

**TITLE PAGE**  
**PAEDIATRIC FEVER MANAGEMENT: CONTINUING EDUCATION FOR**  
**CLINICAL NURSES**

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# **PAEDIATRIC FEVER MANAGEMENT: CONTINUING EDUCATION FOR CLINICAL NURSES**

## **ABSTRACT**

**Purpose:** This study examined the influence of level of practice, additional paediatric education and length of paediatric and current experience on nurses' knowledge of and beliefs about fever and fever management.

**Method:** Fifty-one nurses from medical wards in an Australian metropolitan paediatric hospital completed a self-report descriptive survey.

**Results:** Knowledge of fever management was mediocre (Mean 12.4, SD 2.18 on 20 items). Nurses practicing at a higher level and those with between one and four years paediatric or current experience were more knowledgeable than novices or more experienced nurses. Negative beliefs that would impact nursing practice were identified. Interestingly beliefs about fever, antipyretic use in fever management and febrile seizures were similar; they were not influenced by nurses' knowledge, experience, education or level of practice.

**Conclusions:** Paediatric nurses are not expert fever managers. Knowledge deficits and negative attitudes influence their practice irrespective of additional paediatric education, paediatric or current experience or level of practice. Continuing education is therefore needed for all paediatric nurses to ensure the latest clear evidence available in the literature for best practice in fever management is applied.

**Key Words:** fever, paediatric nursing, education, continuing

## BACKGROUND

For more than two decades there has been strong evidence-based support for the beneficial effects of mild fever (eg., Kluger 1986, Kluger 1992, Lorin 1999, Sarrell et al. 2002). Despite this, reports of nurses' fever phobia, negative beliefs toward fever and fears of febrile seizures remain unchanged (May & Bauchner 1992, Poirier et al. 2000, Sarrell et al. 2002). Nurses continue to reduce low grade fever without other symptoms, wake sleeping febrile children for antipyretics and administer a different antipyretic to children still febrile one hour following initial treatment (Poirier et al. 2000, Sarrell et al. 2002). Inconsistent fever management practices, the impetus for this study, have been reported for nearly two decades and highlight the need for exploration of this integral aspect of paediatric nursing (eg., Younger & Brown 1985, Reeves-Swift, 1990, Harrison 1998). This paper examines whether paediatric experience and education influence nurses' knowledge of and beliefs about fever management.

Fever management literature is inconsistent and could influence nurses' practices. For example, advice on the temperature at which to treat fever varies from 38.3°C (Thomas 1995), 38.9°C (Cunha et al. 1984), 39.4°C (McCarthy 1999) to only treating fevers greater than 40°C when the physiological benefits of fever diminish (Connell 1997, Lorin 1994, Luria et al. 1996). Rationales for reducing temperatures, to prevent febrile seizures, are no longer applicable. Febrile seizures are benign, common events in young children (D'Auria 1997) associated with rectal temperatures above 38°C (Kudsen et al. 1996). They are precipitated by a number of factors including a lower seizure threshold of the developing

cortex (normal seizure threshold is higher than 41.5°C (Kudsen et al. 1996)), susceptibility to infections, tendency to have high fevers and a genetic component affecting the seizure threshold (Baumann 2001, Freeman 1992, Nelson & Ellenberg 1981). Nursing management of febrile children should be scientifically based focusing on energy conservation, promoting comfort and maximizing the immunological benefits of fever (Connell 1997).

Reports of nurses' management of fever remain static (eg., Poirier et al. 2000; Sarrell et al. 2002). Do these reports reflect experienced or novice nurses' management? Literature reflects negative beliefs about fever and febrile seizures (May & Bauchner 1992, Poirier et al. 2000; Sarrell et al. 2002) and the lack of nursing documentation of fever management (Edwards et al. 2003a, Grossman et al. 1995). However, there is a dearth of literature describing the influences of nursing experience, education and level of practice on nurses' knowledge of and beliefs about fever and fever management. This study attempted to address these deficits and to identify ongoing education needs for practicing paediatric nurses. This paper refers to the second phase of a three phased study. The first phase involved audits of 67 charts, of children admitted to hospital for a febrile illness, to explore nurses' fever management practices (Edwards et al. 2003b) the second phase was a survey for which a general description of nurses' knowledge, beliefs and the influences on their fever management practices can be found in Walsh et al. (2005) and the third phase involved focus group discussions to explore the contradictions found in the data (Edwards et al. 2001). This paper reports the influences of specific nurse characteristics on their knowledge of and beliefs about fever and fever management. In particular it explores the

influences of:

1. The level at which nurses are practicing. Level 1 registered nurses provide direct patient care. Level 2 nurses provide direct patient care and have additional responsibilities in the unit, such as the orientation and preceptorship of new staff, staff development, providing continuing education and research as part of their responsibilities (ANRAC, 1990).
2. Completion of a paediatric certificate from either a hospital based program or tertiary certificate. This was included to determine nurses' interest in and commitment to paediatric nursing.
3. Length of paediatric experience and
4. Length of time in current position (current experience)

on their knowledge of and beliefs about fever and fever management.

## METHOD

### Research design

A cross-sectional design utilising a self-report, self-administered survey was employed.

### Sample

All nurses (100%) in a targeted convenience sample of 51 Level 1 and Level 2 registered nurses (nurses) employed to work in the two medical wards of a metropolitan, paediatric hospital in Australia participated. As expected, the majority were female (84%), employed full time (73%) at Level 1 (84%). The highest academic qualification of more than half was

a diploma/degree (59%); one-quarter (28%) had postgraduate qualifications. Only 33% had undertaken specific paediatric education as a paediatric certificate. One quarter (25%) had less than 1 year paediatric experience, 24% between one and four years and 49% five or more years of paediatric experience. Thirty-two percent of nurses had been in their current position less than six months, 18% had between seven and eleven months current experience, 28% had between one and four years and 22% had five or more years experience in their current position. More than half were younger than 30 years (65%) and 14% were between 41 and 50 years. Four nurses omitted to identify their demographic variables.

### Instrument

An instrument was developed to target nurses' knowledge and beliefs; its development is described in detail in Walsh et al. (2005). Areas examined in this paper include knowledge about the physiology of fever (8 items), general fever management (7 items) antipyretics use in fever management (5 items) and beliefs about fever (10 items), febrile seizures (10 items) and antipyretic use in fever management (13 items).

### Procedure

Ethical approval was granted by the university and hospital ethics committees; issues of voluntary participation, anonymity and confidentiality were addressed. Potential participants were informed of the study during ward staff meetings by a nurse manager who later distributed the surveys to nurses working similar shifts. Completed surveys were placed in a sealed box in each ward and collected at the end of the two-week data collection

period.

### Data Entry and Analyses

Data were entered into SPSS (SPSS 2001, Version 11.5), searched for irregularities and a random 10% of cases checked for data entry reliability. Demographic data were examined for frequency of responses. Missing knowledge responses were recoded as incorrect on the premise that a known answer would have been recorded. Scores were calculated for total knowledge and each aspect of knowledge examined. Belief items were recoded to ensure a higher score indicated a more positive belief. The specific variables examined were: level of practice, completion of a paediatric certificate in nursing, length of paediatric nursing experience and current experience. Level 2 nurses and those who had undertaken additional paediatric experience were expected to be more knowledgeable; therefore, one tailed t-tests and ANOVAs were conducted. Beliefs were examined by two-tailed t-tests and ANOVAs. Where ANOVA findings were significant Tukey HSD post-hoc tests were performed.

## RESULTS

The two areas examined, knowledge and beliefs, will be discussed separately. Table 1 provides a detailed description of the nurses' knowledge by the independent variables.

### Knowledge

Overall knowledge on the 20 items was unsatisfactory for nurses who manage children's fever on a daily basis (Mean 12.4, SD 2.18, Range 7 to 17). Nurses were most

knowledgeable about general fever management principles; however, this knowledge was not as high as expected (7 items, Mean 4.51, SD 1.07, Range 3 to 6). Slightly less knowledge was reported about the physiology of fever (8 items, Mean 5.04, SD 1.39, Range 1 to 8) and nurses' knowledge of antipyretics and their use in fever management was even poorer (5 items, Mean 2.84, SD 0.97, Range 0 to 5). Nurses' knowledge is described in more detail in Walsh et al. (Walsh, 2005).

Level 2 nurses had more overall knowledge of fever and fever management than Level 1 nurses ( $t_{(49)}=-2.37$ ,  $p=.02$ ) (See Table 1). Specific areas of greater knowledge were the physiology of fever ( $t_{(49)}=-2.22$ ,  $p=.03$ ) and use of antipyretics in fever management ( $t_{(49)}=-1.31$ ,  $p=.02$ ). Nurses who had undertaken additional paediatric education were significantly more knowledgeable of the physiology of fever, only ( $t_{(48)}=1.67$ ,  $p=.05$ ), than those who had not undertaken further paediatric studies.

Insert Table 1 about here

Length of experience in current position influenced overall knowledge ( $F[3,46]=3.712$ ,  $p=.02$ ), again in relation to of the physiology of fever ( $F[3,46]=3.588$ ,  $p=.02$ ). Nurses with between one to six months and seven to twelve months current experience had significantly less overall knowledge ( $p=.05$  and  $p=.04$  respectively) and knowledge of the physiology of fever ( $p=.07$  and  $p=.04$  respectively) than those with one to four years current experience. Interestingly, those with one to four years current experience tended to have more overall knowledge, specifically about the physiology of fever and role of antipyretic medication in

fever management, than those with five or more years current experience (See Table 1).

Length of paediatric experience also positively influenced overall knowledge ( $F[2,47]=5.046$ ,  $p=.01$ ), particularly knowledge of the physiology of fever ( $F[2,47]=5.399$ ,  $p=.01$ ). Nurses with between one to four years paediatric experience were significantly more knowledgeable overall ( $p=.01$ ) and in relation to the physiology of fever ( $p=.01$ ) than those with less than one year experience. Again, nurses with five or more year's experience tended to be less knowledgeable in all areas of fever management than those with between one and four years experience (See Table 1).

### Beliefs

Existing reports about antipyretic use in fever management and febrile seizures tend to be restricted to fever phobia and fears of febrile seizures. This study examined a comprehensive range of beliefs toward fever, febrile seizures and antipyretic use in fever management. Both positive and negative beliefs were discovered.

Overall beliefs about fever and fever management were positive, for example, 60% believed that fever is not necessarily related to the severity of the illness and 75% reported believing children with cardiac and/or respiratory disorders were 'at risk' from fever. However, a number of negative beliefs that would significantly impact practice were identified. More than half the nurses (57%) believed their colleagues were fever phobic and that fevers below 41°C might be harmful to children (61%). Many (86%) believed doctors

recommended antipyretic use to reduce fever. Some determined the need for antipyretic administration on temperature alone (39%) and reduced all temperatures of 38.3°C and higher (39%), even when the child was asleep (37%). Although many were unsure about the need for aggressive antipyretic therapy to prevent febrile seizures in all children (73% unsure, 14% agreed), most believed it necessary to treat fever aggressively in children with a history of febrile seizures (85%). Inappropriate beliefs about antipyretics were confirmed by the 50% who disagreed that antipyretics have minimal effect in preventing recurrent febrile seizures. A more detailed account of nurses' beliefs is available in Walsh et al. (Walsh, 2005).

However, surprisingly few differences in beliefs were discovered. Level 2 nurses believed more strongly than Level 1 nurses that fever is the most common reason parents took a child to a doctor ( $t_{(48)}=2.27$ ,  $p=.03$ ). Years of paediatric experience significantly influenced beliefs ( $F[2,46]=5.49$ ,  $p=.01$ ). Nurses with more than five years experience were less likely to believe antipyretics had a minimal effect in the prevention of recurring febrile seizures than those with less than one year ( $p=.05$ ) and one to four years paediatric experience ( $p=.01$ ).

Length of current experience influenced beliefs about paracetamol requirements ( $F[3,46]=2.84$ ,  $p=.05$ ). Nurses with one to six months current experience believed more strongly that children younger than three years have similar paracetamol per kilogram requirements as those three years and older than nurses with seven to twelve months current

experience ( $p=.04$ ). Those with between one to four years current experience more strongly believed infection altered brain metabolism and lowered seizure thresholds than nurses with one to six months ( $p=.07$ ) and seven to twelve months current experience ( $p=.08$ ) ( $F[3,46]=3.69$ ,  $p=.02$ ). Having completed specific paediatric education made no difference to nurses' beliefs.

## DISCUSSION

Fever management is an integral aspect of paediatric nursing practice. Findings strongly suggest the paediatric nurses studied were not expert fever managers. Although those practicing at a higher level and with between one and four year's paediatric or current experience had more accurate knowledge than their co-workers, they were not experts, their knowledge was mediocre. Discovering that knowledge did not influence these nurses' beliefs is important for clinical practice as many educational interventions target knowledge. Nurses with negative beliefs about fever who support the use of antipyretics to reduce temperatures in the belief they are preventing febrile seizures might be responsible for the fever phobia they report in their peers. The nurses studied had not incorporated the latest clear evidence for 'best practice' in fever management, available in the literature, into their practice (eg., Connell 1997, McCarthy 1999, Robertson 2002).

### Implications for Practice

Limited knowledge and inappropriate beliefs about antipyretic effectiveness, for example, administering antipyretics to prevent febrile convulsions and reducing temperatures as low as  $38.3^{\circ}\text{C}$ , raises concerns about the quality of care children hospitalised for a febrile illness

receive. Nurses, in this study, with poor knowledge of and negative beliefs about fever and fever management might care for febrile children ritualistically, and/or inconsistently, rather than rationally, reinforcing fever phobias in themselves, their colleagues and the parents of children in their care (eg., Impicciatore et al. 1998, Weiss & Herskowitz 1983, May & Bauchner 1992, Thomas et al. 1994, Poirier et al. 2000). Current practices may be the interaction between nurses' indecisiveness about the effectiveness of aggressive antipyretic therapy in preventing febrile convulsions and a strong desire to prevent harm. The nurses studied were employed in a major metropolitan paediatric hospital, how do children in provincial and rural hospitals fare?

Fever management must be grounded in a thorough knowledge of fever and the febrile response, based on a thorough assessment of the individual child and their response to fever at each time point (Connell, 1997). Findings highlight the need to improve nurses' fever management practices, irrespective of recommendations from a recent systematic review that an endeavour to alter practice in the absence of obvious harm from antipyretics was unjustifiable (Meremikwu & Oyo-Ita 2002). Parent education in fever management by nurses has been recommended for the past 20 years (Casey et al. 1984, Purssell 2000), however, if the nurses studied do educate parents then poor knowledge and negative beliefs are being reinforced.

### Implications for Paediatric Nursing Education

Paediatrics is a relatively small speciality area so undergraduate nursing students usually have limited paediatric placements. As attainment of a paediatric certificate appears to have

made little difference to knowledge or beliefs it is possible that paediatric fever management is learnt 'on the job' through informal education. Informal education is a tool used by experts to guide workplace learning by addressing learning needs as they arise (Gillam 1997). Informal education has been successfully used by experienced paediatric nurses to educate novices about paediatric pain assessment (Fuller & Conner 1997). Although the informal educators in this study, Level 2 and experienced nurses, were more knowledgeable, they reported similar beliefs to novices. Findings suggest the informal educators might reinforce negative beliefs and practices through their teachings and behaviours, identifying a need to investigate how novice paediatric nurses learn to manage fever. It could, therefore, be argued that informal fever management education had been effective. Many of the informal educators, those with more paediatric and current experience, demonstrated levels of knowledge and negative beliefs similar to newer nurses.

Findings highlight the need for Level 2 and experienced nurses to continually upgrade their knowledge and attend available inservice and continuing education programs about fever management. Experienced nurses are perceived as experts by new and current nursing and medical staff; they have been there longer and are presumed to 'know it all'. This lack of knowledge by experienced paediatric nurses is of utmost importance and in particular for nurse educators responsible for planning and conducting postgraduate, continuing education and inservice programs. Additionally, focused investigations are necessary to determine causes for low knowledge levels and negative beliefs. Areas for investigation include: application of knowledge to practice; interest in continued education; opportunity for both novice and experienced nurses to attend inservice on fundamental nursing issues;

influence of reductions in permanent staffing and the associated increased workload of experienced staff to continually educate casual, pool and agency nurses and nursing students; and disinterest in continued learning due to 'burn-out'.

Traditional knowledge enhancing programs targeting nurses' pain management, a similarly interdependent nursing activity, have not always influenced either practice or beliefs in practice settings (Camp-Sorrell & O'Sullivan 1991, Francke et al. 1997) or been enduring (Howell et al. 2000). To promote consistent, rational fever management educational programs must target all nurses, both experienced and novice, and challenge nurses' negative beliefs, not simply give information. Fever management practices are influenced by normative beliefs that parents, peers and doctors expect nurses to administer antipyretics to febrile children (Walsh, 2005). Therefore, barriers to changing practice following fever management education will possibly be similar to those in pain management, that is, colleagues and the setting (Czurylo et al. 1999). This highlights the need to ensure all nurses attend continuing education programs to facilitate the removal of normative barriers to evidence-based fever management.

Why were expert nurses not knowledgeable about this common paediatric practice? As an everyday occurrence for paediatric nurses, fever management might not be included in further paediatric education, or could be considered unimportant thereby receiving minimal coverage. The scarcity of nursing documentation of fever management practices and rationales for antipyretic administration highlight this (Edwards et al. 2003a, Grossman et al. 1995). If so, then experienced paediatric nurses as well as nurse educators and managers

might consider fever management education relevant only for novices, limiting experienced nurses' interest in and attendance at inservice about basic paediatric nursing practices.

### Limitations

The findings of this study must be considered within the following limitations. The study was undertaken at one paediatric hospital and the sample was small thereby limiting the generalisability of findings to other settings. The recruitment method, by a nurse manager, might have influenced response rate (100%) and some responses could reflect social desirability.

### Conclusions

This study identified that Level 2 nurses and nurses with between one and four years paediatric or current experiences were most knowledgeable about fever and fever management. However, this knowledge did not positively influence their beliefs; their beliefs were similar to novice paediatric nurses. Of concern for practicing paediatric nurses is that nurses with the greatest length of paediatric and current experience were not the most knowledgeable. Additionally, neither greatest length of paediatric experience nor completion of additional paediatric education made minimal difference to level of knowledge or beliefs.

Implications for nursing education include determining how novice paediatric nurses learn to manage fever and educating the educators, Level 2 nurses and experienced nurses. It is essential that 'on the job' learning is evidence-based. Educational programs should be ward

based with all staff members encouraged to attend. Programs need to target beliefs as well as knowledge as higher knowledge levels in fever management did not positively influence nurses' beliefs.

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Table 1: Nurses' knowledge of fever and fever management examined by the study variables

	Total knowledge score 20 items				Physiology of fever 8 items			Fever management 7 items			Antipyretics 5 items		
	N	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
<b>Level of practice N=51</b>													
Level 1	43	12.09 <sup>a</sup>	2.19	7-17	4.86 <sup>a</sup>	1.39	1-8	4.47	1.10	3-6	2.77 <sup>a</sup>	1.02	0-5
Level 2	8	14.00 <sup>a</sup>	1.31	12-16	6.00 <sup>a</sup>	0.93	5-8	4.75	0.89	3-6	3.25 <sup>a</sup>	0.46	3-4
<b>Paediatric certificate N=50</b>													
Yes	17	12.65	2.03	7-16	5.47 <sup>a</sup>	1.18	3-8	4.24	0.90	3-6	2.94	1.09	0-5
No	33	12.18	2.26	8-17	4.79 <sup>a</sup>	1.45	1-8	4.61	1.12	3-6	2.79	0.93	1-4
<b>Length of paediatric experience N=50</b>													
Less than 1 year	13	11.08 <sup>b</sup>	2.29	7-14	4.15 <sup>b</sup>	1.14	3-6	4.46	1.27	3-6	2.46	1.13	0-4
1 to 4 years	12	13.67 <sup>b</sup>	2.15	10-17	5.83 <sup>b</sup>	1.11	4-8	4.58	1.08	3-6	3.25	1.06	1-5
5 years and more	25	12.44	1.85	8-16	5.12	1.43	1-8	4.48	1.00	3-6	2.84	0.80	1-4
<b>Length of time in current position N=50</b>													
1 to 6 months	16	12.06 <sup>b</sup>	1.91	8-15	4.81 <sup>b</sup>	1.17	3-6	4.44	1.09	3-6	2.81	0.98	1-4
7 to 11 months	9	11.67 <sup>b</sup>	1.73	9-14	4.44 <sup>b</sup>	1.13	3-6	4.33	1.12	3-6	2.89	0.33	2-3
1 to 4 years	14	13.93 <sup>b</sup>	1.90	10-17	6.00 <sup>b</sup>	1.04	4-8	4.57	1.09	3-6	3.36 <sup>b</sup>	0.93	1-5
5 years and more	11	12.00	2.05	8-16	4.73	1.79	1-8	4.82	0.98	3-6	2.45 <sup>b</sup>	0.82	1-4

<sup>a</sup> Significant difference for a one-tailed independent t-test between the identified variables at .05 level

<sup>b</sup> Significant difference for two-tailed independent t-tests between the identified variables at the .05 level

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