

Critical appraisal – Diagnostic testing studies

Comparison of non-contact infrared thermometry and rectal thermometry in cats.

Introduction	
Are the aims clearly stated?	<p>In the abstract, the authors state the objectives are to compare NCIT with rectal temperature, and determine if NCIT could identify hypothermic or hyperthermic cats. The introduction then states that the aims are to determine correlation between NCIT and rectal thermometry.</p> <p>The materials and methods section then introduces the aim of comparing different NCIT devices to determine which is most accurate.</p>
Methods	
Is the study design suitable for the aims?	<p>Yes. A two-part trial determined the most suitable anatomical locations for NCIT measurements to be performed, and the most suitable devices to be tested on the clinical population.</p> <p>The second part of the trial tested NCIT in a larger population of cats in both familiar non-veterinary settings, and a veterinary clinic.</p>
What population of animals was being studied?	<p>Phase 1, used 14 adult short haired cats housed indoors at a shelter (no further information provided).</p> <p>Phase 2, used 188 adult short haired cats from animal shelters (113), veterinary clinics (57) and private homes (18). No further information was provided on gender, age, bodyweight etc.</p>
Was this the right sample to answer the objectives?	<p>Hard to say, as too little information given about the individual cats used. Only short haired cats so no option to investigate the effect of coat length.</p> <p>There did appear to be a range of body temperatures within the study population,</p>

	allowing evaluation of the devices at hypothermia, euthermia and hyperthermia.
Was an independent blinded gold standard test applied to all subjects?	No blinding of operators mentioned. Predictive rectal thermometry was used for the comparator.
Is it clear what measurements were carried out in the study?	Yes: body temperature recorded by NCIT at various anatomical sites, and rectal temperature.
Were the correct measurements chosen? Do they that reflect (or are they strongly related to) the outcome of interest?	Interestingly the authors included a thermographic image of a cat, and stated that the warmest location identified was the ocular surface, yet this site was not used for NCIT measurement. The authors did investigate anatomical locations accessible with and without patient restraint. The measurements reflect the outcome of interest.
Were previously established validated methods used to make the measurements? (e.g. Glasgow pain score, International Units etc.)	European standard of degrees Centigrade. Temperature ranges for hypothermia, euthermia and hyperthermia are based on a recent study investigating normal rectal temperature ranges in domestic cats in their home environment.
Are the statistical methods described?	Yes, however the reported use of Bland Altman plots does not reflect the figures shown in the study.
Was the statistical significance level stated?	Not in the materials and methods, and no P values are reported.
Was the sample size justified?	No.
Was ethical approval obtained?	Yes, University of Florida Institutional Animal Care and Use Committee.

<p>Overall, are the methods described in enough detail that you could repeat them?</p>	<p>No, not enough information on population (age, breed, body weight), not enough information on how many cats were anaesthetized during their measurements, and no details provided of the temperature recording protocol (e.g. was rectal performed before or after the NCIT readings, what order where the readings taken in, no mention of randomisation).</p>
<p>Results</p>	
<p>Were the basic data adequately described?</p>	<p>No.</p>
<p>Do the numbers add up? Are all subjects accounted for?</p>	<p>Yes. Yes. Where the NCTI devices failed to provide a reading (reporting too low or too high for the device to read) there are missing data points.</p>
<p>Was the statistical significance (p value) stated in the results? Is this consistent with the methods? (It should be stated in the sample size or power calculation)</p>	<p>Not stated. No power or sample size calculation.</p>
<p>What were the main findings/key results?</p>	<p>Phase 1, determined the 3 NCIT devices with the best correlation to rectal temperature, and the 3 anatomical locations with the best temperature correlation to rectal temperature (pinna, gingiva and perineum).</p> <p>Phase 2, NCIT showed weak correlation (no P value) with rectal temperature for all devices in all anatomical locations. Mean NCIT readings were 0.7-1.3 °C lower than rectal. NCIT did not identify hypothermia (measured higher than rectal temperature), and under-reported body temperature in both euthermic and hyperthermic cats. Modified Bland Altman analysis showed poor agreement between all NCIT readings and rectal temperature.</p>

Discussion and conclusion	
What do the main findings/key results mean?	No human NCIT devices were found to be clinically usable in feline patients, when used to measure temperature at the gingiva, perineum or pinna.
Are the negative findings discussed? How are the negative findings interpreted?	Briefly, hypothesized that variation in blood flow, reduced emissivity of hair body regions and skin pigmentation may affect temperature readings using the NCIT devices. Human NCIT devices currently available are not suitable for measuring body temperature in cats.
Does the discussion reflect the results?	Yes, but briefly.
Interpretation	
What are the clinical implications of this study? Are the subjects in the study similar to those in the BET/your own?	The NCIT devices tested in this study should not be used for measuring the body temperature of cats in clinical practice. Difficult to say as little information about the study population given.
General	
Who funded this study?	Grants from Maddie's Fund, the Humane Society Veterinary Medical Association and the Department of Small Animal Clinical Sciences at the University of Florida College of Veterinary Medicine.