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Diagnosing fever by touch: observational study

Katherine Whybrew, Matthew Murray, Colin Morley

Fever is a useful indicator of whether a child is seriously ill.[1] Many mothers and doctors estimate children's temperature by touch.[2] We assessed whether mothers and medical students could use touch to determine if children had fever.

Subjects, methods, and results

During their elective in a Zambian hospital, medical students and the child's mother felt children's abdomen, forehead, and neck and independently recorded whether the child felt hot. Simultaneously, a mercury thermometer was used to measure axillary temperature for exactly 3 minutes. Rectal temperature measurement was not permitted at this hospital.

In total, 1090 children aged 1 month to 16 years (median 2 years) were studied. The mean ambient temperature was 24.5 (SD 2.0)°C; the mean axillary temperature from 24 children not recently vaccinated and with no complaint was 36.7 (2SD 1.12)°C. Therefore 37.8°C or higher was defined as a fever. With this definition, 236 (27%) children had fever.

The mothers assessed 862 children and thought 574 (67%) were warm or hot. Their sensitivity was 94% (221/236), specificity 44% (273/626), positive predictive value 39% (221/574), and negative predictive value 95% (273/288).

Two students assessed 1086 children and thought 525 (48%) were warm or hot. Their sensitivity was 94% (257/274), specificity 67% (544/812), positive predictive value 49% (257/525), and negative predictive value 97% (544/561). Two students, working independently, had remarkably similar results (sensitivities 95% and 94%, positive predictive values 50% and 47%). The table shows the data for the two groups.

Comment

This study showed that when mothers and medical students felt the children they rarely missed a child with fever, but they overestimated the number who had fever.

Because it was impractical to measure rectal temperature for cultural reasons, axillary temperature had to be used. Axillary temperature is not always accurate. One study comparing axillary and rectal temperature found means of 36.8°C and 37.4°C, respectively, and a median difference of 0.5°C (range −1.0°C to 3.2°C).[3] The difference was largest in children with high fever. The shortcomings of axillary temperature measurement might have influenced our results: positive predictive values might have been higher if rectal temperature been used.

These children felt warmer than did children in Britain, possibly because of the higher ambient temperature and the tendency to overdress. Therefore, rather than use a range derived from a different population, we calculated a normal range for the group. Defining fever as a temperature of 37.8°C or more was higher than the temperature used in other studies (37.2°C,[3] 37.4°C,[4] and 37.5°C[5]). In our study the thermometer was assiduously kept in the axilla for 3 minutes. In other studies the temperature was taken for a shorter time, which may account for the lower temperatures used.

A recent African study investigated the ability of patients (1606 men and children) or their carers to decide whether they had a fever.[5] Twenty per cent had fever, but only 28% of those thought to have fever did; of those thought to have a normal temperature, 92% did.

These two studies establish that, as a screening procedure, touch will seriously overestimate the incidence of fever, but with touch, fever will rarely be missed; also, a patient who does not feel hot is very likely not to have fever. A child who feels hot needs to have a temperature taken before fever is diagnosed.

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Determination of fever in children by mothers and medical students and by axillary temperature ≥37.8°C

	Axillary temperature		
	≥37.8°C	<37.8°C	Total
Mothers:	236	626	862
Child feels warm or hot	221	353	574
Child feels normal or cold	15	273	288
Students:	274	812	1086
Child feels warm or hot	257	268	525
Child feels normal or cold	17	544	561