

Critical appraisal – Diagnostic testing studies

A comparison of surface infrared with rectal thermometry in dogs.

Introduction	
Are the aims clearly stated?	Yes, the aims were to compare the accuracy of using infrared thermometry on the forehead and nasal regions of the head with rectal thermometry in dogs presented to a teaching hospital.
Methods	
Is the study design suitable for the aims?	A novel thermometer (NCIT) is directly compared to the industry standard for minimally invasive body temperature measurement (digital rectal thermometry) in a large group of dogs presenting to a veterinary clinic. This allows the stated aims to be investigated.
What population of animals was being studied?	130 dogs presenting to a veterinary hospital (reasons not stated), including a range of breeds (stated), aged 5 weeks to 8 years. No information on sex is provided.
Was this the right sample to answer the objectives?	Potentially yes, but without knowing the proportion of males to females, possibly not.
Was an independent blinded gold standard test applied to all subjects?	No. There was no mention of blinding of operators. A glass mercury rectal thermometer is used as the “gold standard” measure of temperature.
Is it clear what measurements were carried out in the study?	Yes: surface temperature of the nasal and forehead regions were taken at various distances, within 2 minutes of rectal thermometry.
Were the correct measurements chosen? Do they that reflect (or are they strongly related to) the outcome of interest?	The surface temperatures recorded at three different distances were then averaged to provide the surface temperature measured with the NCIT, however as distance can affect infrared

	thermometer readings a single distance for all readings may have improved accuracy.
Were previously established validated methods used to make the measurements? (e.g. Glasgow pain score, International Units etc)	European standard of degrees Centigrade.
Are the statistical methods described?	Yes, although there is no mention of testing results for normality which could impact test selection and validity.
Was the statistical significance level stated?	Not stated.
Was the sample size justified?	No sample size calculation or estimate of power is described.
Was ethical approval obtained?	Not stated.
Overall, are the methods described in enough detail that you could repeat them?	No, there is no information on the sex of the dogs, and no information on where the examinations were performed, e.g. indoors or outdoors, as sunlight can also affect intra-red thermometer results this could impact the readings. Ideally, some information regarding the range of conditions causing the dogs to present to the veterinary hospital would also be useful, e.g. number of hypothermic, normothermic or hyperthermic patients.
Results	
Were the basic data adequately described?	Mean and standard deviations for the three temperature measurements sites are reported, but the number of readings taken is not reported. Body temperature data, especially in clinical populations is often non-parametric,

	meaning reporting the median and range of results can be more appropriate.
Do the numbers add up? Are all subjects accounted for?	No numbers are reported so this is not possible to check.
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 values are stated in the results. As no mention is made to P value significance in the methods interpretation is difficult.
What were the main findings/key results?	Surface temperature of the nasal region differed to rectal temperature by an average of 7.6°C, and appeared to correlate with rectal temperature. Surface temperature at the forehead region differed to rectal by an average of 5.3 °C and showed a greater correlation to rectal temperature. Bland Altman plots suggest that as rectal temperature decreases, the NCIT device increasingly under-reports body temperature.
Discussion and conclusion	
What do the main findings/key results mean?	NCIT measuring surface temperature of the nasal and forehead regions does not reliably report body temperature in dogs.
Are the negative findings discussed? How are the negative findings interpreted?	Yes. NCIT of the two regions should not be considered appropriate for a clinical patient.
Does the discussion reflect the results?	Yes
Interpretation	

<p>What are the clinical implications of this study?</p> <p>Are the subjects in the study similar to those in the BET/your own?</p>	<p>NCIT using a BENETECH GM300 non-contact thermometer should not be used to assess body temperature in dogs for clinical monitoring.</p> <p>Possibly, but without the sex information this is impossible to confirm.</p>
General	
<p>Who funded this study?</p>	<p>Not stated.</p>