Forehead thermometers – The device is hot the infant maybe not

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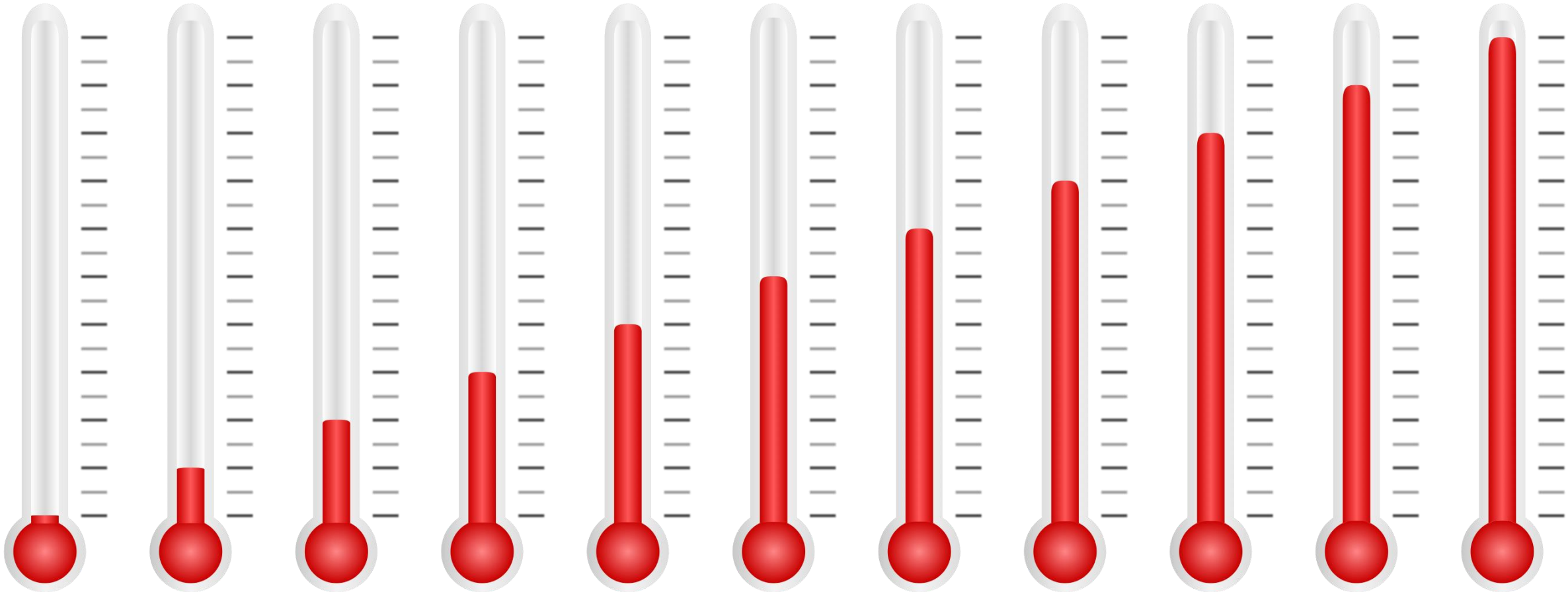


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m+

- A – Full Septic Work Up
- B - Partial Septic Work Up
- C - Home
- D- 

PICO (T)

- Population
  Infants 0-60 day old presenting with fever or lethargy to RCH ED

Intervention

Infra-red thermometers

Comparison

Axillary or Rectal thermometers

Outcome

-Presence of Invasive Infectious Illness

-Subsequent fever in Hospital

Time

- 12 month period July 2016 - June 2017

Methods

- Single Centre
- Retrospective
- Chart Review
- 12 months
- Fever, Device, Diagnosis, Management

Results

- 203 patients identified
- 56 excluded
- 147 patients

Demographics

	Recommended Thermometer	Non Recommended
Male	47 (45%)	21 (44%)
Female	56 (55%)	23 (56%)
0-30 days	20 (45%)	52 (50%)
30-60	24 (55%)	51 (50%)

Results

- Device used by parents at home

Thermometer	Number	Percentage
Forehead	82	**55%**
Tympanic	22	**15%**
Axilla	37	**25%**
Rectal	7	**5%**

Forehead thermometers most common

Subsequent Fever in Hospital

Device used pre-hospital	Fever in Hospital/Group Total	Percentage
Forehead	12/81	**14%**
Tympanic	13/22	59%
Axillary	21/37	56%
Rectal	7/7	**100%**

Forehead thermometers appear to be the least reliable device at predicting subsequent fever in hospital

Diagnosis of Invasive Infection

Thermometer	Invasive infection	Percentage
Forehead	11/81	**13%**
Tympanic	9/22	**40%**
Axilla	12/37	**32%**
Rectal	3/7	**42%**

Forehead thermometers appear to be the least reliable device at predicting the presence of invasive infection

Comparison

Thermometer	Fever in Hospital	No fever in Hospital	Total
Forehead and Tympanic	25	78	103
Axillary and Rectal	28	16	44
	53	94	147

Standard T test

P< 0.001

Recommended devices appear better at predicting fever in hospital

Comparison

Thermometers	Invasive Infection	No invasive infection	
Forehead and Tympanic	20	83	103
Axillary and rectal	15	29	44
	35	112	147

P = 0.06

No significant difference between recommended and non recommended devices at predicting presence of invasive infection

Comparison

Thermometer	Invasive Infection	Non Invasive Infection	Total
Forehead	11	70	81
Axillary and rectal	15	29	44
	26	99	125

P = 0.01

Recommended devices appear better at predicting the presence of invasive infection

Weakness

- Retrospective
- Single Centre
- Chart review
- Bias- use of anti-pyretics
- Compliance with product description

Conclusion

- Patients 0-60 days with an infra-red forehead thermometer measured pyrexia (>38.0) are less likely to have a subsequent fever in hospital or invasive infectious illness when compared to recommended thermometer measured fever

Take homes

- Use Gestalt
- Forehead Thermometers are the preferred device by parents

Thanks

- Doris Tham and A/Prof Sandy Hopper
- Patients
- A/Prof Mike Starr

Questions?


Normal
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Elevated
38.1
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High
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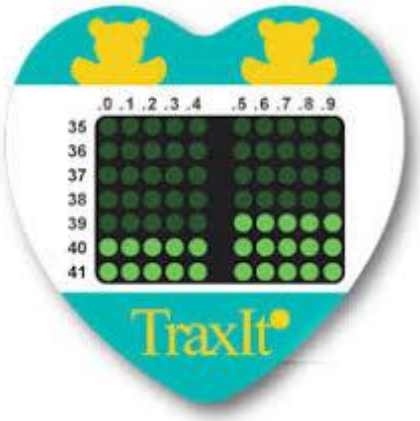
37.0


New
37.0


NUROFEN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Questions

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BMJ Open. 2016 Mar 31;6(3):e009509. doi: 10.1136/bmjopen-2015-009509.

Temperature measurements with a temporal scanner: systematic review and meta-analysis.

Geijer H[1], Udumyan R[2], Lohse G[3], Nilsagård Y[4].

Author information

Abstract

OBJECTIVES:

Systematic review and meta-analysis on the diagnostic accuracy of temporal artery thermometers (TAT).

DESIGN:

Systematic review and meta-analysis. The index test consisted of temperature measurement with TAT. The reference test consisted of an estimation of core temperature.

PARTICIPANTS:

Clinical patients as well as healthy participants, with or without fever.

INTERVENTIONS:

Literature search in PubMed, Embase, Cinahl and Web of Science. Three reviewers selected articles for full-text reading after which a further selection was made. Risk of bias was assessed with QUADAS-2. Pooled difference and limits of agreement (LoA) were estimated with an inverse variance weighted approach. Subgroup and sensitivity analyses were performed. Sensitivity and specificity were estimated using hierarchical models. Quality of evidence was assessed according to the GRADE system.

PRIMARY AND SECONDARY OUTCOME MEASURES:

The primary outcome was measurement accuracy expressed as mean difference ± 95% LoA. A secondary outcome was sensitivity and specificity to detect fever. If tympanic thermometers were assessed in the same population as TAT, these results were recorded as well.

RESULTS:

37 articles comprising 5026 participants were selected. Pooled difference was -0.19 °C (95% LoA -1.16 to 0.77 °C), with moderate quality of evidence. Pooled sensitivity was 0.72 (95% CI 0.61 to 0.81) with a specificity of 0.94 (95% CI 0.87 to 0.97). The subgroup analysis revealed a trend towards underestimation of the temperature for febrile patients. There was a large heterogeneity among included studies with wide LoA which reduced the quality of evidence.

CONCLUSIONS:

TAT is not sufficiently accurate to replace one of the reference methods such as rectal, bladder or more invasive temperature measurement methods. The results are, however, similar to those with tympanic thermometers, both in our meta-analysis and when compared with others. Thus, it seems that TAT could replace tympanic thermometers with the caveat that both methods are inaccurate.

Ann Intern Med. 2015 Nov 17;163(10):768-77. doi: 10.7326/M15-1150.

Accuracy of peripheral thermometers for estimating temperature: a systematic review and meta-analysis.

Niven DJ, Gaudet JE, Laupland KB, Mrklas KJ, Roberts DJ, Stelfox HT.

Abstract

BACKGROUND:

Body temperature is commonly used to screen patients for infectious diseases, establish diagnoses, monitor therapy, and guide management decisions.

PURPOSE:

To determine the accuracy of peripheral thermometers for estimating core body temperature in adults and children.

DATA SOURCES:

MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, and CINAHL Plus from inception to July 2015.

STUDY SELECTION:

Prospective studies comparing the accuracy of peripheral (tympanic membrane, temporal artery, axillary, or oral) thermometers with central (pulmonary artery catheter, urinary bladder, esophageal, or rectal) thermometers.

DATA EXTRACTION:

2 reviewers extracted data on study characteristics, methods, and outcomes and assessed the quality of individual studies.

DATA SYNTHESIS:

75 studies (8682 patients) were included. Most studies were at high or unclear risk of patient selection bias (74%) or index test bias (67%). Compared with central thermometers, peripheral thermometers had pooled 95% limits of agreement (random-effects meta-analysis) outside the predefined clinically acceptable range (± 0.5 °C), especially among patients with fever (-1.44 °C to 1.46 °C for adults; -1.49 °C to 0.43 °C for children) and hypothermia (-2.07 °C to 1.90 °C for adults; no data for children). For detection of fever (bivariate random-effects meta-analysis), sensitivity was low (64% [95% CI, 55% to 72%]; I^2 = 95.7%; P < 0.001) but specificity was high (96% [CI, 93% to 97%]; I^2 = 96.3%; P < 0.001). Only 1 study reported sensitivity and specificity for the detection of hypothermia.

LIMITATIONS:

High-quality data for some temperature measurement techniques are limited. Pooled data are associated with interstudy heterogeneity that is not fully explained by stratified and metaregression analyses.

CONCLUSION:

Peripheral thermometers do not have clinically acceptable accuracy and should not be used when accurate measurement of body temperature will influence clinical decisions.

J Korean Acad Nurs. 2013 Dec;43(6):746-59. doi: 10.4040/jkan.2013.43.6.746.

[Systematic review and meta-analyses of diagnostic accuracy of infrared thermometer when identifying fever in children].

[Article in Korean]

Park YJ[1], Park SH[2], Kang CB[3].

Author information

Abstract

PURPOSE:

Infrared thermometers are increasingly used as a convenient, non-invasive assessment method for febrile children. However, the diagnostic accuracy of the infrared thermometer for children has been questioned, particularly in relation to sensitivity and specificity. The aim of this study was to evaluate diagnostic accuracy of infrared thermometers in febrile children.

METHODS:

Articles published between 1966 and 2012 from periodicals indexed in the Ovid Medline, Embase, CINAHL, Cochrane, KoreaMed, NDSL, KERIS and other databases were selected, using the following keywords: 'infrared thermometer'. The QUADAS-II was applied to assess the internal validity of the diagnostic studies. Selected studies were analyzed using meta-analysis with MetaDisc 1.4.

RESULTS:

Nineteen diagnostic studies with high methodological quality, involving 4,304 children, were included. The results of meta-analysis showed that the pooled sensitivity, specificity and AUC (Area Under the Curve) of infrared tympanic thermometers in children over 1 year were 0.80 (95% CI 0.78, 0.81), 0.94 (95% CI 0.93, 0.95) and 0.95 respectively. However the diagnostic accuracy of infrared tympanic thermometers in children with hyperthermia was low.

CONCLUSION:

The diagnostic accuracy of infrared tympanic thermometer was similar to axillary and rectal thermometers indicating a need for further research to substantiate these findings in children with hyperthermia.

- Medicine (Baltimore). 2018 Feb;97(5):e9737. doi: 10.1097/MD.0000000000009737.
- **Use of noncontact infrared thermography to measure temperature in children in a triage room.**
- Ataş Berksoy E[1], Bağ Ö[2], Yazici S[3], Çelik T[2].
- **Author information**
- **Abstract**
- We compared the accuracy and utility of 3 infrared (IFR) thermographs fitted with axillary digital thermometers used to measure temperature in febrile and afebrile children admitted to an emergency triage room.A total of 184 febrile and 135 afebrile children presenting to a triage room were consecutively evaluated. Axillary temperature was recorded using a digital electronic thermometer. Simultaneously, IFR skin scans were performed on the forehead, the neck (over the carotid artery), and the nape by the same nurse. Fever was defined as an axillary temperature ≥37.5°C. The temperature readings at the 4 sites were compared.For all subjects, the median axillary temperature was 37.7 ± 1.5°C, the IFR forehead temperature was 37 ± 1.1°C, the IFR neck temperature was 37.6 ± 1.5°C, and the IFR nape temperature was 37 ± 1.2°C. A Bland-Altman plot of the differences suggested that all agreements between IFR and axillary measures were poor (the latter measure was considered the standard).
The forehead measurements had a sensitivity of 88.6% and a specificity of 60% in patients with temperatures ≥36.75°C. The sensitivities of the neck measurement at cut-offs of ≥37.35°C and ≥36.95 were 95.5% and 78.8% for those aged 2 to 6 years. Thus, 11.4% of febrile subjects were missed when forehead measurements were performed.An IFR scan over the lateral side of neck is a reliable, comfortable, rapid, and noninvasive method for fever screening, particularly in children aged 2 to 6 years, in busy settings such as pediatric triage rooms.

Pediatr Emerg Care. 2013 Sep;29(9):992-7. doi: 10.1097/PEC.0b013e3182a2d419.

Clinical accuracy of tympanic thermometer and noncontact infrared skin thermometer in pediatric practice: an alternative for axillary digital thermometer.

Apa H[1], Gözmen S, Bayram N, Çatkoğlu A, Devrim F, Karaarslan U, Günay İ, Ünal N, Devrim İ.

Author information

Abstract

INTRODUCTION:

The aim of this study was to compare the body temperature measurements of infrared tympanic and forehead noncontact thermometers with the axillary digital thermometer.

METHODS:

Randomly selected 50 pediatric patients who were hospitalized in Dr Behcet Uz Children's Training and Research Hospital, Pediatric Infectious Disease Unit, between March 2012 and September 2012 were included in the study. Body temperature measurements were performed using an axillary thermometer (Microlife MT 3001), a tympanic thermometer (Microlife Ear Thermometer IR 100), and a noncontact thermometer (ThermoFlash LX-26).

RESULTS:

Fifty patients participated in this study. We performed 1639 temperature readings for every method. The average difference between the mean (SD) of both axillary and tympanic temperatures was -0.20°C (0.61°C) (95% confidence interval, -1.41°C to 1.00°C). The average difference between the mean (SD) of both axillary and forehead temperatures was -0.38 (0.55°C) (95% confidence interval, -1.47°C to 0.70°C). The Bland-Altman plot showed that most of the data points were tightly clustered around the zero line of the difference between the 2 temperature readings. With the use of the axillary method as the criterion standard, positive likelihood ratios were 17.9 and 16.5 and negative likelihood ratios were 0.2 and 0.4 for tympanic and forehead measurements, respectively.

DISCUSSION:

The results demonstrated that the infrared tympanic thermometer could be a good option in the measurement of fever in the pediatric population. The noncontact infrared thermometer is very useful for the screening of fever in the pediatric population, but it must be used with caution because it has a high value of bias.

Pediatr Emerg Care. 2013 Sep;29(9):992-7. doi: 10.1097/PEC.0b013e3182a2d419.

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