

Too Hot to Handle: A Survey of Attitudes toward Fever of 462 PICU staff.

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ABSTRACT

Objective: The role played by fever in the outcome of paediatric critical illness is unclear. This study aims to establish attitudes to management of children with fever and the use of paracetamol on UK paediatric intensive care units

Design: Self-administered questionnaire.

Setting: 36 Paediatric Intensive Care Units and Paediatric Intensive Care Transport Teams in the UK Northern Ireland.

Subjects: Medical and nursing staff working in UK PICUs.

Intervention: None.

Measurements and Main Results:

462 UK paediatric critical care medical and nursing staff responded to a web-based survey request. Respondents answered questions regarding thresholds for fever control in clinical practice, indications for paracetamol use, and readiness to participate in a clinical trial. The mean reported threshold for treating temperature in clinical practice was 38.3°C. Paracetamol is widely used as an analgesic and antipyretic but also for non-specific comfort indications. There was widespread

support for a clinical trial of a permissive versus liberal approach to temperature in PICU. Within the context of a trial, respondents were prepared to accept higher treatment thresholds for fever than in routine practice. 58% of respondents would consider a temperature of 39°C acceptable without treatment.

Conclusions: Current approaches to management of fever by PICU staff is conservative. However there is a willingness within the UK PICU community to conduct a randomized controlled trial of fever in the PICU.

Introduction:

Fever plays a central role in the host response to infection. Paracetamol inhibits immune responses to vaccination (1), increases the duration of time to crusting in chicken pox (2) and prolongs resolution of parasitaemia in children with malaria (3). Data from critically unwell adults suggests that febrile adults with infection have a lower adjusted odds of death compared with those who do not generate a febrile response (4). A study of critically ill adults demonstrates that the use of antipyretic treatment in sepsis is associated with increased mortality. (5)

No guidance is offered on the use of antipyretics in international sepsis guidelines (6). Paediatricians have historically been reluctant to adopt a permissive approach to the management of fever (7) and international guidelines reflect this (8). No randomized controlled trials of antipyretic use in critically ill children have been published, however recent UK guidance recommends withholding paracetamol for the sole purpose of reducing temperature in children presenting with a feverish illness (9).

Methods:

We devised a cross-sectional, self-administered questionnaire designed to establish the current attitudes and practices relating to the management of fever and the use of paracetamol by medical and nursing staff working in paediatric intensive care in the UK. Invitations to complete the online questionnaire were distributed by email amongst members of the Paediatric Intensive Care Society of the United Kingdom (518 members) and also emailed to individual paediatric intensive care units where the questionnaire was disseminated amongst the staff.

The survey was composed of 8 questions (see supplementary material). Questions 1 and 2 established the respondent's place of work and their professional role. 2 questions were concerned with current clinical practice: one question established the threshold for treatment of fever in clinical practice and one question established the range of uses of paracetamol in clinical practice. One question was concerned with the United Kingdom National Institute for Health and Care Excellence (NICE) guidance. 3 questions established the respondent's attitude to a clinical trial of permissive versus strict temperature control.

Data were collected over a 3 month period March to May 2014.

Statistical Analysis

Data is presented as means \pm 1 standard deviation where appropriate. The *t*-test was used in bivariate comparisons. Statistical analysis was conducted with SPSS software (version 22, IBM, Chicago, IL).

Results:

Place of work and professional role:

There were 462 respondents of which 291 were nurses and 171 doctors. The membership of the UK paediatric intensive care society is 518, however the invitation to answer the questionnaire was more widely distributed and the precise response rate is therefore not known. Staff from 35 paediatric intensive care units, or paediatric intensive care transport teams, in the UK and Northern Ireland responded. 261 respondents were classified as 'junior' (junior nursing staff, or doctors in training) and 201 were 'senior' (ward sisters, or consultants). The completion rate was high with 90% of respondents answering all questions.

Current practice

The mean temperature at which respondents attempt to lower temperature in their routine clinical practice is 38.3°C (sd 0.78). This threshold was higher in doctors (38.7°C) than in nursing staff (38.0°C) ($p < 0.05$) and higher in senior staff (38.4°C) than in junior staff (38.2°C) ($p < 0.05$). Junior nurses are the most conservative group with a mean threshold of 38.0 °C (sd 0.66). Senior doctors are the most permissive with a mean threshold temperature of 38.8°C (sd 0.74). (see fig. 1)

Indications for the use of paracetamol were established (Fig 4). On UK PICUs, paracetamol is used frequently as an analgesic and for treatment of fever. (Mean Likert scores 1.3 and 1.5, where 1=Very Frequently, 2=Frequently, 3=Occasionally, 4=Rarely and 5=Very Rarely). It is used uncommonly for endotracheal tube tolerance and sedation (Mean Likert score 3.6 and 4.0). It appears to be commonly used for 'general discomfort' (Mean Likert score 2.0).

Attitude towards change in practice.

We used a 5 point Likert rating scale to established whether respondents thought their unit would adopt the NICE guideline advising that paracetamol not be used with the sole aim of reducing body temperature in children. The most common response was “neutral” (37.5% of responses) with other answers distributed symmetrically around the mode. This pattern was broadly replicated within each professional group. 46% of senior doctors thought it either unlikely or very unlikely that their unit would adopt the guideline compared with 27% of senior nurses. 33.3% of junior doctors think that their unit is either likely or very likely to adopt the NICE guideline – the highest of any professional group. Across all the professional groups, less than 5% of respondents think their unit is very likely to adopt the NICE guideline.

92% of respondents reported being keen for their intensive care unit to participate in a randomized trial of permissive versus strict temperature control.

Trial thresholds

Within the context of a proposed trial, we established the highest acceptable temperature without treatment – what would be in practice the ‘permissive arm’ of a clinical trial (see Chart 1). The mean highest acceptable temperature for all respondents was 39 °C. 81% of respondents considered a temperature of 38.5°C and above acceptable without treatment. This dropped to 58% at 39°C and above, and 30% at 39.5°C and above. Only 17.5% of respondents considered a temperature of 40 °C acceptable without treatment.

Within the context of a proposed clinical trial, doctors report a higher acceptable threshold than do nurses (Mean temp 39.4°C vs 38.7°C $p < 0.005$). Senior staff report a higher acceptable threshold than junior staff (39.04°C vs 38.9°C $p < 0.05$).

Alternatives to analgesia

Respondents were asked whether, within the context of a clinical trial, they would agree to use forms of analgesia that are paracetamol-free. Two thirds (67%) answered Yes, one third (33%) answered No. The differences between professional categories are marked. Senior nurses were the most likely to accept alternative forms of analgesia (78%) whilst junior doctors were the most cautious about using non-paracetamol analgesia (51%).

Discussion:

Despite the absence of evidence that treating febrile children in intensive care with paracetamol is of benefit, attitudes to the management of fever by health professionals in PICUs remain non-permissive with a mean treatment threshold of 38.3 °C in clinical practice. We have observed that a permissive attitude to temperature control is associated with increasing seniority and being a doctor.

Skepticism is present amongst the survey respondents regarding the likely uptake of the recent NICE guidance restricting the use antipyretics within an intensive care setting. Senior doctors appear to be the most skeptical.

Paracetamol is frequently used as both an analgesic and an antipyretic by respondents in this survey. We also demonstrate the use of paracetamol for a wide range of indications – including general discomfort and endo-tracheal tube tolerance. This may explain the degree of skepticism towards a change in practice.

There is enthusiasm, within the United Kingdom PICU community for a randomized controlled trial of permissive temperature control. Within the context of a trial,

respondents appear willing to accept a higher treatment threshold than in routine practice. Again, doctors accept higher treatment thresholds than nurses, and senior staff are noted to be more permissive than juniors.

Such attitudes to fever are long-standing. In our cohort they may be due to the influence of avoidance of hyperthermia in low cardiac output states (10) and in traumatic brain injury (11). In addition parental anxiety towards fever in children is well documented (12).

Current restrictive attitudes to fever in the PICU appear to be at odds both with the state of scientific knowledge and with the national guidance for feverish illness in children. This separation between current clinical practice and where the authors believe clinical equipoise to lie, indicates the need for a randomized controlled trial of strict versus permissive temperature control in the PICU in order to establish best-practice.

Tables

Figure 1: Plot of thresholds at which respondents lower temperature, both in clinical practice and in the context of a trial. (Whiskers are at 1.5 x interquartile range, the solid box includes 25th to 75th centile, and the dark line is the median, dots are outliers).

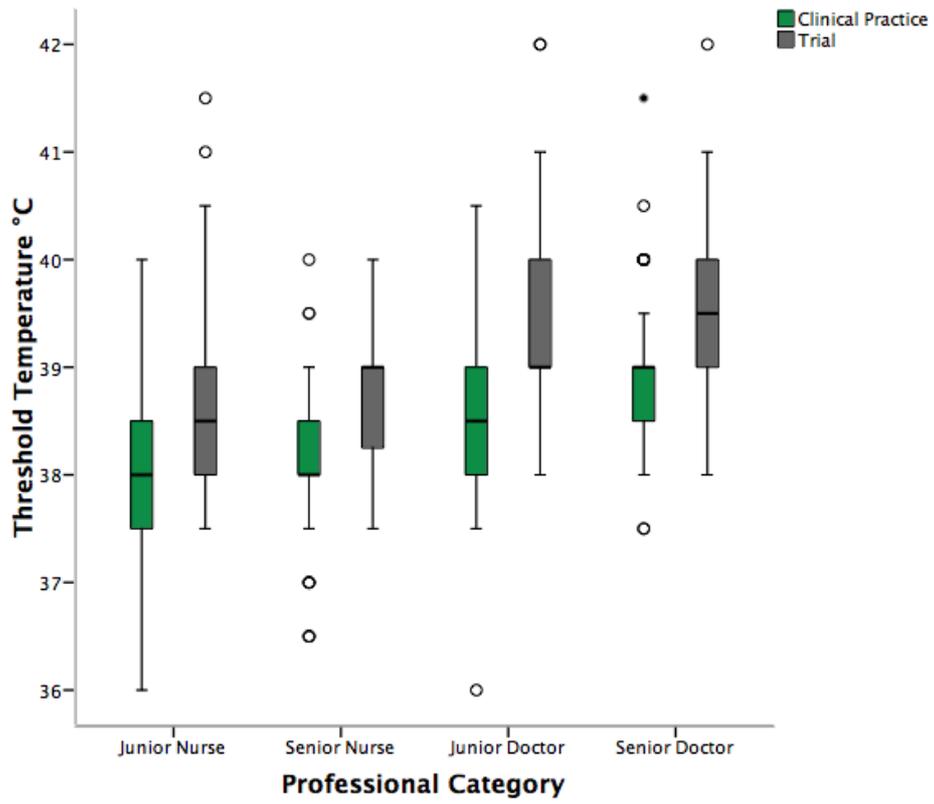


Figure 2: Histogram of responses to question 3, regarding threshold at which temperature respondents would attempt to lower temperature in routine clinical practice. Percentages refer to the percentage of respondents at or above a temperature threshold.

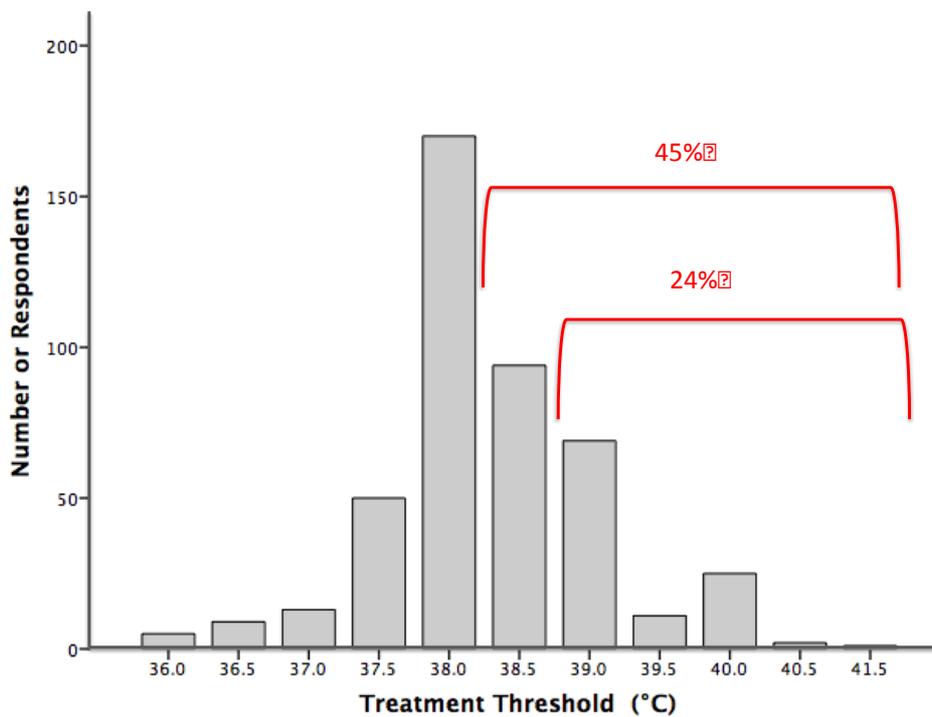


Figure 3: Responses to questions 7, regarding highest acceptable temperature without treatment, within a clinical trial. Red percentages refer to percentage of respondents at or above a temperature threshold.

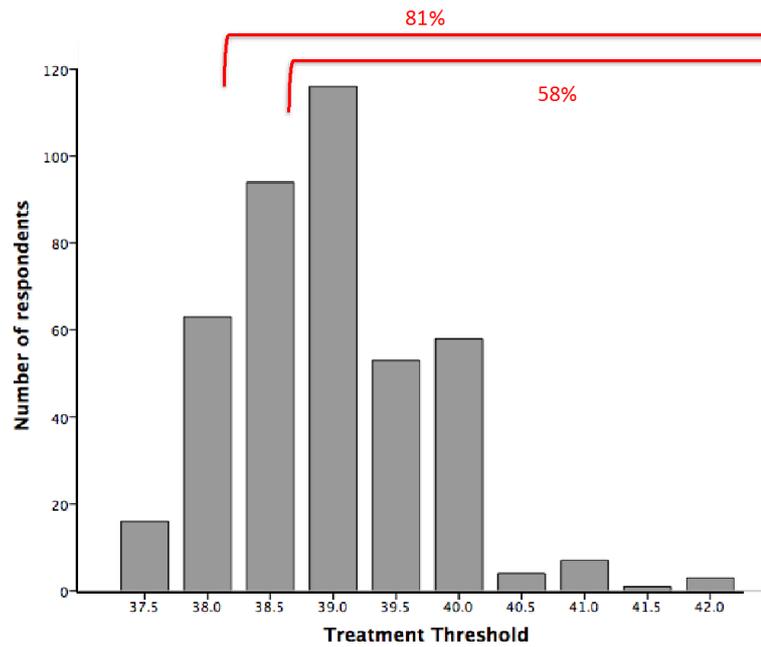
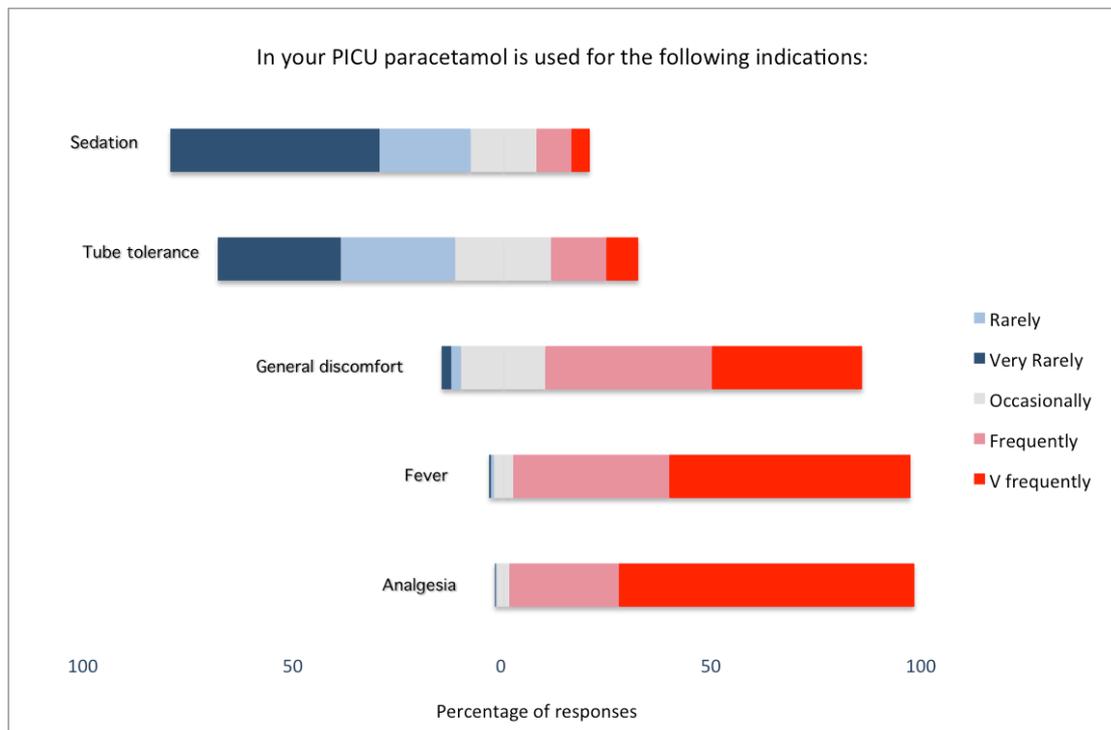


Fig 4: Responses to question 4, regarding uses of paracetamol in respondent's PICU.



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Supplementary Material

1. Which unit or transport team do you work for?

2. What is your role in PICU?

3. You are caring for a child who requires intensive care due to a confirmed, or suspected, infection. The child has no specific indication to maintain normothermia (i.e. there is no head injury, encephalopathy or low cardiac output state). At what threshold would you attempt to lower the temperature in such a child?

37.5°C	38°C	38.5 °C	39°C	39.5°C
40°C	40.5°C	41°C	41.5°C	42°C

4. In your PICU paracetamol is used for the following indications:

	Very frequently	Frequently	Occasionally	Rarely	Very rarely
Analgesia					
Fever					
General discomfort					
Tube tolerance					
Sedation					

5. The 2013 update to the NICE guideline 'Feverish Illness in Children' states: Do not use antipyretic agents with the sole aim of reducing body temperature in children with fever. What is the likelihood of your PICU accepting this recommendation?

Very unlikely	Unlikley	Neutral	Likely	Very likely
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6. Would you be keen, in principle, for your unit to participate in a multicentre randomised controlled trial of permissive versus strict temperature control in children receiving intensive care?

Yes	No
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7. Patients in the permissive arm of the trial will be permitted to have a higher temperature than in the strict arm before intervention is indicated. What is the highest temperature you would consider acceptable without treatment?

Up to:	37.5°C	38°C	38.5 °C	39°C	39.5°C
	40°C	40.5°C	41°C	41.5°C	42°C

8. Imagine this scenario: Your patient is entered into the trial. He or she is febrile, but does not reach the threshold for treating fever within the trial protocol. He or she is also in pain, and you would like to give some analgesia. In this scenario, would you agree to use only non-paracetamol forms of analgesia?

Yes	No
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