


ORIGINAL RESEARCH

Fever phobia in caregivers presenting to New Zealand emergency departments

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Abstract

Objective: To determine the prevalence of fever phobia among caregivers of children presenting to New Zealand EDs.

Methods: A cross-sectional survey was administered to caregivers of children <5 years of age presenting to three New Zealand EDs. We defined fever phobia as caregivers having a high level of concern regarding fever or having incorrect beliefs regarding the consequences of fever.

Results: A total of 502 caregivers completed the survey. Fever phobia was present in 365 (74.3% [95% confidence interval, CI 70.3–78.0%]) respondents, with 242 (49.3% [95% CI 44.9–53.7%]) caregivers reporting a high level of concern regarding fever, and 288 (61.8% [95% CI 57.3–66.1%]) caregivers reporting at least one incorrect belief regarding the consequences of fever. Majority of caregivers ($n = 383$, 87.6% [95% CI 84.2–90.4%]) knew the correct dosing interval for paracetamol,

compared to less than half of caregivers ($n = 179$, 42.5% [95% CI 37.9–47.3%]) for ibuprofen. Caregivers reported non-evidence-based fever management practices such as sponging, always giving paracetamol and/or ibuprofen for fever, and waking children from sleep to give antipyretics. Over one-third of caregivers identified ED doctors ($n = 195$, 40.2% [95% CI 34.7–43.2%]) and ED nurses ($n = 173$, 35.7% [95% CI 31.5–40.0%]) as sources of information regarding fever management. A higher level of education was associated with fever phobia (odds ratio 1.68 [95% CI 1.04–2.72], $P = 0.04$).

Conclusions: Fever phobia is prevalent among caregivers of children presenting to New Zealand EDs. Opportunistic caregiver education in the ED in conjunction with public health strategies are needed to dispel undue fears and misconceptions about fever.

Key words: antipyretics, child, emergency department, fever, hospital.

Key findings

- Fever phobia is prevalent among caregivers of children attending New Zealand EDs and affects caregivers from all backgrounds.
- ED doctors and nurses were commonly identified as a source of information regarding fever management.
- Opportunistic caregiver education in the ED in conjunction with public health strategies are needed to dispel undue fears and misconceptions about fever.

Introduction

Fever is one of the most common reasons for caregivers to bring their children to the ED.¹ Fever itself is not an illness, rather part of the body's physiological and protective response against infection.² In the vast majority of cases, fever is not harmful. International guidelines, such as the National Institute for Health and Care Excellence guideline, state that management of fever should be aimed at relief of the child's discomfort and investigation of the underlying cause, rather than the sole purpose of temperature reduction.^{2–4} Interventions including tepid sponging and underdressing are not recommended. Antipyretics are only recommended if the child remains distressed, regardless of temperature.⁴ There is also clear evidence that

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prophylactic use of antipyretics do not prevent febrile seizures.^{4,5} Despite this expert consensus, fever remains a cause for considerable parental concern. In 1980, Schmitt coined the term 'fever phobia' to describe caregivers' unfounded fears and misconceptions regarding fever in children,⁶ which can lead to overly aggressive and potentially harmful interventions to reduce fever.⁶⁻⁹

Fever phobia has been well described over the last four decades.^{7,10,11} A systematic review¹⁰ found that fever phobia continues to be a worldwide phenomenon.^{7,10-13} A recent survey of Australian parents demonstrated that poor knowledge and misconceptions surrounding fever and its management are still common, and suggested educational interventions are needed to dispel misconceptions about fever and encourage appropriate care of febrile children.¹⁴ To date, fever phobia has not been studied in the New Zealand setting. Understanding local caregivers' beliefs and attitudes towards fever is crucial in order to address the misconceptions that international literature suggests are prevalent.

The aim of the present study was to determine the prevalence of fever phobia among caregivers of children aged <5 years presenting to New Zealand EDs. Our secondary aims were to determine the prevalence of incorrect fever management practices; caregivers' knowledge about fever; caregivers' sources of information regarding fever and fever management; and factors associated with fever phobia.

Methods

Study design and participants

Through convenience sampling, a cross-sectional survey was administered to caregivers of children aged <5 years presenting to three New Zealand EDs (one tertiary children's hospital – Starship Children's Hospital, Auckland; two tertiary adult hospitals with secondary paediatric services – Kidz First Children's Hospital, Auckland, and Waikato Hospital, Hamilton). Caregivers of children with Australasian Triage Scale (ATS) category 3–5 were invited

and completed the survey independently on paper or a tablet device.

The survey was a 20-item questionnaire based on a review of previous fever phobia literature,^{6,7,11,15} and included questions about demographics, presenting complaint, the presence or absence of a fever in the preceding 24 h, knowledge and understanding of fever, concerns regarding fever, use of antipyretics and sources of knowledge regarding fever and fever management. Statements addressing caregiver concerns regarding fever and fever management practices were rated using a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The questionnaire was anonymous and required approximately 10 min to complete (Appendix S1).

Outcomes

The primary outcome was caregiver prevalence of fever phobia defined as either a high level of concern regarding fever (agreed to all statements suggesting a high level of concern regarding the presence of fever) or incorrect beliefs regarding the consequences of fever (at least one incorrect belief regarding the consequence of fever). Caregivers were considered to have an incorrect belief if they identified brain damage, coma, heart damage, blindness or death as a possible consequence of fever. Secondary outcomes included knowledge of fever, prevalence of incorrect fever management practices, source of information regarding fever, and factors associated with fever phobia.

Statistical analysis

Data were collated and entered into the Research Electronic Data Capture (REDCap) system, and analysed using Microsoft Excel add-in XLSTAT (Addinsoft, New York, NY, USA) and SAS 9.4 (SAS Institute, Cary, NC, USA). Ethnicity was prioritised as per New Zealand Ministry of Health Ethnic Group prioritisation.¹⁶ Socioeconomic status was determined using the New Zealand Deprivation Index (1 = lowest deprivation, 10 = highest deprivation) based on the caregiver's residential address.¹⁷ Responses to

questions using the five-point Likert scale were collapsed such that 'somewhat agree' and 'strongly agree' were coded as 'agreed'.

Characteristics of participants with and without fever phobia were compared using univariable and multivariable logistic regression, including ethnicity, level of education, socioeconomic status, number of children, presenting child's age and sex, and presenting complaint (fever *vs* non-fever).

We estimated that if the measured prevalence of fever phobia among caregivers was 20%, a sample of 600 participants would yield 95% confidence limits for the population prevalence of 17.0% and 23.4%, using the modified Wald method (for a prevalence of 40%, 95% confidence limits are 36.1% and 43.9%). Therefore, we aimed to survey 200 participants at each of the three sites. Similarly, among Māori caregivers, assuming a recruitment rate of 25%, we estimated that the study would provide 95% confidence limits of 13.8% to 28.1%.

In March 2020, the study was terminated early because of the novel coronavirus (COVID-19) pandemic. COVID-19 necessitated that all interactions with families of children presenting with fever or respiratory symptoms were undertaken with droplet precautions personal protective equipment as a minimum, and were likely to have a significant impact on caregivers' perception of fever in children.

Ethics and consent

The study was approved by the New Zealand Central Health and Disability Ethics Committee (18/CEN/178). Verbal consent was obtained from caregivers using a standardised consent script.

Results

Cohort description

Between January 2019 and March 2020, 502 caregivers completed the survey (Starship Children's Hospital = 156 [31.1%]; Kidz First Children's Hospital = 197 [39.2%]; Waikato

Hospital = 146 [29.1%]; site not recorded = 3 [0.6%].

The majority of participants were mothers ($n = 369$, 73.5%), with a mean (standard deviation [SD]) age of 31.6 (7.8) years. Participants had a median of 2 (interquartile range [IQR] 1–3) children (Table 1). One-quarter of participants ($n = 123$, 24.5%) identified as being of New Zealand European ethnicity and nearly one-quarter identified as Māori ($n = 118$, 23.5%). Over half ($n = 248$, 53.0%) of participants had low socioeconomic status (New Zealand Deprivation Index 8–10).¹⁷

One-third of the children ($n = 171$, 34.1%) brought to the ED by participating caregivers were <1 year of age. One-fifth ($n = 106$, 21.5%) stated fever in their child as their main reason for attending the ED (Table 1). Nearly half ($n = 245$, 49.3%) of the children had a fever in the previous 24 h.

Primary outcome

Overall, 365 caregivers (74.3% [95% confidence interval, CI 70.3–78.0%]) had fever phobia, including 242 (49.3% [95% CI 44.9–53.7%]) with a high level of concern about fever (Table 2), and 288 (61.8% [95% CI 57.3–66.1%]) with at least one incorrect belief regarding the consequences of fever (Table 3). Incorrect beliefs about the consequences of fever included concerns about brain damage ($n = 232$, 49.8% [95% CI 45.3–54.3%]), and death ($n = 176$, 37.8% [95% CI 33.5–42.3%]) (Table 3).

Secondary outcomes

Knowledge about fever and antipyretics

Only 30.0% ($n = 137$, 95% CI 26.0–34.4%) of caregivers correctly identified that a fever begins between 38.0°C and 38.3°C. When asked how long to wait between doses of paracetamol, 87.6% ($n = 383$, 95% CI 84.2–90.4%) correctly stated 4–6 h, and 4.6% ($n = 20$, 95% CI 2.9–7.0%) stated they would wait less than 4 h between paracetamol doses. Regarding ibuprofen, only 42.5% ($n = 179$, 95% CI 37.9–47.3%)

TABLE 1. Participant characteristics

	<i>n</i>	<i>n</i> (%), mean (SD)† or median (IQR)‡
Caregiver type	502	
Mother		369 (73.5%)
Other		133 (26.5%)
Age, years†	494	31.6 (7.8)
Ethnicity§	502	
Māori		118 (23.5%)
Pasifika		117 (23.3%)
Asian		101 (20.1%)
MELAA		24 (4.8%)
Other		19 (3.8%)
New Zealand European		123 (24.5%)
Highest level of education	483	
Tertiary qualification		266 (55.1%)
Completed high school		117 (24.2%)
High school (3 years or less)		96 (19.9%)
Primary school		4 (0.8%)
Number of children‡	497	2 (1–3)
Presenting child's sex, male	502	282 (55.8%)
Presenting child's age, months†	497	21.5 (16.0)
Primary reason for attendance to ED	494	
Fever		106 (21.5%)
Breathing problem		93 (18.8%)
Injury		56 (11.3%)
Vomiting/diarrhoea		52 (10.5%)
Pain		33 (6.7%)
Other¶		154 (31.2%)
Presenting child had a fever in the previous 24 h	497	245 (49.3%)
Low socioeconomic status††	468	248 (53.0%)

Data are *n* (%), mean (SD)† or median (IQR)‡. §Prioritised. ¶Includes “not eating/drinking”, “sore throat”, “sore ear” and others. ††Low socioeconomic status defined as New Zealand Deprivation Index 8–10. IQR, interquartile range; MELAA, Middle Eastern, Latin American and African; SD, standard deviation.

correctly stated 6–8 h dosing interval, and 19.0% ($n = 80$, 95% CI 15.5–23.0%) stated they would wait less than 6 h between ibuprofen doses.

Fever management practices

The majority of caregivers reported using non-evidence-based fever

management practices, such as sponging their child with water ($n = 321$, 65.9% [95% CI 61.6–70.0%]), always giving paracetamol or ibuprofen ($n = 399$, 81.6% [95% CI 77.9–84.8%]), checking their child's temperature until the fever goes away ($n = 432$, 88.7% [95% CI 85.6–91.2%]), or waking their child from sleep to give

TABLE 2. Caregiver concerns about fever

	<i>n</i>	Disagree, <i>n</i> (%)	Neutral, <i>n</i> (%)	Agree, <i>n</i> (%)
I am very concerned when my child has a fever	490	30 (6.1%)	74 (15.1%)	386 (78.8%)
I am worried when my child's fever does not come down with treatment	490	13 (2.7%)	26 (5.3%)	451 (92.0%)
When my child has fever, it does not matter how high the temperature goes	488	348 (71.3%)	41 (8.4%)	99 (20.3%)
If my child has a fever that does not come down it can cause serious damage to them	485	32 (6.6%)	21 (4.3%)	432 (89.1%)
Caregivers demonstrating high level of concern to each statement	491			242 (49.3%, 95% CI 44.9–53.7%)

CI, confidence interval.

TABLE 3. Caregiver beliefs about the consequences of fever

<i>n</i> = 466	<i>n</i> (%)
Dehydration	348 (74.7%)
Seizure	295 (63.5%)
Confusion	237 (50.9%)
Brain damage	232 (49.8%)
Death	176 (37.8%)
Coma	162 (34.8%)
Heart damage	132 (28.3%)
Blindness	79 (17.0%)
None	26 (5.6%)
Other	19 (4.1%)
Caregivers expressing at least one incorrect belief	288 (61.8%, 95% CI 57.3–66.1%)

CI, confidence interval.

antipyretics (*n* = 297, 60.7% [95% CI 56.3–65.0%]) (Table 4).

Sources of information about fever

The family doctor was most commonly identified as a source of information regarding fever management (*n* = 440, 90.7% [95% CI 87.8–93.0%]). Over one-third of caregivers identified ED doctors (*n* = 195, 40.2% [95% CI 34.7–43.2%]) and ED nurses (*n* = 173, 35.7% [95% CI 31.5–40.0%]) as

sources of information regarding fever management. One-third (*n* = 168, 34.6% [95% CI 30.5–39.0%]) of caregivers identified the internet as a source of information.

Factors associated with fever phobia

In univariable analysis, there was a significant association between caregivers having a tertiary education and the likelihood of fever phobia (odds ratio [OR] 1.17 [95% CI 1.14–2.57], *P* = 0.01), and this association remained

in the multivariable model (OR 1.68 [95% CI 1.04–2.72], *P* = 0.04). There was a negative association between caregivers being of low socioeconomic status and likelihood of fever phobia in univariable analysis (OR 0.59 [95% CI 0.39–0.89], *P* = 0.01) but not in the multivariable model. No other demographic characteristics were associated with fever phobia (Table 5).

Discussion

The present study provides the first New Zealand data on caregivers' beliefs and knowledge regarding fever and fever management practices. Our study found that fever phobia is prevalent among New Zealand caregivers of children aged <5 years presenting to EDs. Misconceptions regarding fever and its consequences were pervasive. Caregivers also stated that they perform unnecessary and potentially harmful interventions to manage their child's fever. Although there was an association between a higher level of education and fever phobia in our study, fever phobia affected caregivers across all education levels and is ubiquitous in our study population.

Almost three-quarters of caregivers met our study outcome definition for fever phobia. Our findings were similar to previous studies, with numbers expressing high level of

TABLE 4. Caregivers' knowledge, management practices and information sources about fever

Survey question	<i>n</i>	<i>n</i> (%)
At what body temperature would you say that your child has a fever?	456	
<38.0°C		111 (24.3%)
38.0–38.3°C		137 (30.0%)
>38.3°C		100 (21.9%)
Do not know		108 (23.7%)
How high can your child's body temperature go when they have a fever?	443	
<38.0°C		8 (1.8%)
38.0–41.0°C		229 (51.7%)
>41.0°C		35 (7.9%)
Do not know		171 (38.6%)
What do you use to check if you think your child has a fever?†	492	
By touch/feel/skin		273 (55.5%)
Underarm thermometer		258 (52.4%)
Ear thermometer		190 (38.6%)
Other‡		240 (48.8%)
How long do you wait between giving doses of paracetamol to treat fever?	437	
<4 h		20 (4.6%)
4–6 h		383 (87.6%)
>6 h		12 (2.7%)
Do not give paracetamol		22 (5.0%)
How long do you wait between giving doses of ibuprofen to treat fever?	421	
<6 h		80 (19.0%)
6–8 h		179 (42.5%)
>8 h		2 (0.5%)
Do not give ibuprofen		160 (38.0%)
If my child has a fever I would:		
Keep checking their temperature until the fever goes away	487	432 (88.7%)
Strip them down to a single layer of clothes	488	410 (84.0%)
Always give them paracetamol OR ibuprofen	482	399 (81.6%)
Sponge them with water	487	321 (65.9%)
Wake them from sleep to give them paracetamol or ibuprofen	489	297 (60.7%)
Wake them from sleep to check their temperature	487	246 (50.5%)
Only give them medicine if their fever is making them feel uncomfortable	483	234 (48.4%)
Always give them paracetamol and ibuprofen	482	233 (48.3%)

worry ranging from 56% in North America^{7,11,18} to 82% in the United Arab Emirates.¹⁵ Approximately, two-thirds of caregivers continue to have incorrect beliefs regarding the potential for fever to cause brain damage, coma, heart damage, blindness or death, similar to caregivers surveyed four decades ago when Schmitt found 45% of caregivers were concerned about brain damage.⁶ Compared to Australian caregivers, New Zealand caregivers were more concerned about the risk of brain damage (36.8% *vs* 49.8%), coma (20.9% *vs* 34.8%) and death (28.1% *vs* 37.8%).¹⁴ Fever phobia and incorrect beliefs regarding the consequences of fever among caregivers have persisted across countries and over many decades.

Non-evidence-based fever management practices remain commonplace among New Zealand caregivers, with 60% of caregivers waking their children from sleep to give antipyretics compared to only 8% of Australian caregivers.¹⁴ Almost half of caregivers in our study indicated that they would always give both paracetamol and ibuprofen if their child had a fever. International fever management guidelines recommend that antipyretic use in febrile children be for discomfort rather than for the sole aim of temperature reduction.^{3,4} Although there is weak evidence that combined antipyretics may be more effective at reducing fever than monotherapy, the evidence for combined antipyretics improving discomfort remains inconclusive; thus this practice is not recommended.¹⁹ Although only 5% of caregivers stated that they would give paracetamol less than 4 h, given that paracetamol is the most common medication used in young children, even a minority could still place many young children at undue risk of toxicity from inappropriate dosing. There was even less knowledge surrounding ibuprofen dosing. Effective educational strategies to improve caregivers' knowledge regarding evidence-based fever management practices and safe use of antipyretics are needed.

TABLE 4. *Continued*

Survey question	<i>n</i>	<i>n</i> (%)
If I was worried my child might get a fever I would give them paracetamol or ibuprofen just in case	488	162 (33.2%)
Information sources for fever and fever management†	485	
Family doctor		440 (90.7%)
General practice nurse		213 (43.9%)
Plunket nurse		205 (42.3%)
ED doctors		195 (40.2%)
Relatives		188 (38.8%)
ED nurses		173 (35.7%)
Internet		168 (34.6%)
Other‡		183 (37.7%)

†Multiple answers possible. ‡Includes “forehead thermometer,” “mouth thermometer,” and “rectal thermometer”. §Includes “friends,” “media,” and “traditional healers”. CI, confidence interval.

Healthcare professionals were the most commonly used information source about fever management, similar to international findings.^{7,13,20} This is particularly encouraging as a source of caregiver education in the face of large amounts of information widely available online. One-third of caregivers in our study use the internet as a source of information, comparatively more than Australian (16%)¹⁴ and Japanese

(13%)²⁰ parents. Over one-third identified ED doctors and nurses as sources of information about fever, suggesting the important role ED doctors and nurses have for opportunistic caregiver education regarding fever. However, it begs the question whether the high prevalence of fever phobia among caregivers could be related to attitudes and information passed on from healthcare professionals. Fever phobia and

inconsistent fever management practices among healthcare professionals have been well documented in international and Australian literature.^{10,12,21} In the ED, frequent temperature monitoring and the practice of ensuring apyrexia prior to discharge may reinforce caregiver fever phobia. There is a need to further investigate whether information caregivers are receiving from healthcare professionals is consistent with current recommendations.

Some studies have found associations between fever phobia and certain ethnicities.^{18,22–24} We had an ethnically diverse cohort of caregivers and we did not find a statistically significant association between caregiver ethnicity and the likelihood of fever phobia. The only variable found to be independently associated with the likelihood of fever phobia was higher level of caregiver education. Although, of note we did not find lower socioeconomic status to be associated with fever phobia. In contrast, most prior studies have found fever phobia to be more likely among caregivers with lower socioeconomic status and lower levels of education,^{10,11,14,22,23} although two have had results similar to ours. Canadian parents of higher socioeconomic status and education were more concerned about the risks of

TABLE 5. *Factors associated with fever phobia*

Independent variables	Univariable (odds ratio [95% CI])	<i>P</i>	Multivariable (odds ratio [95% CI])	<i>P</i>
Tertiary education	1.17 (1.14–2.57)	0.01	1.68 (1.04–2.72)	0.04
Low socioeconomic status	0.59 (0.39–0.89)	0.01	0.73 (0.44–1.22)	0.24
Cares for >1 child	0.69 (0.45–1.06)	0.09	0.66 (0.41–1.06)	0.08
Fever as presenting complaint	1.03 (0.64–1.68)	0.89	1.20 (0.70–2.08)	0.50
Child's age >1 year	0.97 (0.64–1.47)	0.89	0.97 (0.60–1.54)	0.88
Child's sex – male	1.33 (0.89–1.97)	0.16	1.28 (0.82–1.98)	0.28
Ethnicity				
Māori	0.77 (0.44–1.35)	0.28	0.91 (0.47–1.77)	0.69
Pasifika	0.65 (0.37–1.13)	0.06	0.92 (0.46–1.86)	0.75
Asian	1.37 (0.72–2.58)	0.17	0.94 (0.46–1.94)	0.82
MELAA	1.69 (0.53–5.31)	0.24	1.90 (0.51–7.14)	0.24
Other	0.73 (0.26–2.09)	0.51	0.68 (0.21–2.20)	0.41

CI, confidence interval; MELAA, Middle Eastern, Latin American and African.

brain damage or seizures as sequelae of fever,²⁵ while in higher-educated Turkish mothers concerns about fever were more common.²⁶ The reasons for these differences require further investigation. However, as our findings show that fever phobia is common among all caregivers of children attending the ED, regardless of education and socioeconomic status, education regarding fever management should be universal.

A strength of our study is our relatively large sample size and the inclusion of caregivers of children attending the ED at three sites. This is the first study of the phenomenon of fever phobia in New Zealand, including caregivers' knowledge and beliefs about fever and fever management practices among New Zealand caregivers of varying backgrounds.

Our study has several limitations. Because of COVID-19, recruitment was halted at approximately 500 participants compared to our intended sample size of 600. However, because of the high prevalence of fever phobia in our population, our estimate remained precise (confidence limits $\pm 4\%$). Caregivers of children with ATS category 1 or 2 were not initially approached to complete the survey on arrival and so our findings in this group must be interpreted with caution. However, such patients are a relatively small proportion of all ED patients, and where possible we made attempts to approach these caregivers if their child improved sufficiently for them to participate. Another limitation is the lack of universal consensus for assessing fever phobia. We feel that by incorporating two factors into our study outcome definition of fever phobia, a combination of concerns regarding fever and incorrect beliefs regarding the consequences of fever, we have encapsulated Schmitt's original definition of fever phobia and arrived at a pragmatic measure of fever phobia with face validity.

Conclusion

Fever phobia is prevalent among caregivers of children attending

New Zealand EDs, affecting caregivers from all backgrounds and socioeconomic status. Caregiver knowledge regarding fever and the safe and appropriate use of antipyretics remains poor, and caregivers commonly use non-evidence-based and potentially harmful interventions to reduce fever. Given that most caregivers identify healthcare professionals as their primary source of information regarding fever, it may be prudent to investigate whether the advice given by healthcare professionals is in line with current best practice guidelines.

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Competing interests

SRD is a section editor for *Emergency Medicine Australasia* and has received support for attendance at meetings from Fisher and Paykel Healthcare.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting information

Additional supporting information may be found in the online version of this article at the publisher's web site:

Appendix S1. Survey questionnaire.