groups. However, the adjusted TAT readings were too frequently divergent from RT readings to be used to measure temperature in individual patients for both pediatric and geriatric groups.

Key words: Temporal artery thermometer; Emergency nursing; Pediatric temperature; Geriatric temperature

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Patients presenting to the emergency department (ED) require timely and accurate physical assessment. Among all the assessment components, temperature reading provides vital information that guides patient management.¹ One acceptable method for obtaining a noninvasive temperature measurement in the ED is an oral reading. For patients who are unable to perform this function, rectal temperature (RT) assessments may be obtained. In an effort to optimize patient comfort and improve timeliness of obtaining a temperature reading, EDs have incorporated various noninvasive techniques to capture these data, one of which is a temporal artery temperature (TAT) device.² However, there is great controversy on the efficacy of TAT, especially in pediatric and geriatric patients.³

Since the introduction of TAT, multiple conflicting articles have been written about correlation of TAT measurements compared with other sources of core temperature measurements. In 2012, the Emergency Nurses Association (ENA) published the clinical practice guidelines (CPG) for noninvasive temperature measurements in the ED, which assigned a high level of recommendation for use of TAT in adults, pediatric patients between the ages of 3 and 18 years, and febrile pediatric patients.³ The ENA's recommendations leave gaps in patient populations. A further review of the literature depicts inconsistencies in use of the TAT in pediatric patients younger than 3 years old.⁴⁻⁶ In addition, a literature review for evaluating fever in geriatric patients revealed discrepancies between accepted tympanic, rectal, oral, and TAT readings.⁷⁻⁹ Furthermore, a recently published meta-analysis on the accuracy of TAT measurements concluded that TAT measurement is inaccurate; however, the authors recommend continuing to use the TAT despite inaccurate readings.¹⁰

In the presence of conflicting pediatric studies and lack of geriatric studies, additional research is needed to determine accuracy of TAT in both pediatric and geriatric populations within the ED setting. For pediatric patients below the age of 3 and geriatric patients above the age of 65 who are unable to participate in a noninvasive oral temperature assessment, a postponed or inaccurate temperature measurement may impede necessary medical interventions and result in a missed or delayed diagnosis.

An accurate temperature measurement provides vital information necessary to formulate a proper medical diagnosis. When obtaining an oral temperature measurement is not an option, a TAT measurement may be less time consuming for staff and more comfortable for patients compared with RT measurement. The gap in current

research does not articulate whether it is feasible in ED settings to obtain a TAT in both pediatric and geriatric populations. The question prompting this research was to determine if a TAT measurement correlated adequately well with RT measurements in pediatric patients younger than 3 years and geriatric patients 65 and older who, owing to a variety of factors—unable to follow commands, mouth breathing, respiratory distress, and/or facial trauma—could not participate with an oral temperature assessment.

The questions to be answered in this study, separately for the pediatric and geriatric populations, were as follows (1): Is TAT a reliable instrument? (2) If reliable, what is the distribution of deviations from RT, and what adjustment on TAT would provide an average of TAT readings equivalent to an average of RT readings? (3) Do demographics of patient (age, sex, and ESI score) and caregiver (profession, years of education, and years of experience) influence the difference between RT and an adjusted TAT? (4) In light of this distribution, can TAT be used as a substitute for RT in individual patients? Specifically, can TAT be used to detect fever? And does TAT provide a measure of temperature similar enough to RT for clinical use?

Methods

This study was conducted in a military hospital on a remote island. Data were collected in a 17-bed ED with an average monthly census of 1,300 patients. The study was initiated upon approval from the institutional review board, which waived the requirement for written consent because of the nature of the study, which carried minimal risk. The informed consent process was twofold. First, data collectors explained the TAT process and provided the parent/patient/caregiver with an information sheet describing the purpose and procedures of the study. Verbal consent was obtained from the parent/patient/caregiver before obtaining a TAT reading. Subject recruitment took place during the triage process for all patients. Inclusion criteria consisted of febrile and afebrile pediatric patients 3 years old and younger, who were unable to follow the necessary commands for obtaining an oral temperature reading, and geriatric patients aged 65 and older, who were unable to participate in an oral temperature assessment owing to their inability to follow commands, mouth breathing, respiratory distress, or facial/oral trauma. Exclusion criteria consisted of patients with injuries or deformities at the TAT site or those with behavioral problems who may be disturbed by TAT measurement.

The equivalence t test was used as the basis for a power analysis. A mean adjusted TAT-to-RT equivalence margin of $\frac{1}{2}^{\circ}$ F can be tested with power of 0.80, two one-sided test

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