

Parental knowledge, beliefs and management of childhood fever in Australia: a nationwide survey

ABSTRACT

What is known and objective: Fever, one of the most common symptoms of illness experienced by children, often creates undue parental anxiety about the consequences of fever, which can lead to over-treatment. The full extent of this problem in Australia is not known. This study aimed to describe parents' knowledge, beliefs and perceptions about childhood fever and its management, and identify any predictors of the burden on parents when children are febrile.

Methods: This was a cross-sectional web-based survey of parents living in Australia. Parents with at least one child <6 years were recruited via Facebook. Demographic information, parental fever knowledge and beliefs and responses to the Parent Fever Management Scale, a measure of parental burden, were collected and analysed.

Results and discussion: Of the 12,179 parents who completed the survey, 42.0% knew that a temperature above 38°C constitutes a fever, with 33.4% underestimating the temperature of a fever. Parents believed that there were many harms associated with untreated fever, namely seizures (71.8%), dehydration (63.6%), serious illness (43.0%) and brain damage (36.8%). Phobic beliefs were more common among parents who underestimated the temperature of a fever. Identification of health professionals as a main information source about fever did not significantly improve knowledge or reduce fears. Up to 65.0% of respondents indicated that they practice non-evidence-based strategies to reduce temperature. The belief that 'every child with a fever should be treated with medication to lower temperature' was the strongest predictor of parental burden ($\beta = 0.245$, $P < 0.001$).

What is new and conclusion: Poor parental knowledge and misconceptions surrounding fever and its management are still common among parents throughout Australia. Large scale, sustainable educational interventions are needed to dispel misconceptions and concerns about fever, encourage appropriate and safe care of febrile children.

INTRODUCTION

Fever, one of the most common symptoms of illness experienced by children, often creates undue parental anxiety about the consequences of fever, which can lead to over-treatment. Parents' fear of fever, or 'fever phobia', was first described in 1980, when it was reported that many parents believed that moderate fevers could have serious neurological consequences, aggressively treating mild fever with antipyretic medication and physical temperature reduction methods.¹ Since this observation, many studies around the world have investigated fever phobia and found similar fears among parents.² Many parents express unfounded fears about fever, with a poor understanding of fever perpetuating these concerns.³⁻⁵

Poor parental knowledge and misconceptions about fever often results in over treatment and increased contacts with the healthcare system. Aggressive and potentially dangerous home therapy is common: parents have been reported to use antipyretics unnecessarily or more frequently than recommended, combine or alternate antipyretics, and frequently use physical temperature reduction strategies.³⁻⁵ Misconceptions and anxiety among parents often result in increased doctor and Emergency Department visits, increasing the burden on the healthcare system.^{6,7}

When fever phobia was first described almost 40 years ago, it was recommended that health education to counteract parents' fears should be a part of routine paediatric care. Despite current resources and services available to parents and educational interventions,⁸ little has

changed in parents' fever management, knowledge and beliefs.⁹ However, surveys of parents about childhood fever rarely use validated instruments, to allow comparisons over time. The most recent Australian data from 2005, reported suboptimal fever knowledge and phobic beliefs. This study also detailed the development and validation of an instrument to measure parents' fever management practices and the burden on parents when children are febrile, with most practices targeted through the scale reflecting phobic beliefs.⁵ More recent nationwide data are required, to determine any changes in parental beliefs and management over the last decade. The aim of this study was to investigate parents' current knowledge and beliefs about childhood fever, determine parents' fever management practices and identify any predictors of the burden on parents when their children are febrile.

METHODS

Study design and participants

This study was an online, cross-sectional survey conducted using LimeSurvey. Participants were required to be parents of at least one child under the age of 6 years old, and living in Australia. Parents who did not provide an Australian postcode for their place of residence, or who did not have any children under the age of six were excluded.

Parents were recruited using Facebook, and a paid advertisement ran throughout the duration of survey activity. Facebook groups also assisted with recruitment by sharing the link to the survey among their followers. A prize draw of an iPad mini was used as a recruitment incentive (to maintain anonymity, prize draw details could not be linked to survey responses).

Responses to at least 384 surveys were needed, to ensure the results were generalisable to the target population. This recruitment target was calculated using the population of parents in Australia with children under six years (approximately 1.8 million parents),^{10,11} with a confidence interval of 95% and a 5% margin of error.¹²

The online survey was active from March to August 2016. The survey was initially targeted to parents in Tasmania however, after three weeks of being active and well-surpassing our recruitment target, it was opened to all parents in Australia with children under six years of age.

Survey

The design of the survey was based on a review of the literature concerning parents' knowledge and management of fever, and fever phobia. The survey contained 30 items and included questions about participant demographics, previous experiences with fever, knowledge and beliefs about fever and the burden of a febrile child on the parents (Online Appendix 1). To get a more complete picture, both phobic beliefs (e.g. concern about brain damage due to fever) and non-phobic beliefs (e.g. concern about dehydration) were explored. Postcodes were also gathered for estimation of socioeconomic status using the Index of Relative Socio-economic Advantage and Disadvantage,¹³ with a score of >1000 indicating a socio-economic advantage above the national average.¹⁴

The potential burden of a febrile child on parents was assessed using the Parent Fever Management Scale (PFMS), a validated 7-item questionnaire.⁵ Responses were assessed on a 5-point scale (1=never, 5=always) and the overall burden calculated through the sum of the questions. The potential range of scores was 7-35, with mean score above the median indicating a moderate burden on parents when children are febrile.⁵ The survey was designed to take no longer than 10 minutes to complete and was only available in English.

Statistical analysis

All variables were collated and entered into a statistical software package, SPSS version 24 (IBM, New York). Chi Square tests were used to compare categorical variable and t-tests were used for normally distributed continuous variables. Categorical variables were tested against the PFMS using t-tests and continuous variables were tested against the PFMS using

linear regression tests. All variables were tested against the Parent Fever Management Scale score using Pearson's correlation tests for continuous data, Spearman's correlation tests for ordinal categorical data and t-tests for nominal categorical data. A multivariate linear regression model was developed using univariate predictors, with $P < 0.10$ used as the threshold for entry into the model. The variance inflation factors of all the independent variables were examined to test for potential collinearity. A $P < 0.05$ was considered statistically significant. All authors had full access to all of the data, including statistical reports and tables.

Ethics and consent

This study was approved by the Tasmanian Social Science Human Research Ethics Committee on 23rd December 2015 (reference number H0015416). Wider recruitment throughout Australia was approved on 31st March 2016. By submitting the survey, patients provided their implied consent.

RESULTS

A total of 12,179 eligible surveys were completed (Figure 1). The average cost of Facebook advertising was \$0.58 per complete, eligible response.

The respondents were residing in New South Wales (27.0%), Tasmania (25.5%), Victoria (19.9%), Queensland (15.5%), Western Australia (6.0%), South Australia (5.2%) and the Northern Territory (1.0%). The average age of the participants was 34 years, 97.8% were female, and had an average of two children (Table 1).

Parental knowledge and beliefs about childhood fever are displayed in Table 2. Only 42.0% of parents knew that a temperature above 38°C constitutes a fever, with 33.4% underestimating the temperature of a fever. Correct definition of a fever was significantly

more likely among parents with a higher level of education ($P = 0.008$) and parents who lived as a couple ($P = 0.008$).

Parents who underestimated the temperature of a fever were significantly more likely to believe that untreated fevers could cause serious illness ($P = 0.003$), coma ($P < 0.001$), seizures ($P = 0.001$), brain damage ($P < 0.001$), blindness ($P = 0.002$) and death ($P < 0.001$), and were significantly more likely to believe that reducing a fever with medication would decrease discomfort ($P = 0.002$), the risk of seizures ($P < 0.001$) and other harm ($P < 0.001$), and that every child with a fever should be treated with medication to lower temperature ($P = 0.003$).

Parents who believed that untreated fevers could cause dehydration ($P = 0.001$), serious illness ($P < 0.001$), seizures ($P < 0.001$), brain damage ($P < 0.001$), and death ($P < 0.001$) were significantly more likely to have previously called an ambulance or taken their child to hospital for a fever. Those who believed that reducing a fever with medication would decrease the risk of seizures ($P < 0.001$) and other harm ($P < 0.001$), and that every child with a fever should be treated with medication to lower temperature ($P < 0.001$) were also significantly more likely to have previously called an ambulance or taken their child to hospital for a fever.

Parents whose children had previously had a febrile convulsion were significantly less likely to believe that untreated fevers could cause serious illness ($P < 0.001$) and brain damage ($P = 0.001$), but more likely to believe that untreated fevers could cause seizures ($P = 0.005$). They were also significantly more likely to believe that reducing a fever with medication would decrease the risk of seizures ($P < 0.001$).

Parents who stated that they consulted health professionals for information about fever were significantly more likely to believe that untreated fevers could cause coma ($P = 0.041$) and

blindness ($P = 0.025$) and were significantly more likely to believe that reducing a fever with medication would decrease the risk of harm ($P = 0.040$).

Table 3 shows the common management strategies employed by parents in the face of childhood fever. Up to 65% of respondents indicated that they sometimes or more often practice non-evidence-based temperature-reduction strategies such as applying cool or tepid sponges (65.0%), placing children in a cool or tepid bath (30.7%), and alternating two or more medications to reduce the temperature (54.9%). The PFMS scores ranged from 7 to 35 (mean 24.8 ± 4.1), indicating a moderate burden on parents when children are febrile.⁵

The multiple regression model contained 27 variables and explained 39.6% of the variance in the PFMS scores ($R^2 = 0.396$, $P < 0.001$). The variance inflation factors ranged from 1.01 to 2.09, implying no significant problems with multicollinearity. While the model showed 21 significant independent predictors (Table 4), the belief that ‘every child with a fever should be treated with medication to lower temperature’ made the strongest contribution to the model ($\beta = 0.245$, $P < 0.001$). Other variables that made relatively strong contributions to the model included the belief that ‘it is important to be able to measure a child's temperature’ ($\beta = 0.215$, $P < 0.001$), and fever management practices such as applying a tepid/cool sponge ($\beta = 0.118$, $P < 0.001$) and alternating two or more medicines to reduce fever ($\beta = 0.112$, $P < 0.001$).

DISCUSSION

This study provides the first Australian nationwide data on parents’ knowledge and beliefs surrounding childhood fever and its management. With over 12,000 participants, it was the largest survey on childhood fever in the world and demonstrated that phobic beliefs about childhood fever are still very prevalent in society.

While most parents thought it was important to be able to measure their child’s temperature, more than half did not know the temperature constituting a fever and approximately one-third

would classify an afebrile child as febrile. Many parents believed fever to be harmful; the concern about febrile seizures was similar in other recent studies,^{5,15} while the concern about dehydration, serious illness, brain damage and death was higher than others reported,^{15,16} and seems to have increased over time.^{1,3,5} Many parents believed reducing fever with medication would decrease the risk of harm, suggesting that the care of febrile children may be motivated by fever phobia.

Parents' previous experiences with fever related to their beliefs and concerns. While it is understandable pre-existing concerns influenced the likelihood of parents calling an ambulance or taking their child to hospital, it is also possible that previous frightening experiences with fever may increase future anxiety and concerns. Previous research has demonstrated that parents who were very concerned about fever were more likely to have had their child evaluated for a fever in the past.³ It is therefore important that opportunities are taken during fever evaluation for parental education.

It was encouraging to see health professionals were parents' most commonly used information source for fever management, similar to previous studies.^{3,17} Unfortunately, the use of health professionals did not improve knowledge or reduce fears. In fact, the use of health professionals increased concerns about the risks of untreated fevers and beliefs that antipyretics would reduce the risk of seizures. However, the view that medication can reduce the risk of seizures contrasts with existing literature.¹⁸ Degrees of fever phobia and inconsistent management practices among health professionals have been described elsewhere,¹⁹⁻²¹ and previous Australian research has shown that nearly half of parents had received conflicting information about managing fever, increasing fever-related anxiety and concerns.⁵ It is therefore important to further investigate whether the information parents are receiving from health professionals is in line with current guideline recommendations.

Up to 65% of parents indicated that they sometimes or more often practice non-evidence-based strategies to reduce temperature such as applying cool or tepid sponges, placing children in a cool or tepid bath and alternating antipyretics. Physical methods for reducing temperature are no longer recommended,^{22,23} as they do not offer any advantage in temperature reduction and can cause more discomfort.²⁴ While there is some evidence that alternating and combining antipyretics may be more effective at reducing temperatures than monotherapy, the evidence for improvements in discomfort remains inconclusive.²⁵ The practice is not recommended in management guidelines,^{22,23} and there are concerns that alternating antipyretics can increase the likelihood of incorrect dosing and dosing intervals.²¹

Parents' mean PFMS score was 24.8, indicating a moderate level of interference with daily life with a focus on non-evidence-based practices.⁵ By comparison, the mean score in the first Australian study to use the PFMS was 17.2, demonstrating that the burden on parents when their children are febrile has increased over the last decade. The strongest predictors of parental burden were the beliefs that 'every child with a fever should be treated with medication to lower temperature' and 'it is important to be able to measure a child's temperature', indicative of parents' preoccupation with the height of the fever and the need to reduce it with medication.

Our study has some limitations. Despite our attempts to recruit a large heterogeneous sample of parents, more than 97% of respondents were female. This self-selection bias may be a reflection of the demographics of primary caregivers²⁶ as well as social media users²⁷ in Australia. Therefore, our results are more likely to be generalizable to Australian mothers, rather than all parents. Furthermore, almost 10% had children who had a previous febrile convulsion, and almost a third had previously called an ambulance or taken their children to hospital for a fever. It is possible that previous distressing experiences with childhood fever may have influenced a parents' decision to participate. Information about the general health of

participants' children was not collected, and it should be noted that in children with certain chronic diseases, some management strategies could be correct and not a sign of fever phobia. It is also important to acknowledge that Tasmania had a disproportionately large number of responses. This may be because the survey was available to Tasmanian parents for the first 3 weeks before it was made nation-wide. It may have also been influenced by interest and support in local research. Lastly, recruitment via Facebook may have led to a select population within the sample.

The large sample size is a major strength of this study. To our knowledge, this was the largest study ever conducted on childhood fever in the world, bearing testimony to the importance of the issue of childhood fever in our society. Furthermore, the high survey uptake indicates that parents are recruited well through Facebook and they are very interested in and responsive to research involving their children's health.

CONCLUSION

The results from our study reiterate the fact that poor parental knowledge and misconceptions surrounding fever and its management are still commonplace in Australian society. Fever phobia is rife among parents, with many practicing non-evidence-based strategies to reduce their child's temperature. There is a substantial need for improved parental knowledge and understanding of childhood fever and its management. Large scale, sustainable educational interventions are needed to dispel misconceptions about fever and encourage appropriate management of febrile children. Health professionals need to be aware of common misconceptions about fever and play an active role in education parents and promoting evidence-based fever management strategies.

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