

PAEDIATRIC NURSES' KNOWLEDGE, ATTITUDES AND FACTORS INFLUENCING FEVER MANAGEMENT

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Paediatric nurses' knowledge, attitudes and factors influencing fever management.
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ABSTRACT

Background

Despite evidence-based support for the beneficial effects of fever over the past three decades health professionals' negative attitudes toward fever and reliance on antipyretics to reduce fever have persisted and continue to be reported in the literature.

Aims

This paper describes Australian paediatric nurses' knowledge of and attitudes toward fever and fever management and the predictors of their intentions to administer paracetamol to a febrile child.

Methods

A self-report questionnaire identified knowledge, attitudes and factors influencing nurses' intention to administer paracetamol to febrile children. Fifty-one paediatric nurses working in medical wards of a metropolitan paediatric hospital in Australia participated. An instrument was developed, piloted by test re-test and revised prior to data collection.

Results

Nurses' mean knowledge about the physiology of fever, general fever management and antipyretics was 62%, not as high as expected. Participants reported positive attitudes toward the benefits of fever, the necessity for fever reduction in children with pre-existing cardiac or respiratory conditions and regular antipyretic administration masking the infective process. Negative attitudes included disbelief that temperature is often unrelated to illness severity. Conflicting attitudes toward febrile convulsions were highlighted by beliefs that antipyretic therapy prevents febrile convulsions and that antipyretics do not prevent initial febrile convulsions. Predictors of intentions to administer paracetamol were beliefs about the effectiveness of paracetamol and normative beliefs. Nurses reported strong intentions to administer paracetamol to the next febrile child they cared for. However, the use of a nurse manager for recruitment might have influenced socially desirable responses and undertaking the study at one site limits the generalisability of findings.

Conclusions

Fever management is an integral aspect of paediatric nursing. For consistent rational fever management nurses' knowledge must improve, their positive attitudes enhanced and negative attitudes challenged. This highlights the need for continuing education in fever management.

Key Words: Acute Care Nursing Practice, Paediatrics, Medication, Theory of Planned Behavior, Fever Management

SUMMARY STATEMENT

What is already known about nurses' fever management?

- Fever management is an integral aspect of paediatric nurses' practice. The literature continues to report ritualistically based inconsistent practices influenced by fear of fever and febrile convulsions.
- Although antipyretics have not been found to prevent febrile convulsions, health professionals continue to administer antipyretics to febrile children to prevent febrile convulsions and harm from fever.

What this study adds.

- A comprehensive tool has been developed and tested to identify nurse' knowledge of, attitudes towards and factors influencing their management of fever in children hospitalised for a febrile illness.
- Nurses had limited knowledge about the physiology of fever, general fever management and antipyretic use in fever management and negative attitudes toward fever continue.
- Nurses' intentions to administer paracetamol to febrile children can be predicted from their beliefs about the effectiveness of paracetamol and normative influences from parents, peers and medical officers.

PAEDIATRIC NURSES' KNOWLEDGE, ATTITUDES AND FACTORS INFLUENCING FEVER MANAGEMENT

INTRODUCTION

Fever, a common event in childhood, is generally an indication of a self-limiting viral infection rather than a bacterial infection or serious illness (McCarthy 1999, Knobel *et al.* 2002). In children, temperatures of 40°C or less are more likely to indicate the body's adaptive response to the infective process rather than the severity of illness (VandenBosch *et al.* 1993). Many health professionals perceive fever to be harmful (Knobel *et al.* 2002) and determine illness severity by the height of the fever (Sarrell *et al.* 2002). Nurses' fever phobia continues to be reported in the literature and negative attitudes toward fever remain unchanged (May & Bauchner 1992, Poirier *et al.* 2000, Sarrell *et al.* 2002). Strong evidence-based support for the beneficial effects of mild fever has been available for 30 years (eg., Lorin 1999, Knobel *et al.* 2002, 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 by others and highlight the need for exploration of this integral aspect of paediatric nursing (eg., Younger & Brown 1985, Reeves-Swift 1990, Harrison 1998).

BACKGROUND

Fever

Fever is a primitive host survival mechanism. It intentionally and purposefully increases body temperature to within a predetermined limit, occasionally beyond 40°C, rarely beyond 41.1°C and never beyond 42.2°C (Lorin 1986, Bruce & Grove 1992). When associated with infection fever seldom exceeds 40°C and poses negligible risk of brain injury (Scheifele 1994, Casey 2000). Many children tolerate temperatures of 39.0°C with remarkable ease. Immunological functions present in low and moderate fevers reduce to below baseline levels as temperatures approach 40°C (Lorin 1990), therefore, temperatures of 40°C and higher should be avoided (Holtzclaw 1992, Connell 1997, Lorin 1999). Critically ill children and those with pre-existing respiratory, cardiac and neurological disorders can become severely compromised by the additional physiological strain of fever (Holtzclaw 1992, Lorin 1999). Fever in these children should be treated.

Fever management is an everyday occurrence for paediatric nurses (nurses). However, inconsistent nursing practices are understandable when the literature is examined. The risks and benefits of fever have been debated for more than two decades along with the efficacy and necessity of reducing fevers with antipyretics. Not all studies reach the same conclusion, advice on the temperature considered febrile and appropriate fever management varies. Nurses continue to reduce fever to prevent febrile convulsions and brain damage (Poirier *et al.* 2000, Sarrell *et al.* 2002).

Febrile convulsions

Large epidemiological studies, in children with no history of afebrile convulsions or intracranial involvement, demonstrate simple febrile convulsions to be benign, common events (D'Auria 1997). 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 (Freeman 1992, Baumann 2001). The incidence rate of febrile convulsions in western countries, for example the United Kingdom and United States of America, is 2-5% in children aged three months to five years (D'Auria 1997, Baumann 2001). No long-term effects have been found in the health or intellect of children aged 6-12 years post-febrile convulsion (Kolfen *et al.* 1998, Hutt *et al.* 1999, Chang *et al.* 2001).

Antipyretic therapy

Traditionally antipyretics have been used to prevent rises in temperature and, by association, febrile convulsions (Abdullah *et al.* 1987, Thomas *et al.* 1994, Poirier *et al.* 2000). Available evidence suggests that controlling fever rarely, if ever, prevents either an initial or recurrent febrile convulsion (eg., Uhari *et al.* 1995, Baumann 1999, Rantala *et al.* 2000, van Esch *et al.* 2000, Baumann 2001). Although paracetamol, the most common antipyretic, is considered a safe medication there are genuine concerns about hepatotoxicity in children 5 weeks to 10 years of age (eg., Kearns *et al.* 1998, Miles *et al.* 1999, Knobel *et al.* 2002). Serious toxicity, from paracetamol and ibuprofen, has been reported in children with a febrile illness who are unwell, anorexic, vomiting and/or dehydrated (Robertson 2002). Stegelman (1999) recommends avoiding ibuprofen in children who are dehydrated as a result of diarrhoea, fever or vomiting. The efficacy of the latest practice in fever management, alternating paracetamol and ibuprofen, has not been studied and is open to overdosing errors (Mayoral *et al.* 2000, Knobel *et al.* 2002).

Fever management

Evidence-based information available in the literature recommends management of the febrile child is based on the child's response to the febrile illness, not temperature. This includes maximising the immunological benefits of fever, promoting comfort, preventing dehydration, conserving energy, aiding recovery, safely caring for children during a febrile convulsion and educating parents in evidence-based fever management (Connell 1997, Purssell 2000, Robertson 2002). Antipyretic administration should be individualised and based on vital signs as well as temperature (Connell 1997) with analgesic administration to manage pain.

Inconsistent nursing practices have been noted (Younger & Brown, 1985; Reeves-Swift, 1990; Harrison, 1998) and require explanation. It is not clear if these practices are based on evidence or influenced by negative attitudes similar to those reported in the literature (eg., Abdullah *et al.* 1987, May & Bauchner 1992, Poirier *et al.* 2000, Sarrell *et al.* 2002). To determine the basis of practice differences it is necessary to identify not only nurses' knowledge of and attitudes toward fever and fever management but also the factors influencing their decision-making regarding antipyretic administration.

Theory of Planned Behavior

Nurses' decision making processes and intentions in antipyretic administration to febrile children could be determined by a number of factors. Such factors would include beliefs about the qualities of antipyretics, evaluation of those beliefs (attitudinal factor), perception of others (eg., parents and doctors) expectations of antipyretic administration (social factor) and beliefs of personal control over antipyretic administration (control factor).

The social cognition model of the Theory of Planned Behavior (TPB) (Ajzen 1985) was selected for this study. This theory predicts behaviours not under volitional control (behaviours influenced by others) from the person's intention to perform the behaviour. The TPB is based on the assumption that people rationally consider all the information available

to them when making behavioural decisions. The probability of performing a particular behaviour, 'behavioural intention', has three conceptually distinct elements. These include:

- ◆ a personal or attitudinal factor that reflects beliefs and the evaluation of the influence of these beliefs,
- ◆ a social factor or subjective norm reflecting beliefs about the expectations of others in relation to their performance of a particular behaviour and the person's motivation to comply with these beliefs and
- ◆ a control factor that reflects perceived personal control over the behaviour in question (direct control) (Ajzen 1985, Madden *et al.* 1992).

Researchers have used the TPB as a framework to predict nurses' behaviours. These include intentions to conduct pain assessments (Nash *et al.* 1993), administer as required pain therapy (Edwards *et al.* 2001a, Edwards *et al.* 2001b) and care for HIV/AIDS patients (eg., Dilorio 1997, Vermette & Godin, 1996). This theory is therefore suitable to examine factors influencing nurses' intentions and decision making regarding the administration of antipyretics to children hospitalised for a febrile illness. With conflicting information available to nurses in the literature and inconsistent nursing fever management practices reported it is timely that a study be undertaken to examine nurses' knowledge of and attitudes toward fever and fever management and to identify the factors influencing decisions to administer antipyretics to febrile children.

THE STUDY

This paper refers to the second phase of a three phased study. Details of the other phases have been published elsewhere (Edwards *et al.* 2001, Edwards *et al.* 2003).

Aims

Aims of this phase of the study were to identify factors influencing paediatric nurses' management of fever in children hospitalised for a febrile illness. The specific aims were to identify:

- ◆ nurses' knowledge about the physiology of fever, fever management and antipyretic use in fever management,
- ◆ nurses' beliefs about and attitudes toward fever, febrile convulsions and antipyretic use in fever management and the
- ◆ factors influencing nurses' decisions to administer paracetamol to febrile children.

Design

This descriptive cross-sectional study utilised a self-report, self-administered survey.

Sample

To target nurses caring for febrile children a purposeful sample of Level 1 and Level 2 nurses in the medical wards of a metropolitan, paediatric hospital was selected. No power calculation was performed. Level 1 nurses provide direct care for a specific patient population. Level 2 nurses have additional clinical responsibilities, for example, orientation and preceptorship of new staff, staff development and research (A.N.R.A.C. 1990).

Data collection

A nurse manager informed potential participants of the study and their anticipated involvement during ward staff meetings. This nurse manager worked various shifts (morning, evening and night) during the two-week data collection period and distributed surveys to

nurses working similar shifts, using a prepared script, in an attempt to maximise participation. Time was allocated for survey completion during the shift nurses received the survey. Completed surveys were returned the following shift to a sealed box in each ward. Fifty-one nurses were approached to participate, all completed and returned the questionnaire.

Instrument

An extensive search of CINAHL and Medline revealed two instruments, a continuing education test in fever management (Murtha & Waldman 1995) and an instrument identifying intentions to practice (Nash *et al.* 1996). Permission to use them was obtained and they were adapted to the study. Additional items were developed from the literature to target the study aims.

Pilot study

A pilot study, test-re-test, was undertaken with 11 nurses from a paediatric surgical ward to determine item reliability and instrument clarity. Instructions preceding each section were clear, most items were easily understood and some items were removed or revised. A Kappa (0.644) of the remaining items determined item reliability.

Final instrument

The final instrument targeted knowledge and attitudes toward fever and fever management and factors influencing decision-making in paracetamol administration. Paracetamol was the most frequently used antipyretic at the time of the study. The 20 multiple choice knowledge items had an unsure response to prevent bias from guessing a correct answer (Palmore 1988) and are displayed in Table 4.

In accordance with the TPB a person's attitude towards an object is a function of their beliefs about the object and the evaluative aspects of those beliefs. The more a person believes an object has "good" characteristics, qualities, and attributes, then the more that person will "like" (or have a positive attitude towards) the object (Fishbein & Ajzen 1975, Ajzen & Fishbein 1980). Therefore, some items in the section examining nurses' attitudes toward fever and fever management ascertain nurses' beliefs about certain aspects of fever and fever management. Thirty-three items were included to target beliefs and attitudes. Of these, 10 targeted fever, 13 antipyretics and another 10 febrile convulsions. These items were scored on a 5-point Likert scale.

Paracetamol administration was targeted in the section identifying factors influencing nurses' antipyretic administration. Thirty-seven items addressed the predictive elements of intention according to the TPB (Ajzen 1985), belief-based attitudes about the benefits (of paracetamol), subjective norms, indirect control and direct control. Examples of these are presented in

Table 1.

Insert Table 1 about here

Validity and reliability

Surveys were used as they are an economical data collection method and enable an in-depth exploration of areas either previously unexplored or unexplored in depth (Polit & Hungler 1999 p. 200-201). The pilot and final instrument were examined by an expert paediatric team consisting of academic and clinical nurses, a pharmacist and a medical officer to determine item accuracy, face validity and response bias (Polit & Hungler 1999 p. 350-351). The items

were judged accurate, the instrument measured what it was meant to and response bias was limited through careful placing of specific items.

Ethical considerations

Ethical approval was obtained from the university and participating hospital to conduct the research. Issues of voluntary participation, confidentiality, anonymity and consent and data security were considered and addressed with potential participants during informed consent.

Data analysis

Data were entered into SPSS, searched for outliers and irregularities and 10% of cases randomly checked for data entry reliability. Demographic data were examined for frequency of responses. In the knowledge section missing responses were recoded as incorrect on the premise that if an answer was known it would have been recorded. Scores were calculated for total knowledge and each aspect of knowledge examined. The sample size was not large enough to examine subsections for internal consistency. Descriptive analyses were undertaken.

Attitude items were recoded to ensure a higher score indicated a positive attitude and Cronbach's alphas performed to determine scale internal consistency and homogeneity (Polit & Hungler 1999). Alpha coefficients were moderate; attitudes toward fever were 0.53, fever management with antipyretics 0.45 and febrile convulsions 0.47. This was not unexpected as attitudes toward different aspects of fever management differed. Frequencies of responses were examined. Attitudes were determined positive when 50% or more responses were positive.

Data examining influences on paracetamol administration were prepared for analysis in accordance with the theoretical model developed by Ajzen and Fishbein (1980) described in detail in Edwards et al. (2001a) and a simultaneous regression conducted to identify the predictors of intention. To examine the individual tenets descriptive data were recoded so that a higher score indicated a strong belief in or agreement with each item.

RESULTS

Sample

Fifty-one nurses, all those approached by the nurse manager, participated and their demographics are presented in Table 2. The variability in gender and educational background were as expected. Nursing in Australia remains a predominantly female profession. Tertiary nursing education has been available in Queensland since 1982 and hospital-based nursing education ceased in 1993.

Insert Table 2 about here

Knowledge

Sixty-two percent (61.6%) of the knowledge items were correctly answered. General fever management and physiological knowledge were similar, 64.4% and 63.5% respectively. Knowledge of antipyretics was poorer, 56.9% correct. Most nurses (80.4%) correctly answered more than half the items. However, only a few (13.8%) correctly answered 75% of the questions. See Table 3 for the distribution of the knowledge scores and Table 4 for the frequency of correct knowledge responses for individual items.

Insert Tables 3 and 4 about here

Attitudes

Attitudes toward fever

Positive attitudes were found toward the benefits of fever (68%); external cooling methods causing shivering (88%) and reduced tolerance to fever in children with cardiac and respiratory disorders (74%) were reported. Most nurses' believed fever the commonest reason for parents taking a child to the doctor (90%) and that parents were phobic about fever (90.2%). Inappropriate attitudes were reflected in disbelief that childhood temperatures are often unrelated to illness severity (52%), fevers below 41°C might be harmful (60.7%) and immune responses were maintained in fevers greater than 41°C (59.6%). More than half (56.8%) reported nurses to be fever phobic.

Attitudes toward antipyretics and their use in fever management

Most nurses agreed regular antipyretic administration could mask fever indicative of an infective process (94.0%), believed they determined antipyretic administration (82.3%) and that paracetamol reduced fever for 3 to 4 hours (88.3%). Some nurses believed paracetamol necessary for all children with temperatures of 38.3°C and higher (31.4%), that it was necessary to wake sleeping children with a temperatures of 38.3°C or higher for an antipyretic (37.3%) and that temperature alone formed the basis for antipyretic administration (39.2%).

Some believed, or were unsure whether, children younger than 3 years required a lower paracetamol dosage (mg/kg) (37.2%) and disbelieved the maximum daily dose of paracetamol to be 90mg/kg/day to a maximum of 4g/24hours (56.0%), the recommended daily dose at the time of the study (MIMS Australia Pty. Ltd. 1996-1999). Most believed doctors recommend antipyretics to reduce temperature (92.2%), did not believe or were unsure whether antipyretics caused temperatures to 'overshoot' into a subnormal range (80.4%) and/or reduced temperature by approximately 2°C (66.0%). Only 40% believed it better to reduce temperatures non-pharmacologically.

Attitudes toward febrile convulsions

Nurses correctly believed initial febrile convulsions are not preventable (90.2%) that they do not cause neurological damage (92.1%) and generally occur within the first 24 hours of a febrile illness (58%). Most believed a history of febrile convulsion a risk factor for a recurrence (86.2%). Conversely, many believed it necessary to prevent febrile convulsions in all children by treating fever aggressively with antipyretics (86.2%). More than half disbelieved a recurrent febrile convulsion could occur 6 to 12 months following an initial febrile convulsion (53.0%), that a family history of febrile convulsions was a risk factor for a febrile convulsion (53%) or that antipyretics were minimally effective in preventing recurrences (72%).

Influences on nurses' paracetamol administration

Predictors of intention to administer paracetamol to febrile children

A simultaneous regression was conducted on the tenets (scales) of the TPB, belief-based attitudes about the benefits of paracetamol, subjective norms, indirect control and direct control, to identify the predictors of nurses' intentions ($R^2 .25$, $\beta .05$). Internal tenet reliabilities were high excepting for direct control (see Table 5), its trustworthiness was

questioned and it was removed from the regression. Belief-based attitudes, subjective norms and indirect control significantly predicted 25% of the variability in intention ($F[3,47] = 5.22$, $p = .003$) although the unique contribution of each predictor was small. See Table 6 for regression findings.

Insert Tables 5 and 6 about here

Belief-based attitudes

Nurses strongly *believed* (correctly) and *desired* paracetamol to increase a child's comfort, reduce irritability and temperature and, in turn, reduce parental anxiety. They had moderate, incorrect *beliefs* that paracetamol would reduce the probability of a febrile convulsion and strongly *desired* this. Table 7 displays these findings.

Insert Table 7 about here

Subjective norms

Nurses' *believed* the strongest normative pressure to administer paracetamol came from parents (Mean 6.65, SD 0.69, Range 4-7) and peers (Mean 6.14, SD 0.98 and Range 3-7). However, they were more likely to *adhere to* the wishes of medical staff (Mean 5.82, SD 0.95, Range 3-7) than parents (Mean 5.53, SD 1.21, Range 1-7) or peers (Mean 5.45, SD 1.12, Range 1-7).

Indirect control

Consideration of illness factors related to the child's temperature (Mean 6.45, SD 0.78, Range 4-7), admission diagnosis and history of febrile convulsions (Mean 6.27, SD 0.98, Range 3-7; and Mean 6.10, SD 0.98, Range 4-7) were the strongest indirectly controlling factors. Unexpectedly, illness related factors were more influential in paracetamol administration than ward expectations (Mean 4.31, SD 1.76, Range 1-7).

Direct Control

Participants reported it moderately *within their control* to administer paracetamol to febrile children (Mean 5.94, SD 1.09, Range 3-7). Interestingly, although this was within their control, it was not always *easy* (Mean 5.46, SD 1.22, Range 2-7). Comments on the surveys suggesting nurses' *control over* paracetamol administration (Mean 2.88, SD 1.09, Range 2-7) was influenced by the child's demeanour and presence of a helpful, capable parent confirmed the decision to remove direct control from the regression.

Intention

A strong *likelihood* of administering paracetamol when next caring for a febrile child was identified (Mean 6.08, SD .093, Range 3-7). However, nurses reported moderate *intentions* to administer paracetamol (Mean 5.27, SD 1.46, Range 1-7). Reports of intention were more variable than reports of likelihood

DISCUSSION

Findings strongly suggest evidence available in the literature over the past two decades to provide 'best practice' in fever management have not been incorporated into practice. This is particularly evident in beliefs of the necessity of reducing temperatures with antipyretics to prevent febrile convulsions. Knowledge levels (62% correct) compound negative attitudes and reinforce nurses' fever phobias. Key predictors of intentions to administer paracetamol to

febrile children were belief-based attitudes towards paracetamol and normative influences from phobic referents.

Limitations

Findings 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. Items targeting direct control were ambiguous; items that are more precise need to be developed.

Knowledge

Literature identifying nurses' knowledge of fever management is scarce. Mediocre knowledge was consistent across all areas examined highlighting this as an area requiring attention and further investigation. Most had basic knowledge of the physiology of fever and its associated immunological benefits implying knowledge of the benefits of fever; knowledge that Abdullah *et al.* (1987) had found lacking. This appears to have improved over the past decade.

From a practice perspective, identified knowledge deficits are of concern. They include not only vital sign changes associated with fever but also the principal danger of fever, dehydration, previously identified by Poirier *et al.* (2000). Significant concern about the quality of care is associated with knowledge deficits relating to the peak absorption time and side effects of paracetamol. Identified deficits indicate lack of knowledge as a probable cause for inconsistent fever management practices.

Beliefs and Attitudes

Previously identified negative beliefs and attitudes toward fever and febrile convulsions were confirmed. These included beliefs that fevers below 41°C might be harmful and that temperature is related to illness severity. Nurses continue to make treatment decisions based on temperature, substantiating other findings (Abdullah *et al.* 1987, Grossman *et al.* 1995, Poirier *et al.* 2000, Sarrell *et al.* 2002). Nurses continue to rely on antipyretics (Poirier *et al.* 2000, Sarrell *et al.* 2002). Nurses' unwarranted concerns about fever (fever phobia) have continued during the past two decades (eg., Schmitt 1980, Abdullah *et al.* 1987, May & Bauchner 1992, Thomas *et al.* 1994, Poirier *et al.* 2000, Crocetti *et al.* 2001, Sarrell *et al.* 2002) evidenced by beliefs of the necessity to wake sleeping febrile children for an antipyretic (37%). Others report 27% to 73% of nurses would wake a sleeping febrile child for an antipyretic (Blumenthal 2000, Sarrell *et al.* 2002).

Attitudes toward febrile convulsions were contradictory; possibly highlighting the emotive effect witnessing a febrile convulsion has and a desire to prevent harm to children in their care. Although most believed initial febrile convulsions were not preventable and half disbelieved antipyretics prevent recurrences, many believed it necessary to treat fever aggressively to prevent both initial and recurrent febrile convulsions. Other studies report nurses' negative attitudes toward febrile convulsions ranging from 57% to 72% (Abdullah *et al.* 1987, Thomas *et al.* 1994, Poirier *et al.* 2000).

Additional negative beliefs and attitudes were identified. These include disbelief that risk factors for febrile convulsions include a family history of febrile convulsion and the lowered convulsion threshold from altered brain metabolism associated with fever. Disbeliefs about the antipyretic effectiveness of different antipyretics (paracetamol and ibuprofen), the

recommended daily dose of paracetamol and the ability of antipyretics to cause temperature to overshoot the normal range or reduce temperature by up to 2°C were discovered. These disbeliefs could place the children in their care at risk and contribute to inconsistent fever management practices.

Factors Influencing Practice

The TPB established that 25% of the variability in nurses' intention to administer paracetamol to febrile children was predicted by belief-based attitudes about paracetamol, subjective norms and indirect controlling factors. These findings support previous research that belief-based attitudes and subjective norms strongly influence nurses' intentions to practice (Spence Laschinger & Goldenberg 1993, Vermette & Godin 1996, Meyer 2002, Edwards *et al.* 2001a).

Belief-Based Attitudes

Some evidence-based belief-based attitudes toward paracetamol's ability to reduce temperature, irritability and parental anxiety were strong (eg., Bruce & Grove, 1992, MIMS Australia Pty. Ltd., 1996-1999, McCarthy 1999). Others, not evidence-based, reflected a desire to prevent febrile convulsions, corroborating negative attitudes toward febrile convulsions in this and other studies (Schneiderman *et al.* 1993, van Stuijvenberg *et al.* 1998). Further disbeliefs include fever reduction increases appetite and activity. Reducing fever slightly increases activity but not appetite (Kramer *et al.* 1991, Bruce & Grove 1992). The strength and variability of belief-based attitudes highlight their influence on intentions.

Subjective Norms

Nurses strongly believed referents expected them to administer antipyretics and moderately intended to comply with these wishes, even though they had earlier identified their referents as fever phobic. Referring to peers may stem from personal fever phobias based on limited knowledge and negative attitudes, referring to doctors, from a professional need. This reliance on normative expectations, although questionable, might explain observed inconsistent practices.

Indirect Control

A strong reliance on temperature, diagnosis and history of febrile convulsions is not surprising in light of negative attitudes identified in this and other studies (eg., Abdullah *et al.* 1987, May & Bauchner 1992, Poirier *et al.* 2000, Sarrell *et al.* 2002). The neutral influence from ward expectations seems contradictory. Experience and anecdotal evidence suggest nurses generally adhere to ward expectations. Perhaps there are no ward expectations; no ward protocols, policies or guidelines for fever management. Alternatively, nurses might base care on individualised assessments, if so, then non-adherence to ward expectations, although dependent on individual knowledge and attitudes, might be positive.

Intentions

Although nurses were highly likely to administer paracetamol to the next febrile child they cared for their intentions to do this were moderate and could reflect a duty of care or social desirability. The variability in intention reflects the specific attitudes, normative pressures and indirect controlling factors influencing individual nurses' intentions. Nurses with negative attitudes toward fever and positive attitudes toward paracetamol are likely to administer Paracetamol. Those with more positive attitudes towards fever and its benefits may be less likely.

Implications for practice

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). Current practices of phobic nurses are inappropriate, advocating antipyretic use to prevent febrile convulsions and reduction of temperatures as low as 38.3°C. Fever generation is protective; pharmacological efforts to reduce it may be harmful.

Fever management must be grounded in a thorough knowledge of the febrile response, based on thorough individual assessment and response to fever, at each time point. Nurses must carefully consider of immunological benefits, the child's febrile response and potential for dehydration, side effects, unintentional overdosing and parental fever phobia. Fever reduction is not always necessary excepting when temperatures reach 40°C or in children with neurological or cardiopulmonary diseases or septic shock (D'Auria 1997).

CONCLUSIONS

Lower than expected knowledge levels about fever and fever management and negative beliefs about and attitudes toward fever, febrile convulsions and antipyretics were discovered. These findings provide further insight into nurses' fever phobia, identified in this and previous studies, and inconsistent fever management practices, the impetus for the study (eg., Abdullah *et al.* 1987, Thomas *et al.* 1994, Poirier *et al.* 2000, Sarrell *et al.* 2002). Nurses were concerned about febrile convulsions and reduced fever, with antipyretics, to prevent them.

Belief-based attitudes, including disbelief about the effectiveness of paracetamol in fever management, and normative influences, from phobic referents, strongly influenced intentions to reduce fever. Nurses' intentions reflect individual nurses' knowledge and attitudes, increasing the probability of inconsistent practice of this everyday paediatric nursing care. The interrelatedness between knowledge of and attitudes toward fever, fever management, febrile convulsions and antipyretics in nursing practice are highlighted.

RECOMMENDATIONS

Educational interventions to improve paediatric nurses' knowledge, to strengthen positive attitudes and challenge negative attitudes are recommended. With accurate knowledge, positive attitudes and evidence-based intentions nurses will be better equipped to educate their peers, diminish fever phobia and reduce unnecessary antipyretic administration to febrile children.

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Table 1: Number and examples of the items targeting the Theory of Planned Behavior

<i>Tenet</i>	<i>Targeting</i>	<i>Example</i>
<i>Belief-based attitudes</i>	Paracetamol administration: benefits of (N=8) and desirability of benefits (N=8)	When you administer paracetamol to a febrile child, how likely and desirable are the following consequences: increased comfort, increased activity
<i>Subjective norms</i>	Paracetamol administration: others expectations (N=3) and likelihood of complying (N=3)	How likely are parents, peers and doctors expectations the nurse will administer Paracetamol and how likely are you to comply
<i>Indirect control</i>	Paracetamol administration: Indirect influences on (N=5) and consideration of these influences (N=5)	How much effect does and how often do you consider the height the child's fever, history of febrile convulsion, prior to paracetamol administration
<i>Direct control</i>	Amount of person control over paracetamol administration (N=3)	When paracetamol is ordered, how much control do you have in administering it to a febrile child
<i>Intention</i>	Intentions to administer paracetamol to next febrile child cared for (N=2)	How likely are you to administer paracetamol when next caring for a febrile child

Table 2: Demographics of participants (N=51)

	<i>N</i>	<i>%</i>
<i>Gender</i>		
Male	7	13.7
Female	43	84.3
Unknown	1	2.0
<i>Age</i>		
20 – 24 years	11	21.6
25 – 30 years	22	43.1
31 – 40 years	10	19.6
41 – 50 years	7	13.7
Unknown	1	2.0
<i>Highest academic qualification</i>		
General hospital certificate	5	9.8
Post-registration certificate	2	3.9
Diploma/degree	30	58.8
Postgraduate certificate	9	17.6
Postgraduate diploma	3	5.9
Masters	2	4.0
<i>Paediatric certificate</i>		
Yes	17	33.3
No	33	64.7
Unknown	1	2.0
<i>Level of employment</i>		
Level 1	43	84.3
Level 2	8	15.7
<i>Length of paediatric experience</i>		
< 1 year	13	25.5
1 to 4 years	12	23.5
5 and more	25	49.0
Unknown	1	2.0
<i>Length of time in current position</i>		
1 to 6 months	16	31.3
7 to 11 months	9	17.6
1 to 4 years	14	27.5
5 or more	11	21.6
Unknown	1	2.0

Table 3: Mean and Standard Deviations of nurses' knowledge scores (N=51)

	<i>Items</i>	<i>Mean</i>	<i>SD</i>	<i>Range</i>
Total knowledge score	20	12.39	2.18	7 – 17
Knowledge of the physiology of fever	8	5.04	1.39	1 – 8
Knowledge of fever management	7	4.51	1.07	3 – 6
Knowledge of antipyretics	5	2.84	0.97	0 – 5

Table 4: Percentage of correct responses for knowledge items

<i>Item</i>	<i>Correct n</i>	<i>%</i>
<i>Knowledge of the physiology of fever</i>		
The body's thermoregulatory centre is located in the <i>hypothalamus</i>	48	94.1
Most elevated temperatures in young children are the result of <i>viral infections</i>	45	88.2
Beneficial consequences of fever include <i>increased antibody production</i>	41	80.4
For every 1° C rise in temperature there is an associated increase in respiratory rate of <i>1 – 4 breaths per minute</i>	30	58.8
Which is NOT a beneficial effect of fever <i>an increase in serum iron production</i>	17	33.3
Which is NOT a result of fever in infants and children <i>increased appetite</i>	47	92.2
Which of the following is TRUE regarding convulsion/seizure activity associated with fever <i>convulsions commonly occur in children with a low grade fever</i>	3	5.9
Febrile children have increased <i>oxygen consumption, cardiac output and caloric requirements</i>	26	51.0
<i>General knowledge of fever management</i>		
The most common side effects of fever are <i>mild dehydration</i>	45	88.2
The principal danger of fever (excluding the underlying cause) is <i>dehydration</i>	13	25.5
Sponging febrile children with tepid water may be implemented <i>30 minutes after the administration of an antipyretic</i>	15	29.4
Which is NOT a sign of dehydration in infants <i>tearful crying</i>	47	92.2
All children with high fever require <i>thorough physical assessment</i>	34	66.7
Decisions on how to treat a child with a febrile illness should be made on the basis of <i>temperature readings, physical examinations and the child's health history</i>	42	82.4
An increased temperature in children can also be the result of <i>overdressing, a warm bath and exercise</i>	34	66.7
<i>Knowledge of antipyretics and their use in fever management</i>		
Antipyretics reduce fever by <i>inhibiting prostaglandin activity</i>	35	68.6
The usual dose of paracetamol ordered for children 4 th hourly at the (participating hospital) is <i>15 mg/kg/dose</i>	42	82.4
The peak absorption time for paracetamol is <i>10 – 60 minutes</i>	9	17.6
Which of the following is TRUE regarding fever management in children over 3 months of age paracetamol is <i>the most commonly used antipyretic</i>	45	88.2
Side effects of paracetamol are <i>liver and renal toxicity</i>	14	27.5

Table 5: Distribution of the tenets of the Theory of Planned Behavior

	<i>Mean</i>	<i>SD</i>	<i>Range</i>	<i>Possible range</i>	<i>α</i>
Belief-based attitudes	30.57	16.41	0 – 72	-72 to + 72	.85
Subjective Norms	11.14	7.57	-5 – 27	-27 to + 27	.62
Indirect control	23.31	11.49	0 – 45	-45 to + 45	.75
Direct control	5.41	2.38	0 – 10	-27 to + 27	.43
Intention	3.35	2.17	-1 – 6	-9 to + 9	.73

Table 6: Simultaneous regression analysis for the model of intention based on the TPB

<i>Predictor variable</i>	<i>B</i>	<i>SeB</i>	<i>β</i>
Belief-based attitudes	0.39	.023	.29
Subjective norms	0.68	.043	.24
Indirect control	0.11	.030	.06
<i>R</i> ²	.25*		

$F_{(3,47)} = 5.22, p < .01$

Table 7: Belief-based attitudes influencing nurses' paracetamol administration

	<i>Likely</i>				<i>Desirable</i>		
	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Range</i> ^a	<i>Mean</i>	<i>SD</i>	<i>Range</i> ^b
Increased comfort	51	6.29	0.76	4 – 7	6.65	0.69	4 – 7
Increased activity	51	4.65	1.44	1 – 7	5.14	1.22	3 – 7
Increased appetite	51	4.29	1.10	2 – 7	5.27	1.10	3 – 7
Reduced irritability	51	5.94	0.93	3 – 7	6.35	0.89	3 – 7
Reduced temperature	51	6.04	0.72	4 – 7	6.33	0.84	4 – 7
Reduced risk of febrile convulsion	51	5.43	1.27	2 – 7	6.20	1.02	4 – 7
Reduced parental anxiety	51	6.06	1.05	3 – 7	6.31	0.95	4 – 7
Reduced temperature set- point	50	4.94	1.15	3 – 7	5.48	1.30	2 – 7

^a Range 1 = Extremely unlikely, 4 = Neutral, 7 = Extremely likely

^b Range 1 = Extremely undesirable, 4 = Neutral, 7 = Extremely desirable