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ORIGINAL ARTICLE

Use of the Theoretical Domains Framework to explore factors influencing paediatric fever management practices and antipyretic use in New Zealand emergency departments

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Aim: To explore factors influencing fever management practices and antipyretic use among New Zealand Emergency Department (ED) doctors and nurses using the Theoretical Domains Framework (TDF).

Methods: Cross-sectional survey of doctors and nurses across 11 New Zealand EDs. The questionnaire examined eight of 12 TDF domains, based on a generic questionnaire validated to assess TDF-based determinants of health-care professional behaviour. Relevant domains were identified by the frequency of beliefs; the presence of conflicting beliefs within a domain; and the likely strength of impact of a belief on paediatric fever management in the ED.

Results: About 602 participants (243 doctors, 353 nurses and 6 unknown) completed the survey (response rate 47.5%). Over half (351/591, 59.6%, 95% confidence interval (CI) 55.5–63.5%) knew the content of clinical practice guidelines regarding antipyretic use in febrile children (TDF Domain Knowledge), or had been trained to ensure antipyretics are given to febrile children only if they appear distressed (347/592, 58.6%, 95% CI 54.5–62.6%) (Skills). Over 40% (246/590, 95% CI 37.7–45.8%) aim to reduce the fever before discharge (Goals). Most (444/591, 75.1%, 95% CI 71.4–78.6%) participants felt capable of explaining appropriate antipyretic use to parents/care givers (Beliefs about Capabilities). Only a minority (155/584, 26.5%, 95% CI 23.0–30.3%) thought that they can ensure antipyretics are given to febrile children only if they appear distressed when the ED is busy (Environmental Context and Resources).

Conclusions: Using the TDF, we identified factors influencing fever management practices and antipyretic use in the ED. These factors can guide the design of targeted, theory-informed knowledge translation strategies.

Key words: antipyretic; child health; emergency medicine; fever; Theoretical Domains Framework.

What is already known on this topic

1 Despite dissemination of international best practice guidelines regarding paediatric fever management and antipyretic use, non-adherence and practice variation remain commonplace.
2 The published literature does not provide an in-depth understanding of the factors influencing fever management practices.
3 The Theoretical Domains Framework (TDF) can be used to identify determinants of healthcare professional behaviour and design knowledge translation strategies in various health-care settings.

What this paper adds

1 The theoretical domains of Knowledge, Skills, Goals, Beliefs about Capabilities and Environmental Context and Resources all influence paediatric fever management practices and antipyretic use in the emergency department.
2 The identified factors can guide the design of targeted, theory-informed knowledge translation strategies to improve adherence to fever best practice guidelines.

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Fever is one of the most common reasons children are taken to the emergency department (ED) for evaluation, representing up to one-third of all paediatric ED visits.[1] Despite its immunological benefits,[2] there is a common perception that fever is maladaptive and harmful for children, and fever remains a cause for considerable concern and anxiety among care givers and clinicians alike, termed 'fever phobia'.[3,4] To address misconceptions about fever management, best practice guidelines published by the National Institute for Health and Care Excellence (NICE)[5] and the American Academy of Paediatrics (AAP)[2] recommend that antipyretic use in febrile children be for relief of distress, rather than for the sole purpose of temperature reduction. Despite the dissemination of such guidelines for over a decade, recent studies have found low adherence to guidelines among primary care and paediatric doctors and nurses, including only 10% adherence among New Zealand ED doctors and nurses.[3,6–8] Non-adherence to best practice and practice variation contributes to unnecessary health-care costs and undesirable clinical outcomes, with implications for patient safety and health-care quality.[9]

The reasons for this practice variability are unclear[3] and further evidence is needed about barriers and enablers for adoption of best practice guidelines on fever management. Knowledge translation strategies may be optimised if factors influencing practice are viewed through a theoretical lens, enabling interventions to be tailored to the right people, at the right place, at the right time.[10,11] The Theoretical Domains Framework (TDF)[12,13] was developed to make behaviour change theories more accessible for researchers involved in evidence-based practice (EBP) implementation.[12,13] The TDF has been successfully used to explore health-care professional (HCP) behaviour and inform knowledge translation strategies in various health-care settings. In the ED setting, this framework has been used to understand factors influencing management of mild traumatic brain injury,[14] evaluate factors contributing to successful implementation of an accelerated chest pain risk evaluation pathway,[15] and develop implementation interventions in acute stroke management.[16] In paediatric acute care settings, the TDF has been used to explore factors that contribute to variations in bronchiolitis management[17] and to develop interventions which successfully improved the management of infants with bronchiolitis.[18]

The aim of this study was to explore factors contributing to practice variation and adherence to best practice guidelines in fever management of children <2 years of age among ED doctors and nurses using the TDF.

Methods

Design, setting and participants

We conducted a cross-sectional survey of ED doctors and nurses across 11 EDs within the New Zealand Emergency Medicine Research Network, as previously described.[8] Sites included major referral, urban district, and regional referral hospitals; one dedicated paediatric ED was included. Full- or part-time ED doctors and nurses who worked an average of >1 shift per week in an ED treating children <2 years of age were eligible to participate. House officers rotating through ED placement (postgraduate year 2 or less), temporary nursing or medical staff were excluded. Local site investigators used a tailored approach to optimise participant recruitment, including posters, face-to-face recruitment, and promotion through emails and social media. Ethical approval was granted by the Auckland Health Research Ethics Committee (AH21928).

Questionnaire development using the Theoretical Domains Framework

As part of the survey, we included questions to explore factors influencing adherence to fever management best practice guidelines These items were developed using the TDF (Supporting Information) and were based on a generic questionnaire developed by Huijg *et al.*[10] to assess TDF-based determinants of HCP's behaviours. The original TDF consists of 12 theoretical domains (groups of constructs) that can be considered when exploring influencing factors and designing interventions,[12] and has since been refined to a 14-domain version.[13] We used the original 12-domain TDF, because validation studies suggest it is more applicable for developing a TDF-based questionnaire.[10] Items were formulated following the 'TACT principle',[10] using an '[action] in [context, time] with [target]' construction.

We tailored items to suit our research objectives, taking into consideration factors previously suggested in the literature.[3] Study investigators determined the applicability of individual TDF domains to the research question, local context and the ED setting by consensus, in accordance with recommendations for TDF-based questionnaire design.[10,11] Only 8 domains were deemed applicable to the ED setting: Knowledge, Skills, Beliefs about Capabilities, Beliefs about Consequences, Goals, Environmental Context and Resources, and Social Influences. Thirteen questionnaire items were developed and mapped to these 8 TDF domains (Supporting Information). The questionnaire was pilot-tested for applicability, acceptability and clarity by 9 doctors and 2 nurses.

Participants were asked to rate their level of agreement with each statement on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). We also collected information on participant demographics, including employment site, profession, clinical role, years of experience, paediatric-specific qualifications and ethnicity.

Survey distribution

The survey was accessed and completed anonymously by participants using an online link emailed to local site investigators for distribution. Participants provided consent online, after which the survey began. The survey required <10 min to complete and was open for a period of 8 weeks from the start of recruitment at each site. Survey data were collected and managed using REDCap electronic data capture tools[19] hosted at the University of Auckland.

Data analysis

Data were analysed using Stata/BE 17 (StataCorp 2021, College Station, TX, USA). Ethnicity was prioritised as per the New Zealand Ministry of Health ethnicity data protocols.[20] Responses to questions using Likert scales were collapsed such that 'strongly agree' and 'agree' were treated as a 'positive'

response. Differences in demographic characteristics between doctors and nurses were compared using the chi-squared test. The association between each TDF item and profession (doctors vs. nurses) was estimated using generalised linear models. The primary analysis was unadjusted, and a secondary *post hoc* analysis was adjusted for potential confounding by paediatric qualifications, role seniority (senior vs. junior), and ED type (major referral vs. other). A two-tailed $P < 0.05$ was considered statistically significant.

We identified relevant domains likely to explain practice variation based on criteria published in the TDF literature: relative frequency of beliefs; the presence of conflicting beliefs within a domain that would signal variation in HCPs' attitudes and beliefs (e.g. doctors vs. nurses); and the likely strength of impact of a belief on paediatric fever management in the ED.[11,21]

Results

Between May and September 2021, the survey was sent to 1267 ED doctors and nurses (391 doctors, 876 nurses). Of these, 602 participants (243 doctors, 353 nurses and 6 unknown) completed the survey, with an overall response rate of 47.5% (602/1267; doctors 243/391, 62.1%; nurses 353/876, 40.3%). Half (311/600, 51.8%) of participants were from major referral EDs, 82.2% (493/600) had 5 years' professional experience, 39.8% (237/596) worked in a senior role, and 17.5% (105/600) had paediatric-specific qualifications. Participant demographics are summarised in Table 1.

Five TDF domains: Knowledge, Skills, Goals, Beliefs about Capabilities, and Environmental Context and Resources, were perceived to be key factors influencing fever management practices and antipyretic use. Three TDF domains: Social/Professional Role and Identity, Beliefs about Consequences and Social Influences, were not perceived to be an influence (Table 2).

Factors influencing practice

Knowledge

Just over half (351/591, 59.6%, 95% confidence interval (CI) 55.5–63.5%) of participants reported they knew the content of clinical practice guidelines regarding antipyretic use in febrile children. Compared to nurses, fewer doctors reported they knew the content of the clinical practice guidelines (124/240, 51.7% vs. 224/345, 64.9%; difference − 13.3%, 95% CI –21.3 to –5.2%; $P < 0.01$) (Table 2).

Skills

Participants were mixed in their perception of their skills. Although the majority (454/591, 76.8%, 95% CI 73.2–80.2%) of participants stated they have been trained to identify distress in febrile children aged <2 years, just over half (347/592, 58.6%, 95% CI 54.5–62.6%) had been trained to ensure antipyretics are given to febrile children only if they appear distressed (Table 2).

Table 1 Participant characteristics

	All participants		Doctors†		Nurses†	
	N	*n* (%)	*N*	*n* (%)	*N*	*n* (%)
Ethnicity (prioritised)	602		243		353	
Māori		20 (3.3)		4 (1.7)		16 (4.5)
Pasifika		12 (2.0)		7 (2.9)		5 (1.4)
Asian		65 (10.8)		24 (9.9)		40 (11.3)
MELAA + other non-European		30 (5.0)		20 (8.2)		10 (2.8)
European		475 (78.9)		188 (77.4)		282 (79.9)
Type of ED (ACEM designation)‡	600		242		353	
Major referral		311 (51.8)		136 (56.2)		172 (48.7)
Urban district		120 (20.0)		55 (22.7)		65 (18.4)
Regional referral/other		169 (28.2)		51 (21.1)		116 (32.9)
Years of experience in profession‡	600		243		352	
0–4		107 (17.8)		27 (11.1)		79 (22.4)
5–9		145 (24.2)		57 (23.5)		87 (24.7)
10–14		120 (20.0)		56 (23.1)		63 (17.9)
≥15		228 (38.0)		103 (42.4)		123 (34.9)
Clinical role – senior‡§	596	237 (39.8)	243	151 (62.1)	353	86 (24.4)
Paediatric-specific qualifications‡¶	600	105 (17.5)	243	49 (20.2)	352	56 (15.9)

ACEM, Australasian College for Emergency Medicine; ED, emergency department; MELAA, Middle Eastern, Latin American and African. † Profession was not provided by 6 participants. ‡ Data were missing for the following questions: type of ED ($n = 2$), years of experience in profession ($n = 2$), clinical role ($n = 6$) and paediatric-specific qualifications ($n = 2$). § Senior doctor role includes consultant, fellow, medical officer special scale; senior nurse role includes advanced practice nurse (clinical nurse specialist, nurse practitioner), nurse educator, clinical coach, charge nurse; junior doctor role includes registrars; junior nurse role includes registered nurse and enrolled nurse. ¶ Includes Nursing Masters, Diploma of Paediatrics, Fellowship in Paediatrics, subspecialty ACEM training in paediatric emergency medicine.

Table 2 Factors influencing fever management practices based on the Theoretical Domains Framework. Table shows proportion of participants that 'agree' or 'strongly agree' to each statement

	All participants		Doctors†		Nurses†		Absolute difference between doctors and nurses	Adjusted difference between doctors and nurses§
Domain	*N*	*n* (%, 95% CI)	*N*	*n* (%, 95% CI)	*N*	*n* (%, 95% CI)	% (95% CI)	% (95% CI)
Knowledge								
I know the content and objectives of clinical practice guidelines regarding paracetamol and/or ibuprofen use in febrile children‡	591	352 (59.6%, 55.5–63.5%)	240	124 (51.7, 45.1–58.1)	345	224 (64.9, 59.6–70.0)	−13.3% (−21.3 to −5.2%)	−11.8% (−20.4 to −3.1%)
Skills								
I have been trained to ensure paracetamol and/or ibuprofen are given to febrile children only if they appear distressed‡	592	347 (58.6%, 54.5–62.6%)	240	155 (64.6, 58.2–70.6)	346	189 (54.6, 49.2–60.0)	10.0% (2.0–18.0%)	4.4% (−4.3 to 13.0%)
I have been trained to identify distress in febrile children less than 2 years old‡	591	454 (76.8%, 73.2–80.2%)	240	200 (83.3, 78.0–87.8)	345	249 (72.2, 67.1–76.8)	11.2% (4.5–17.8%)	7.9% (0.8–15.1%)
Social/professional role and identity								
Giving paracetamol and/or ibuprofen to febrile children only if they appear distressed is part of my work as an ED doctor/nurse‡	588	395 (67.2%, 63.2–71.0%)	238	163 (68.5, 62.2–74.3)	344	228 (66.3, 61.0–71.3)	2.2% (−5.5 to 9.9%)	−3.8% (−12.4 to 4.7%)
Beliefs about capabilities								
I feel confident explaining to parents/care givers that paracetamol and/or ibuprofen are used for fever only if their child appears distressed‡	591	444 (75.1%, 71.4%–78.6%)	240	198 (82.5, 77.1–87.1)	345	241 (69.9, 64.7–74.7)	12.6% (5.8% to 19.5%)	6.7% (−1.1% to 14.5%)
I have control over ensuring paracetamol and/or ibuprofen are given to febrile children only if they appear distressed‡	590	211 (35.8%, 31.9–39.8%)	238	66 (27.7, 22.1–33.9)	346	142 (41.0, 35.8–46.4)	−13.3% (−21.0 to −5.6%)	−15.6% (−23.8 to −7.4%)
Beliefs about consequences								
For me, giving paracetamol and/or ibuprofen to febrile children only if they appear distressed may increase the risk of convulsions in non-distressed febrile children‡	590	85 (14.4%, 11.7–17.5%)	240	17 (7.1, 4.2–11.1)	344	68 (19.8, 15.7–24.4)	−12.7% (−18.0 to −7.4%)	−14.5% (−21.4 to −7.5%)
Goals								
When managing febrile children in ED, my aim is to reduce the fever before discharge.‡	590	246 (41.7%, 37.7–45.8%)	239	70 (29.3, 23.6–35.5)	345	172 (49.9, 44.5–55.3)	−20.6% (−28.4 to −12.7%)	−16.0% (−24.5 to −7.5%)
Environmental context and resources								
In the ED I work in, giving paracetamol and/or ibuprofen to febrile children only if they appear distressed is routine/the standard of care‡	590	187 (31.7%, 28.0–35.6%)	239	50 (20.9, 15.9–26.6)	345	134 (38.8, 33.7–44.2)	−17.9% (−25.2 to −10.6%)	−16.3% (−24.2 to −8.4%)
I am confident that I can ensure paracetamol and/or ibuprofen are given to febrile children only if they appear distressed, even when the ED is busy‡	584	155 (26.5%, 23.0–30.3%)	237	28 (11.8, 8.0–16.6)	341	125 (36.7, 31.5–42.0)	−24.8% (−31.4 to −18.3%)	−22.0% (−29.5 to −14.5%)

(*Continues*)

Table 2 (Continued)

Domain	All participants		Doctors†		Nurses†		Absolute difference between doctors and nurses	Adjusted difference between doctors and nurses§
	N	*n* (%, 95% CI)	*N*	*n* (%, 95% CI)	*N*	*n* (%, 95% CI)	% (95% CI)	% (95% CI)
In the ED, I have time to educate parents/care givers about fever and use of paracetamol and/or ibuprofen only if their child appears distressed‡	586	269 (45.9%, 41.8–50.0%)	238	127 (53.4, 46.8–59.8)	342	137 (40.1, 34.8–45.5)	13.3% (5.1–21.5%)	11.0% (2.2–19.9%)
Social influences								
I feel challenged/pressured by parents/care givers of children to intervene and give paracetamol and/or ibuprofen to reduce fever regardless of distress‡	585	320 (54.7%, 50.6–58.8%)	238	125 (52.5 (46.0–59.0)	341	194 (56.9, 51.4–62.2)	−4.4% (−12.6 to 3.9%)	−2.6% (−11.6 to 6.5%)
Most colleagues whose opinion I value would approve of me giving paracetamol and/or ibuprofen to febrile children only if they appear distressed‡	583	377 (64.7%, 60.6–68.5%)	237	164 (69.2, 62.9–75.0)	340	209 (61.5, 56.1–66.7)	7.7% (−0.1 to 15.6%)	4.3% (−4.4 to 13.0%)

CI, confidence interval; ED, emergency department. † Profession was not provided by 6 participants. ‡ Data were missing for the following questions: knowledge 1 (*n* = 11), skills 1 (*n* = 10), skills 2 (*n* = 11), identity 1 (*n* = 14), capabilities 1 (*n* = 11), capabilities 2 (*n* = 12), consequences 1 (*n* = 12), goals 1 (*n* = 12), environmental 1 (*n* = 12), environmental 2 (*n* = 18), environmental 3 (*n* = 16), social 1 (*n* = 17) and social 2 (*n* = 19). § Calculated using generalised linear model adjusting for potential confounders of paediatric qualifications, role seniority (senior vs. junior) and ED type (major referral vs. other).

Goals

When managing febrile children in ED, over 40% (246/590, 95% CI 37.7–45.8%) of participants aimed to reduce the fever before discharge. Compared to nurses, fewer doctors stated that their aim was to reduce the fever before discharge (70/239, 29.3% vs. 172/345, 49.9%; difference – 20.6%, 95% CI –28.4 to –12.7%; $P < 0.01$) (Table 2).

Beliefs about Capabilities

Participants were also mixed in their beliefs about capabilities. While most (444/591, 75.1%, 95%CI 71.4%,78.6%) participants felt capable of explaining to parents/caregivers that antipyretics are used for fever only if their child appears distressed, only one-third (211/590, 35.8%, 95%CI 31.9%,39.8%) felt capable of having control over ensuring antipyretics are given to febrile children only if they appear distressed. Compared to nurses, fewer doctors felt capable of having control over ensuring antipyretics are given to febrile children only if they appear distressed (66/238, 27.7% vs. 142/346, 41.0%; difference – 13.3%, 95% CI –21.0 to –5.6%; $P < 0.01$) (Table 2).

Environmental Context and Resources

Only a minority of participants agreed that giving antipyretics only if children appear distressed is routine/standard of care (187/590, 31.7%, 95% CI 28.0–35.6%), or that they can ensure antipyretics are given to febrile children only if they appear distressed even when the ED is busy (155/584, 26.5%, 95% CI 23.0–30.3%). Compared to nurses, fewer doctors agreed that they can ensure antipyretics are given to febrile children only if they appear distressed even when the ED is busy (28/237, 11.8% vs. 125/341, 36.7%; difference – 24.8%, 95% CI –31.4 to –18.3%; $P < 0.01$) (Table 2).

Secondary *post hoc* analysis adjusting for paediatric qualifications, role seniority and ED type did not alter the association between each TDF item and profession.

Discussion

This is the first study using the validated TDF to explore factors that influence paediatric fever management practices and antipyretic use in New Zealand EDs. We identified factors that were most likely to influence adherence to best practice within five domains: Knowledge; Skills; Goals; Beliefs about Capabilities; and Environmental Context and Resources. This is important because fever is one of the most common reasons for children to present to the ED. Our study has generated a more in-depth understanding of the reasons underlying non-adherence to best practice fever management guidelines. Our findings are likely to be highly relevant to ED clinicians, educators and researchers particularly in the field of knowledge translation.

The Knowledge and Skills domains were key factors influencing fever management practices in the ED. Although local guidelines are consistent with international best practice guidelines published by the NICE and AAP (Table 3),[8] just over half of the participants stated they knew the contents of fever best practice guidelines (Knowledge). Previous TDF-based studies have identified lack of knowledge as a potential barrier to EBP in acute care settings. A qualitative study exploring factors influencing the uptake of evidence-based recommendations from the Australasian Bronchiolitis Guideline found that knowledge was the

Table 3 Comparison of local site clinical practice guidelines and international best practice guidelines on single antipyretic use for discomfort in febrile children (from Tan *et al.*[8])

International best practice guidance (AAP/NICE)	Site 1†	Site 2	Site 3	HealthPathways‡	BPAC NZ	Royal Children's Hospital, Melbourne
Single antipyretic use	Consistent	Consistent	Consistent	Consistent	Consistent	Not specified¶
Antipyretic use for discomfort only (i.e. not solely for temperature reduction)	Consistent	Consistent§	Consistent	Consistent	Consistent	Not specified¶

AAP, American Academy of Pediatrics; BPAC NZ, Best Practice Advocacy Centre New Zealand; NICE, National Institute for Health and Care Excellence. † Sites 4–11 refer to Site 1 clinical practice guidelines. ‡ HealthPathways is an online resource designed for primary health-care practitioners offering clinicians best practices, condition-specific guidelines at the point of care. § Parent information sheet inconsistent for single antipyretic use; consistent for using antipyretics only for discomfort. ¶ Standing orders for nurse administration of paracetamol and ibuprofen were not aligned with site clinical practice guidelines, and thus were inconsistent with international best practice.

second most common domain contributing to practice variation in the management of infants with bronchiolitis.[17] An Australian study of mild traumatic brain injury management[14] found that there was little knowledge among ED clinicians about assessment of post-traumatic amnesia, and this was attributed to a lack of training. This is consistent with our finding that just over half of participants have been trained to ensure antipyretics are given to febrile children only if they appear distressed (Skills). It may also be that the broad range of conditions ED clinicians deal with pose challenges in keeping up-to-date with current practice. We cannot assume that the knowledge and skills needed for EBP will be acquired during medical/nursing training and subsequently sustained by continuing professional development activities.

The Goals domain was another important factor influencing fever management and antipyretic use. When managing febrile children, over 40% of participants aim to reduce the fever before discharge. This was not surprising given that fears and misconceptions regarding consequences of fever, termed 'fever phobia', have been well-described in the literature, and fever remains a cause for considerable concern among HCPs.[3] Additionally, although most febrile illnesses are due to self-limiting viral infections, fever may also be a presenting feature of serious bacterial infections. There may be a perceived need for temperature reduction as reassurance for ED clinicians, even though apyrexia is not a reliable indicator of benign illness.[5] This hypothesis is supported by Tavender *et al.*,[14] who found that although most ED clinicians

Table 4 Examples of behaviour change techniques[23,24] and targeted interventions[25] mapped to relevant Theoretical Domains Framework (TDF) domains that may be used to better align care with international guidelines for antipyretic use

TDF domain	Behavioural change technique	Intervention
Knowledge	Information regarding behaviour, outcome	Medical and nursing leads will continually educate to reinforce benefits of adhering to best practice recommendations and use evidence information sheets to reinforce.
	Antecedents	Medical and nursing lead to educate staff on situations or events that predict non-adherence to best practice recommendations (e.g. pressure from parents/care givers).
Skills	Modelling/demonstration of behaviour; rehearsal of relevant skills	Medical and nursing leads will model behaviour by showing a video of staff educating family about best practice recommendations for antipyretic use (for staff teaching) and model this in clinical practice.
Beliefs about capabilities	Self-monitoring; increasing skills: problem-solving, decision-making, goal-setting; Social pressures of support, encouragement support	Medical and nursing leads will provide encouragement on adherence to best practice recommendations using monthly audits to provide feedback on performance.
Goals	Goal/target specified: behaviour or outcome	Hospitals will be encouraged to set improvement targets for best practice recommendations.
Environmental context and resources	Environmental changes; prompts/cues	Standing orders for paracetamol and ibuprofen use to be aligned with best practice. Medical and nursing lead requested to incorporate best practice recommendations in staff induction sessions. Medical and nursing lead encouraged to use posters, screen savers and electronic prompts as reminders.

were aware of clinical decision rules to guide appropriate computed tomography imaging in mild traumatic brain injury, they articulated concerns about missing life-threatening events, and ordering a scan was seen as reassurance that the patient was safe for discharge.

We identified both enablers of and barriers to best practice within the Beliefs about Capabilities domain. It was reassuring that although over half of participants felt challenged/pressured by caregivers to give antipyretics for fever reduction (Social Influences), most felt confident explaining to caregivers that antipyretics are indicated only if their child appears distressed. Haskell *et al.*[17] found that ED clinicians valued using patient information sheets to reinforce discussions with caregivers, enhancing beliefs about their capabilities to overcome social barriers to evidence-based bronchiolitis management. However, only one-third of participants felt they had control over ensuring antipyretic use followed best practice. Interestingly, ED doctors felt less control over appropriate antipyretic use compared to nurses. One possible explanation is the role of doctors versus nurses in antipyretic administration in the ED. Medication administration falls within the nursing scope of practice. Even though doctors have prescriptive rights, in most EDs, nurses can administer antipyretics under standing orders, with many children having already received antipyretics prior to medical assessment.

The Environmental Context and Resources domain was highly relevant and contributed to fever management practice variation. Only one-quarter of participants felt confident that fever best practice guidelines can be followed even when the ED is busy. Physical, organisational and resource factors are known to influence HCP decision-making and adherence to EBP.[14,17,21] The ED environment has unique characteristics, with the 'variety, novelty, distraction, and chaos, all juxtaposed to a need for expeditious and judicious thinking'.[22] ED-specific environmental barriers to best practice adherence frequently cited in the literature include time constraints, a busy ED, overcrowding, focus on patient flow, inconsistent care processes in-hours versus out-of-hours, staff shortages and turnover.[14–17,21] We found that ED doctors felt less confident than nurses that best practice can be followed when the ED is busy. ED doctors are often required to manage multiple patients with diverse presentations, requiring a high number of decisions per unit time in the face of frequent interruptions. Only 20% of ED doctors in our study thought that giving antipyretics to febrile children only if they appear distressed is routine care. When best practice is not embedded in routine or standard care, the additional mental load to adhere to best practice when it is busy with multiple competing priorities may mean ED clinicians simply succumb to the inertia of previous practice.

Using the TDF, our study has taken a foundational step for the development of theory-informed knowledge translation strategies to improve adherence to best practice guidelines, by providing an understanding of factors influencing fever management and antipyretic use in New Zealand EDs. Future research could build on our work by conducting qualitative interviews to further explore these factors and designing targeted interventions using appropriate behavioural change techniques and modes of delivery mapped to relevant TDF domains that may be used to better align care with international guidelines for antipyretic use (Table 4).[23–25] Interventions need to be multi-faceted and take into consideration evidence of effectiveness, local relevance, feasibility and acceptability within the unique time-pressured, high-stress ED environment.[26]

Strengths of our study include our relatively large sample size and the inclusion of both doctors and nurses across multiple EDs with a mix of ED census and type. Using a validated theoretical framework to explore influencing factors provides an ideal platform for future work.

Our study had several limitations. The response rate of 47.5% may introduce a degree of responder bias. Despite broadly encompassing factors using the TDF, our questionnaire was limited by including only eight of 12 TDF domains, in order to balance overall questionnaire length and maximising survey completion. Thus, it is possible that we may not have captured all relevant factors influencing practice. However, there are precedents in the published literature for tailoring TDF-based instruments to suit specified behaviours and local contexts[11,15]; indeed, this approach is accepted and recommended in TDF-based research.[10,11] A questionnaire-based study design precluded follow-up exploratory questions to confirm the correct interpretation of questions by participants and to generate a deeper understanding of the reasons underlying participant responses. Nevertheless, it has enabled us to identify key TDF domains among a large sample efficiently and cost-effectively, increasing generalisability of our findings.

Conclusions

Using the TDF, we identified factors influencing paediatric fever management practices and antipyretic use in the ED encompassing the domains of Knowledge, Skills, Goals, Beliefs about Capabilities, and Environmental Context and Resources. Future exploratory work based on these TDF-aligned factors can guide the design of targeted, theory-informed knowledge translation strategies to improve adherence to fever best practice guidelines.

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