



Best Practice

Evidence Based Practice Information Sheets for Health Professionals

Management of the Child with Fever

Information Source

This *Best Practice* Information Sheet has been based on a systematic review of research published by The Joanna Briggs Institute entitled *Nursing Management of Fever in Children*¹. The primary references on which this information is based are available in the systematic review report available from The Joanna Briggs Institute and from the web site:

www.joannabriggs.edu.au

Objectives

The objectives of the systematic review were to:

- determine whether the available evidence supported the types and timing of the various nursing interventions commonly used to reduce fever in children.
- the extent to which the outcomes were influenced by these nursing interventions

The specific question asked was:

Does the available evidence, in terms of outcomes, support the types and timing of the various nursing interventions which are commonly used to reduce fever in non critically ill children?

This Information Sheet Covers the Following Concepts:

- Effect of Sponging
- Use of Paracetamol as an Antipyretic
- Parent Information
- Health Information on the Internet

Background

Fever is a common childhood problem faced by medical practitioners, nurses and parents in both hospital and community settings. Statistics from one large urban paediatric hospital indicate that more than 30% of visits to the Emergency Department included fever as part of the major complaint.

While there is evidence to indicate that fever is an adaptive physiologic mechanism with beneficial effects, the definition of its onset varies. For oral temperatures, the definition has been noted to range from

Levels of Evidence

All studies were categorised according to the strength of the evidence based on the following classification system.

Level I - Evidence obtained from a systematic review of all relevant randomised controlled trials.

Level II - Evidence obtained from at least one properly designed randomised controlled trial.

Level III.1 - Evidence obtained from well designed controlled trials without randomisation.

Level III.2 - Evidence obtained from well designed cohort or case control analytic studies preferably from more than one centre or research group.

Level III.3 - Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments.

Level IV - Opinion of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

37.6°C–37.8°C, and from 38°C–38.3°C for rectal temperatures.

No consensus has been found as to what level of temperature differentiates moderate from high fevers. However, there is agreement that children with temperatures over 41.1°C are at higher risk of serious illness.

Despite its prevalence, the literature indicates that the nursing management of fever in children is not often based on research and remains inconsistent in

practice. This, together with the emergence of the world wide web as a major source of health information, is of concern – particularly as in a review of 41 internet sites offering advice about the care of children with fever in the home, only four adhered closely to the main recommendations in the selected guidelines.

In addition, studies of parental knowledge of fever have exposed unfounded fears and misconceptions - leading in many cases to inappropriate care and/or visits to hospital or medical practitioners.

Characteristics of Children in the Studies

The total number of children in the ten studies included in the review was 821. Most of the participants were from the first year of life to approximately five years of age, with the mean age in most studies being two years. There were relatively even numbers of males and females.

Review Results

As the nursing interventions used in the management of fever can have more than one effect, the results of the review have been grouped by outcomes. Given that only narrative comparisons were possible, the results of this review should be interpreted with caution.

Effect of Interventions on Fever

Refer Table 1.

Comfort of the Child

Five studies measured discomfort as an outcome of the interventions. All five studies used physical signs as a measure. No statistical comparisons can be made between the studies as each study used a

different rating scale and the signs assessed varied, although some were common, eg crying.

Two studies reported a significant difference in observed discomfort between those receiving only paracetamol medication and those being sponged, while another reported there was no significant difference in discomfort between these two interventions.

One of the studies provided descriptive statistics on which to compare assessed discomfort. Using a rating of good, fair and poor, 66% of the children being sponged with tepid water were rated as being fair or poor compared to 22% of children receiving only medication. In the remaining study discomfort was measured but the outcomes were not reported.

One study assessed whether the child accepted being sponged. This could be considered an indirect measure of comfort. Of the children being sponged by their parents 46% were assessed as objecting somewhat to the procedure but an equal number apparently enjoyed the warm bath.

Prevention of Febrile Convulsions

Of the total sample of 821 only one febrile convulsion (0.12%) was reported as occurring during a study. This 12 month old child was in a 'tepid sponging only' group and convulsed 90 minutes after commencing treatment when her temperature was 39.7°C, 0.7°C higher than when admitted. She had no history of febrile convulsions.

Two studies reported excluding any child with a history of febrile convulsions. No data describing the participants' history of febrile convulsions or existence of risk factors were reported in any of the studies.

Overview of the Literature

Randomised or quasi-randomised studies that addressed the effectiveness of all nursing interventions used to reduce fever in children between 3 months and 16 years were considered. Studies involving adults or critically ill children/infants, and those describing medical diagnosis and treatment of conditions in which fever was a component were not included. For the review, fever was defined as a temperature ranging from 37.5°C (tympanic)/38°C (rectal)/37.5°C (oral) to 41°C.

The literature located on nursing interventions used to reduce temperature fell into three main groups:

- administration of antipyretics*
- maintenance of hydration
- either direct or environmental external methods of cooling. Direct cooling measures included cool baths, tepid sponges, the application of cool flannels to various parts of the body and removing clothing. The use of fans and reduction of room temperature were classed as environmental measures

***Note:** In studies which included other antipyretics (eg ibuprofen) in addition to paracetamol, only the results relating to the use of paracetamol were included in the review.

Outcomes of nursing interventions of interest were:

- Effect on fever, eg reduction, prevention or increase
- Prevention of febrile convulsions
- Increased comfort, eg decreased irritability
- Decreased parental anxiety

Effect on Parental Anxiety

This outcome was not measured in any of the ten included studies. One author rated how acceptable the intervention was to parents. All care in this study was provided by the parents on advice from the nurse. The interventions were unwrapping, warm sponging, paracetamol, and warm sponging and paracetamol.

Providing medication only was the most acceptable ("very happy"), followed by warm sponging and paracetamol medication ("happy"). Parents were "not sure" about warm sponging only and unwrapping. This study also found that parental response to treatment advice was variable. Most parents reduced the amount of clothing on the child, although some

parents added wrappings. However, advice to increase fluid intake was not heeded by most. The average fluid intake over a four hour period was 163 mls, with 1 in 5 parents (19%) offering no fluids at all over that period.

Summary of the Evidence

The systematic review yielded information on the effectiveness of paracetamol administration and direct cooling measures on the reduction of fever.

For the other three outcomes:

- prevention of febrile convulsions
- increased comfort
- decreased parental anxiety

There was either insufficient or no evidence available on which to base conclusions.

The review results suggest that there is minimal clinical benefit from routine sponging in temperate climates. Only small decreases in temperature were reported, often at the expense of the child's comfort. However, in certain circumstances, such as high environmental temperatures and humidity, or in situations where there is a need for immediate temperature reduction, sponging may be warranted.

The one study that addressed parental care indicated the need for parental education that focuses on knowledge of the body's protective physiological responses and how to support those responses.

Table 1: Effect of Interventions on Fever

Paracetamol vs Sponging

In the seven studies which included these interventions, **paracetamol alone was found to be more effective** in reducing the child's temperature when compared to sponging alone. In only three studies however, a statistically significant difference between these two treatments only became evident after one hour or more.

From a clinical perspective, in the three studies reporting a statistical difference, the mean reduction in temperature in the paracetamol group at one hour ranged from 0.8°C to 1.1°C. On the final measurement in these studies (1-4 hours) the mean reduction in temperature ranged from 0.9°C to 1.85°C. In the sponge only groups the mean reduction at both one hour and on final measurement ranged from 0.55°C to 0.75°C.

Of the remaining studies, one did not detect a significant difference between the interventions, while the other three did not report on whether the results were statistically significant or not.

Paracetamol + Sponging vs Sponging

In all five studies employing these interventions, the **combination of paracetamol and sponging was found to be more effective** than sponging alone. Three studies reported a significant decrease in the mean reduction in temperature on final measurement between the group treated with paracetamol and sponging (range from 1.7°C to 1.3°C) when compared with the group who received sponging alone (range 0.55°C to 1.2°C). A further two studies did not include the outcomes of statistical analysis in respect to this comparison in their reports.

Paracetamol + Sponging vs Paracetamol

All eight studies evaluating these interventions concluded that the **combination of paracetamol plus sponging was more effective** in lowering temperature than paracetamol alone. In four studies a significant difference was identified. In those studies, the mean reduction in temperature in groups receiving medication plus sponging ranged from 1.3°C to 1.7°C. Three of these studies were conducted in tropical climates: Bangkok, Hawaii, and Singapore and included information on room temperatures and humidity. Although the room temperatures were not notably high, the humidity levels were higher than the remaining study sites would normally experience.

In those groups receiving only paracetamol, the mean reductions on final measurement ranged from 0.9°C to 1.3°C. Another three studies demonstrated no significant difference between the interventions. The remaining study did not provide information on statistical difference between the two treatments.

Discussion

Having completed the review, the question has emerged as to whether intervention to reduce the fever is warranted. Uncomplicated fever is relatively harmless, and is in fact an important immunologic defence mechanism. When recommended, intervention is directed to reducing the child's discomfort, not the fever. However, interventions should also be assessed in terms of potential risks. It is within this context that the results of the review are discussed.

Use of Paracetamol

The most serious side effect of paracetamol overuse has been reported to be hepatotoxicity. It has been suggested that the child at risk of liver toxicity is most likely to be under two years of age, is sick (for example has repeated vomiting and diarrhoea together with poor oral food intake), and who has received four hourly paracetamol (90mg/kg/day or greater) for more than one day. Research has also demonstrated that repeated therapy at recommended doses can result in drug accumulation and that cases of serious hepatotoxicity have occurred in children receiving doses of around 150mg/ kg/day when taken for one to four days.

In 1998, the Drug Therapy and Hazardous Substances Committee of the Canadian Paediatric Society published a review of the efficacy and safety of acetaminophen (paracetamol) and ibuprofen in the management of fever in children². The review concluded that in febrile children with temperatures less than 41°C, significant antipyresis can be achieved with a single dose of paracetamol 10-15mg/kg.

In response to recent reports of severe hepatotoxicity in Australian children on relatively low daily doses of paracetamol, one paediatric teaching hospital now recommends an upper limit of 60mg/kg/day for fever.

In one randomised control trial comparing paracetamol with a placebo, no significant difference

between the two groups in terms of the duration of fever or other symptoms was detected. In respect to general well being, based on parental ratings, those children receiving paracetamol demonstrated some improvement in activity and alertness, but there were no significant differences between the two groups in mood, comfort, appetite or fluid intake.

There is a lack of evidence in the literature to support the notion that paracetamol reduces the incidence of febrile convulsions.

Advice to Parents

Parental concerns may in some cases amount to what has been labelled 'fever phobia' and advice and support should be directed to minimising these concerns. Evidence suggests that health care providers may contribute to parental fears with mixed messages about the danger of fever and aggressive over treatment. Similarly it has been noted that guidelines make little reference to the beliefs and feelings of parents, and if the parents' health beliefs and expectations of how to care for a child with a febrile illness differ from those of the care provider, problems arise.

Internet as a Resource

Internet sites providing health advice to parents offer a wide variety of recommendations regarding the management of fever in children. Recommendations to use cold sponging (2 of the sites reviewed) cold baths or showers (2) or to sponge with alcohol (2) are of particular concern as these interventions are contraindicated by research findings.

In respect to antipyretic drugs, several sites still recommended aspirin. Tepid sponging was still recommended by more than half (22) the sites reviewed plus tepid bath or shower by nine sites. Of those listing tepid sponging, 15 could be considered as recommending this as a routine intervention for any fever. The remaining seven indicated that tepid sponging should be confined to those children with temperatures above a certain point (ranging from 38.5°C to 40.5°C). Only six sites mentioned giving an antipyretic drug in conjunction with sponging.

Implications for Practice

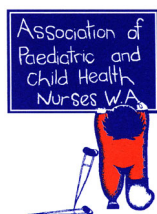
Should one Intervene?

The answer will vary depending on which intervention is being considered.

- The primary purpose is to increase the child's comfort (or decrease their discomfort).
- The purpose of intervening should be clearly identified.
- Reduction of parental anxiety may require consideration.
- Considerations should be balanced against any harm that might result from intervening (eg increasing the child's discomfort or placing the child at risk of liver damage).
- Intervention/s that support the body's physiological response to infection should be used. (eg encouraging fluids, removing excess clothing or wrappings, ensuring circulating air).

Sponging

- There is a lack of evidence to support the *routine* use of sponging in temperate climates as sponging does not produce a sustained drop in temperature.
- There is a significant risk of increasing the child's discomfort during sponging and this may raise the temperature.
- There are economic considerations of using valuable time to carry out ineffective interventions. However, there may be individual situations where a case can be made for sponging/ bathing a child, provided the child does not become upset and show other signs of discomfort, eg shivering. A number of studies reported that some children actually enjoyed a bath, particularly when given by their parents, and were more comfortable after it.
- In cases of high parental anxiety, for example with a child with a history of febrile convulsions, providing the parent with the opportunity to give physical care in the form of bathing the child, when not contraindicated, might be appropriate.



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Use of Paracetamol

- Paracetamol should be used selectively and with caution, even in otherwise healthy children. Despite its comparative safety, the routine sustained administration of paracetamol is not supported in the management of fever.
- Information needs to be obtained about other medications in use by the child which may contain paracetamol - to ensure the total dose per day is accurately estimated.
- Extreme caution should be used if administering paracetamol to young children who are dehydrated and/or malnourished. Children who are fasting may also be at risk.

Parent Information

Parent education is supported in order to increase parents' knowledge and skills in caring for their febrile child and to alleviate anxiety.

A number of cases of accidental overdose have been reported to arise from the use of adult strength preparations and the use of inappropriate measuring devices. Failure to understand the manufacturer's instructions has also been cited as contributing to paracetamol overdose in children. Therefore, where paracetamol is to be given by parents, the information provided should emphasise:

- the importance of administering the correct dosage
- the maximum number of doses per day to be given
- the need to check the strength of the preparation and the means of administration noted on the manufacturer's instructions

Summary

- The treatment of fever needs to be individualised, based on current knowledge of the effectiveness and risks of interventions
- The child (and the parents) should be the focus of nursing care, not the thermometer
- The focus on home care is particularly important with increasing numbers of children being cared for on an ambulatory basis



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Recommendations

Decision to treat fever

- The decision to treat fever needs to be balanced against any harm that might result from intervening (Underlying principle)
- The primary purpose of any intervention is to increase the child's comfort (or decrease their discomfort) (Level IV)
- Interventions that assist the body's physiological responses to infection are recommended, eg encouraging fluids and removing excess clothing or wrappings (Level IV)

Sponging

- The routine use of sponging to reduce fever is not supported (Level II)
- Parental anxiety may be alleviated if given the opportunity to bath a child who enjoys it, and who shows no signs of discomfort (Level IV)

Use of paracetamol in the management of fever

- While a single dose of paracetamol can produce a reduction in temperature (Level II), the drug should be used selectively and with caution, even in otherwise healthy children (Level IV)
- The routine sustained administration of paracetamol to treat mild or moderate fever is not supported (Level IV)
- In febrile children with temperatures less than 41°C, a reduction in temperature can be achieved with a single dose of paracetamol 10-15mg/kg (Level II). An upper limit of 60mg/kg/day is recommended (Level IV)

Advice to parents

- Parent education is recommended to increase their knowledge and skills in caring for their febrile child and to decrease any anxiety (Level IV)
- Parents should be educated about the use of paracetamol, and also alternative measures for treating fever (eg increasing fluids and removing clothing) (Level IV)
- Parents with concerns about their child's condition should be encouraged to seek medical advice (Level IV)
- The use of the Internet is not recommended as a substitute for consultation with a health care professional - due to the sources, currency and accuracy of information (Level IV)

References

1. Watts, R., Robertson, J and Thomas, G. 2001 *The Nursing Management of Fever in Children*. A Systematic Review No. 14, The Joanna Briggs Institute Adelaide
2. Canadian Paediatric Society Drug Therapy and Hazardous Substances Committee 1998. Acetaminophen and ibuprofen in the management of fever and mild to moderate pain in children practice point. Position Paper

Acknowledgments

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Members of the review panel were:

- Ms Geraldine Carlton Director, Surgical Services Clinical Care Unit, PMH
- Mr Alan Kuipers-Chan Clinical Manager, Paediatric Medicine, Endocrinology, Nephrology, PMH
- Ms Rebecca Coghlan Representative, WA Health Consumers' Council
- Ms Elaine Pavlos Formerly Coordinator, Paediatric Nursing Education, PMH
- Ms Liz Prime Paediatric Services Manager, Joondalup Health Campus
- Ms Lorraine Shepherd Director, Paediatric Medicine Clinical Care Unit, PMH
- Ms Brenda Simmons Clinical Manager, Orthopaedic & Plastic Surgery, PMH
- Ms Shirley Woodger Clinical Nurse Consultant, Paediatric Surgery, Burns & Pain Service, PMH

- The Joanna Briggs Institute for Evidence Based Nursing and Midwifery, Margaret Graham Building, Royal Adelaide Hospital, North Terrace, South Australia, 5000.

<http://www.joannabriggs.edu.au>

ph: (+61 8) 8303 4880 fax: (+61 8) 8303 4881

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