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Parental management of children's fever: Assessment of knowledge and use of health record information

E. Chefdeville [a], A.S. Pages [b,*]

[a] UFR of health sciences Simone Veil, University of Versailles, Saint-Quentin-en-Yvelines, 2, avenue de la Source-de-la-Bièvre, 78180 Montigny-le-Bretonneux, France
[b] Centre hospitalier public du Cotentin, Cherbourg-en-Cotentin, 46, rue du Val-de-Saire, 50100 Cherbourg-en-Cotentin, France
* Corresponding author.
E-mail address: as.pages@ch-cotentin.fr (A.S. Pages).

1. Introduction

A high fever is one of the most common reasons for a doctor's appointment in general medicine [1], especially in the pediatric population. Fever in children sometimes triggers an irrational fear [2], which tends to overwhelm general medicine practices and pediatric emergency departments, when it is more often a case of a benign viral infection that gets better spontaneously in less than 72 h [3,4].

In 2005, the AFSSAPS (the French National Agency for Medicines and Health Products Safety) published an update on treating a child with fever that was aimed at parents and healthcare professionals. The following year, on 1 January 2006, the update of the child health record booklet came into effect with several advice cards for parents, including one on managing a child's fever [5].

Despite these messages being publicized, there does not appear to be an improvement in the understanding of the route to take in the event of a fever. A large INSERM (French National Institute for Health and Medical Research) survey carried out from 2007 to 2008 [6] showed that the French population had scant knowledge of, or rarely applied, the good practice recommendations for managing their child's fever. In addition, 88% of parents surveyed during a national study of 300 families that was carried out in April 2012 [7] had located the "fever" advice card in the child health record booklet but, according to other studies [8,9], only 10–12% of parents cited the child health record booklet as a source of information.

Following the identification of rare but serious adverse effects associated with a child taking antipyretics, certain strategies for treating fever have been called into question, with a goal that is, from now on, more focused on improving comfort than a systematic attempt to get rid of a fever. The French National Authority for Health (HAS) published an update of recommendations to this effect on 12 October 2016 [10]. At the same time, a decision by the French Public Health Council (Haut conseil de la santé publique) [11] was taken in May 2016 to update the child health record booklet, including the new version that came into effect on 1 April 2018.

The main objective of this study was to assess the knowledge of parents with regard to managing their child's fever in accordance with the 2016 HAS recommendations.

2. Material and methods

We carried out an observational, descriptive, national survey of parents using an anonymous computerized questionnaire created using "Google Forms" software. This questionnaire comprised three main points:

- characteristics of the parents surveyed: sex, regional department of residence, socioprofessional category (including occupation if the parent works in healthcare), number of children, age of child(ren) concerned in the study, raising child(ren) as a single parent or a couple, usual medical practitioner, and use of a child health record booklet for monitoring;
- data concerning parental knowledge of fever in children: definition, reference for taking temperature, period before seeing a doctor, signs of severity, physical and medicinal antipyretic measures. The expected responses concerning the management of fever according to the 2016 HAS recommendations are indicated by an asterisk in the corresponding tables;
- data concerning the fever card in the 2006 child health record booklet: awareness of the existence of this card and use, opinion and possible changes to be made, overview by the healthcare professional who monitors the child.

An advance test was carried out to assess the feasibility of the questionnaire on a large scale and the majority of questions were "closed" to facilitate analysis.

The questionnaire was put online from 3 December 2017 to 4 February 2018 and was distributed through social networks and communication (e-mail and text messages) through a network of different contacts:

- included were parents who had a French child health record booklet and children born between 2006 (year of publication of the last update of the child health record booklet that features advice on managing fevers) and 2017;
- excluded were parents with poor French language skills or whose children did not have a French child health record booklet, and, due to the computerized nature of the questionnaire, parents with no internet access.

In a bid to reduce the knowledge bias in trained healthcare professionals, we carried out a study in a subgroup that compared the knowledge of parents who stated that they were trained healthcare professionals with that of parents who had no training in treating a fever:

- healthcare professionals considered as being trained in treating fevers (doctor, pharmacist, nurse, childcare worker, and midwife) in view of the knowledge bias anticipated in this specific population;
- non-healthcare professionals or healthcare professionals considered as being untrained (ambulance driver, assistant nurse, orthoptist, speech therapist, support workers, hospital service employee, physiotherapist, dietician, etc.).

In this subgroup, secondary analyses were carried out to assess the impact of a child being monitored by a general practitioner or a pediatrician, as well as the socioprofessional category of the parent who responded to the questionnaire.

The data were entered and analyzed using Microsoft Excel® software. The results were presented as percentages: *n* (%).

The statistical analysis was completed using R software. The chi^2 test with Yates' correction was used to compare the categorized variables. The comparison of averages was carried out with the Student *t*-test. The error risk was identified at 5%.

The study was registered with the data protection officer at the University of Versailles Saint-Quentin-en-Yvelines.

3. Results

A total of 3295 parents, with a total of 5453 children between 0 and 12 years old, answered the questionnaire between 3 December 2017 and 4 February 2018. The regional distribution is shown in Fig. 1 and is compared to the latest INSEE (French National Institute of Statistics and Economic Studies) assessments of January 2018 [12]. Of the parents responding to the questionnaire, 26% stated being a healthcare professional considered as being trained in treating fevers in children.

The main demographic characteristics of the overall population and the two main subgroups (trained healthcare professionals and untrained population) are presented in Table 1.

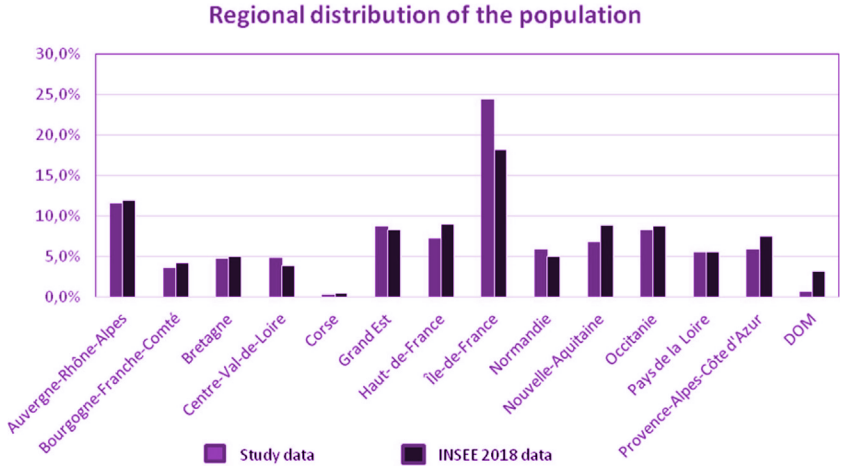

Fig. 1. Regional distribution of the population compared to INSEE 2018 data. DOM: French overseas department; INSEE: French National Institute of Statistics and Economic Studies.

The answers to the questions concerning parental knowledge of treating a child's fever are presented in Tables 2 and 3, including the response rate of the overall population and the two subgroups for each item. Less than 10% of the overall population gave all of the severity criteria that make an immediate doctor's appointment necessary. In addition, in the untrained population, having a child under 3 months of age was significantly associated with better knowledge of the severity criteria for the age of the child (36% vs. 24%; $p < 0.001$).

The secondary analysis assessing the type of medical follow-up for the child on the level of parental knowledge within the untrained population showed the following:

- male/female ratios, two-/single-parent family, higher/lower socioprofessional category, and number of children ≤ 2/ ≥ 3 were more significant in parents cared for by a pediatrician than in those who were cared for by a general practitioner ($p < 0.001$);
- no significant difference was proven between the two types of follow-ups with regard to the rate of the temperature defining the fever, the measurement method, the three physical measures to apply, and the information on treatment with medication;
- care by a pediatrician was significantly associated with better knowledge of the "consultation period in the absence of severe symptoms" and the criteria "age under 3 months old" and "change in skin color" as symptoms that require an immediate appointment ($P < 0.001$). No significant difference was observed with regard to awareness of other severe symptoms;
- parents whose children were cared for by a general practitioner used two medications in alternating turns as the first-line treatment significantly more than parents whose children were monitored by a pediatrician ($P < 0.001$). Similarly, their knowledge of the purpose of these medications was significantly worse than the latter subgroup's knowledge ($P < 0.001$).

Table 1
Demographic characteristics of the population.

	Overall population	Trained population	Untrained population	*P*-value
Number, n (%)	3295 (100)	871 (26.4)	2424 (73.6)	
Female, *n* (%)	3029 (91.9)	810 (93)	2219 (91.5)	0.20
Socioprofessional category, *n* (%)				**< 0.001**
Farmer, artisan, storeowner	47 (1.4)	2 (0.2)	45 (1.9)	
Executives, highly qualified professions	1304 (39.6)	348 (40)	956 (39.4)	
Employee, worker	1269 (38.5)	257 (29.5)	1012 (41.7)	
Intermediary professions	471 (14.3)	247 (28.4)	224 (9.2)	
Unemployed	204 (6.2)	17 (2)	187 (7.7)	
Healthcare professionals, *n* (%)	1630 (49.5)	871 (100)	759 (31.3)	NR
Trained healthcare professionals, *n* (%)	871 (26.4)	871 (100)	0	
Number of children, *n* (%)				**< 0.01**
1	1236 (37.5)	326 (37.4)	910 (37.5)	
2	1421 (43.1)	402 (46.2)	1019 (42)	
3	493 (15)	120 (13.8)	373 (15.4)	
4+	145 (4.4)	23 (2.6)	122 (5.0)	
Average number of children	1.88	1.83	1.9	**0.04**
Single parents, *n* (%)	282 (8.6)	67 (7.7)	215 (8.9)	0.32
Medical follow-up, *n* (%)				
General practitioner	2042 (62.0)	499 (57.3)	1543 (63.7)	**< 0.01**
Pediatrician	1113 (33.8)	328 (37.7)	785 (32.4)	
Other specialist doctor	15 (0.5)	3 (0.3)	12 (0.5)	
PMI (mother and infant welfare institutions)	66 (2.0)	24 (2.8)	42 (1.7)	
No regular follow-up	59 (1.8)	17 (2.0)	42 (1.7)	
Filling out the child health record booklet, *n* (%)	3014 (91.5)	815 (93.6)	2199 (90.7)	**0.012**

The results were presented as the percentage *n* (%), significant *P*-values (< 0.05) were presented in bold, NR: not performed.

Table 2
Parental knowledge of fevers in children.

	Overall population	Trained population	Untrained population	*P*-value
Number, *n* (%)	3295 (100)	871 (26.4)	2424 (73.6)	
Reference for taking temperature				
Armpit	125 (3.8)	41 (4.7)	84 (3.5)	0.08
Rectum [a]	2930 (88.9)	789 (90.6)	2141 (88.3)	
Mouth	21 (0.6)	2 (0.2)	19 (0.8)	
Ear	219 (6.6)	39 (4.5)	180 (7.4)	
Definition of fever				**< 0.001**
< 38 °C	615 (18.7)	90 (10.3)	525 (21.7)	
38 °C	1461 (44.3)	400 (45.9)	1061 (43.8)	
> 38 °C [a]	960 (29.1)	346 (39.7)	614 (25.3)	
Depends on the person	259 (7.9)	35 (4.0)	224 (9.2)	
Period before doctor's appointment in the event of good tolerance				**< 0.001**
The same day	48 (1.5)	5 (0.6)	43 (1.8)	
If the fever persists for 24 h	921 (28.0)	129 (14.8)	792 (32.7)	
If the fever persists for 48 h [a]	1748 (53.1)	494 (56.7)	1254 (51.7)	
If the fever persists for 72 h	578 (17.5)	243 (27.9)	335 (13.8)	
Severe symptoms requiring an immediate appointment				
Temperature threshold	2059 (62.5)	401 (46.0)	1658 (68.4)	**< 0.001**
Below a certain age [a]	2221 (67.4)	635 (72.9)	1586 (65.4)	**< 0.001**
Change in behavior [a]	2736 (83.0)	739 (84.8)	1997 (82.4)	**< 0.001**
Change in skin color [a]	2061 (62.5)	602 (69.1)	1459 (60.2)	**< 0.001**
Difficult or rapid breathing [a]	2925 (88.8)	823 (94.5)	2102 (86.7)	**< 0.001**
Stiff or painful neck [a]	2778 (84.3)	820 (94.1)	1958 (80.8)	**< 0.001**
If temperature is ticked, specify				
> 38 °C	177 (5.4)	14 (1.6)	163 (6.7)	
> 38.5 °C	353 (10.7)	74 (8.5)	279 (11.5)	
> 39 °C	691 (21.0)	131 (15.0)	560 (23.1)	**< 0.001**
> 39.5 °C	311 (9.4)	48 (5.5)	263 (10.8)	
> 40 °C	527 (16.0)	134 (15.4)	393 (16.2)	
If age criteria is ticked, specify				
1 month	236 (7.2)	86 (9.9)	150 (6.2)	
2 months	69 (2.1)	21 (2.4)	48 (2.0)	
3 months [a]	922 (28.0)	343 (39.4)	579 (23.9)	**< 0.001**
6 months	357 (10.8)	68 (7.8)	289 (11.9)	
9 months	66 (2.0)	14 (1.6)	52 (2.1)	
12 months	386 (11.7)	84 (9.6)	302 (12.5)	
Other answers (2 years, 3 years, 6 years)	185 (5.6)	19 (2.2)	166 (6.8)	

The results were presented as the percentage *n* (%), significant *P*-values (< 0.05) were presented in bold.
[a] Expected answers corresponding to the HAS 2016 recommendations.

The secondary analysis assessing the effect of the socioprofessional category on the level of parental knowledge in the untrained population showed the following:

Table 3
Parental knowledge concerning physical and medicinal measures.

	Overall population	Trained population	Untrained population	*P*-value
Number, *n* (%)	3295 (100)	871 (26.4)	2424 (73.6)	
Physical measures				
Room heating	4 (0.1)	1 (0.1)	3 (0.1)	[a]
Wrapping up the child	49 (1.5)	4 (0.5)	45 (1.9)	[a]
Undressing the child [b]	2709 (82.2)	798 (91.6)	1911 (78.8)	**<0.001**
Hydrating the child [b]	3204 (97.2)	858 (98.5)	2346 (96.8)	**0.01**
Giving the child a warm bath	1046 (31.7)	234 (26.9)	812 (33.5)	**<0.001**
Not overheating the room [b]	2624 (79.6)	763 (87.6)	1861 (76.8)	**<0.001**
Applying a cool cloth	860 (26.1)	278 (31.9)	582 (24.0)	**<0.001**
Total correct responses	1079 (32.7)	336 (38.6)	743 (30.7)	**<0.001**
Use of medication as treatment				
Temperature threshold	2340 (71.0)	560 (64.3)	1780 (73.4)	**<0.001**
After medical opinion	122 (3.7)	15 (1.7)	107 (4.4)	
If child is in discomfort [b]	1436 (43.6)	454 (52.1)	982 (40.5)	
If temperature threshold is ticked, specify				
As soon as feverish	864 (26.2)	223 (25.6)	641 (26.4)	
If T° ≥ 37.5 °C	24 (0.7)	3 (0.3)	21 (0.9)	
If T° ≥ 38 °C	660 (20.0)	118 (13.5)	542 (22.4)	**<0.001**
If T° ≥ 38.5 °C	1135 (34.4)	330 (37.9)	805 (33.2)	
If T° ≥ 39 °C	433 (13.1)	84 (9.6)	349 (14.4)	
If T° ≥ 39.5 °C	58 (1.8)	17 (2.0)	41 (1.7)	
If T° ≥ 40 °C	30 (0.9)	8 (0.9)	22 (0.9)	
First-line treatment				**0.01**
Paracetamol [b]	3160 (95.9)	849 (97.5)	2311 (95.3)	
Aspirin	3 (0.1)	0	3 (0.1)	
Nonsteroidal anti-inflammatories	12 (0.4)	3 (0.3)	9 (0.4)	
Two medications in systematic turns	120 (3.6)	19 (2.2)	101 (4.2)	
Purpose of medicinal treatment				**<0.001**
To treat illness causing fever	122 (3.7)	8 (0.9)	114 (4.7)	
To stabilize temperature	1366 (41.5)	325 (37.3)	1041 (42.9)	
To reduce the child's discomfort [b]	1806 (54.8)	538 (61.8)	1268 (52.3)	

The results were presented as the percentage *n* (%), significant *P*-values (<0.05) were presented in bold.
[a] Numbers too low to test.
[b] Expected answers corresponding to the HAS 2016 recommendations.

- male/female ratios, two-/single-parent family, number of children ≤ 2/≥ 3, and care by a pediatrician/care by a general practitioner were more significant among "executives and highly qualified professions" than among "employees and workers" ($P < 0.05$);
- there was no significant difference between the two subgroups with regard to the temperature defining the fever, the measurement method, and the three physical measures to apply;
- belonging to a higher socioprofessional category was significantly associated with better knowledge of the "consultation period in the absence of severe symptoms" and "symptoms that require an immediate appointment" ($P < 0.001$);
- employees/workers were more likely to use two medications in alternating turns as the first-line treatment than executives/those in highly qualified professions ($P < 0.001$). Similarly, their knowledge of the purpose of these medications and therefore of the sign to start treatment was significantly worse ($P < 0.001$).

The opinions of parents with regard to the fever advice card in the 2006 booklet is presented in Table 4.

At the end of the questionnaire, we provided space for comments, which was used by 204 parents. The analysis of this revealed three key themes: standardizing the discourse of healthcare professionals, encouraging conversations on and presentations of the fever card in the child health record booklet by healthcare professionals, and making changes to the fever advice card in the child health record booklet.

To our knowledge, the only study of this scale on the ability of parents to manage a child's fever was carried out in 2007 by INSERM [6]. Despite methodological differences, the results of these two French studies are close and their comparison is even more valuable because they were carried out before and after the 2016 HAS recommendations. We therefore present the main results of these two studies in Table 5.

4. Discussion

This study shows that parental knowledge of treating a period of fever in their child is improving on certain points (Table 5), but that others are still poorly understood by both the general population and healthcare professionals, despite the 2016 update in HAS recommendations.

To limit the knowledge bias expected from trained healthcare professionals, we took a preferential interest in our untrained population for the results analysis.

Parental concern with regard to temperature has been shown in several studies [8,9,13–16] and remains an issue, as can be seen in a 2017 thesis on parents in Montpellier [17]: "For parents, temperature is the only numerical indication that they have. Without any medical knowledge, for them it is a real objective marker of their child's well being. Therefore, it is difficult to disregard figures and a higher figure is inevitably seen as being more serious." This is likely the explanation for the 68% of parents (and 46% of trained healthcare professionals) that we surveyed who considered it as a severe symptom requiring an immediate doctor's appointment. On average, they cited a temperature of, or above, 39 °C as being a severe symptom.

In contrast, the "under 3 months old" factor is very little known (24% of the untrained population and just 39% of trained healthcare professionals) as a sign requiring an immediate appointment.

The parents in our study (52%) are more aware of the 48-h period of persistent fever before consulting a doctor in the absence of severe symptoms than in previous studies. In 2007 in Villefranche-sur-Saône [18], 44% of parents saw a doctor in the first 24 h of a fever, 49% did so in Agen in 2016 [15] and more than 34.5% in our study. In reality, it is highly likely that parents do not adhere to this period as much given the issue of proof of absence for medical reasons required by employers and educational institutions. This problem was highlighted by several parents.

The agreement of statements and practices by parents in line with recommendations on the treatment of fevers in children has clearly improved in 10 years, particularly with regard to physical and medicinal measures. Some points remain insufficient.

The discomfort that a bath might cause is slowly starting to be absorbed: 33% (and 27% among trained healthcare professionals) of parents still do this, even if the trend has been declining in recent years (in 2016, it was cited by almost half of parents included in the studies: 48% in Pas-de-Calais [13], 43% in Amiens [14]).

With regard to treatment using medications, parents have now well understood the idea of using one medication (96% versus 74% in the INSERM study) and, in particular, choosing paracetamol (95% versus 85% in the INSERM study). On the other hand, according to half of the population surveyed, the notion that the purpose of these medications is to relieve signs of discomfort, and to therefore only give them when the child is already in discomfort, is still

Table 4
Parental opinions on the fever card.

	Overall population	Trained population	Untrained population	*P*-value
Number, *n* (%)	3295	871 (26.4)	2424 (73.6)	
Have you already seen this card? Yes	2532 (76.8)	722 (82.9)	1810 (74.7)	<0.001
Have you already used it? Yes	999 (30.3)	204 (23.4)	795 (32.8)	<0.001
If you had read this card at the time your child had a fever, would you have:				
Continued with the same treatment method, because it is in line with this card	1626 (71.4)	512 (79.8)	1114 (68.1)	
Continued with the same treatment method, even if it is not fully in line with the card	398 (17.5)	100 (15.6)	298 (18.2)	<0.001
Changed your method of treatment	253 (11.1)	30 (4.7)	223 (13.6)	
Had the healthcare professional who monitors your child(ren) already shown you this card? Yes	324 (9.8)	68 (7.8)	256 (10.6)	0.023
How did you find this card?				
Easy to understand	3063 (93.0)	821 (94.3)	2242 (92.5)	<0.001
Difficult to understand	20 (0.6)	5 (0.6)	15 (0.6)	
How did you find this card?				
Easy to find	978 (29.7)	288 (33.1)	690 (28.5)	0.64
Difficult to find	543 (16.5)	153 (17.6)	390 (16.1)	
How did you find this card?				
Quite precise, allowing you to know what to do in the event that your child has a fever	1779 (54.0)	464 (53.3)	1315 (54.2)	0.25
Not sufficiently precise	111 (3.4)	23 (2.6)	88 (3.6)	
What changes would you like to see in this card in the new version of the child health record booklet?				
Change the location of the card in the child health record booklet	1327 (40.3)	329 (37.8)	998 (41.2)	
Add information on medications to counter fevers	1066 (32.4)	286 (32.8)	780 (32.2)	
Add information on additional measures	559 (17.0)	156 (17.9)	403 (16.6)	0.26
Improve the presentation of symptoms requiring an immediate doctor's appointment	1091 (33.1)	283 (32.5)	808 (33.3)	
Prompt healthcare professionals to present this card during appointments	1857 (56.4)	523 (60.0)	1334 (55.0)	

The results were presented as percentages *n* (%).

poorly understood (48% and 59%, respectively, for incorrect responses to the purpose and instruction, but much less than in 2012 in Metz, when 81% of parents stated that treating a fever requires taking medication); 43% of parents (and 37% of trained professionals) still think that the purpose of medications is to stabilize temperature. The temperature level is always frightening (the first reason for concern cited by parents in Villefranche-sur-Saône in 2007 [18]) and causes 73% of parents (and 64% of trained professionals) to administer antipyretic medications. In 33% of cases (38% for trained professionals), these are given from a temperature of 38.5 °C. These results are probably related to the current sentence in the update on treating children with a fever by the ANSM in 2005 [19] "It is only when the temperature is above 38.5 °C that it may be worthwhile to begin treatment," which was removed when the recommendations were updated in 2016 [11]. Indeed, this message was inconsistent in view of the purpose

Table 5
Comparison of the results of this study with those of the 2007 INSERM study.

	Study data			INSERM 2007 data
	Overall population	Trained population	Untrained population	
Study population	3295 parents with a total of 5353 children between 0 and 12 years old			6596 children between 1 month and 12 years old
Number, *n* (%)	3295 (100)	871 (26.4)	2424 (73.6)	6596 (100)
Physical measures				
Undressing the child [a]	2709 (82.2)	798 (91.6)	1911 (78.8)	3690 (62.3)
Hydrating the child [a]	3204 (97.2)	858 (98.5)	2346 (96.8)	4623 (78.1)
Not overheating the room [a]	2624 (79.6)	763 (87.6)	1861 (76.8)	1610 (27.2)
Total correct responses	1079 (32.7)	336 (38.6)	743 (30.7)	989 (15)
First-line treatment				
Monotherapy	3175 (96.4)	852 (98)	2323 (96)	4947 (75)
Paracetamol [a]	3160 (95.9)	849 (97.5)	2311 (95.3)	4204 (63.7)
Aspirin	3 (0.1)	0	3 (0.1)	49 (0.7)
Nonsteroidal anti-inflammatories	12 (0.4)	3 (0.3)	9 (0.4)	643 (9.7)
Parental knowledge of fevers				
Definition of fever	960 (29.1)	346 (39.7)	614 (25.3)	4033 (61.2)
Reference for taking temperature	2930 (88.9)	789 (90.6)	2141 (88.3)	4198 (63.6)
Physical measures	1079 (32.7)	336 (38.6)	743 (30.7)	989 (15)
First-line treatment	3160 (95.9)	849 (97.5)	2311 (95.3)	4204 (63.7)
Total correct responses	428 (13)	137 (15.7)	291 (12)	79 (1.2)

The results were presented as percentages *n* (%), INSERM: French National Institute for Health and Medical Research.
[a] Expected answers corresponding to the HAS 2016 recommendations.

of antipyretic medications, which is completely independent of temperature. It is discomfort that is being treated and not temperature.

The results of a French study published in 2017 is in agreement with the HAS recommendations, which stipulate that only discomfort linked to the fever justifies the use of antipyretics, not the fever itself [20]. This study shows that the behavior of the ill person (all of the changes in behavior that can arise when a child is ill) is not dependent on the severity of the fever.

The present study found a higher correlation between the recommendations and parental knowledge with regard to the "consultation period in the absence of severe symptoms," "the purpose of antipyretic medications," and "monotherapy to choose" when the care was carried out by a pediatrician or when the parent surveyed belonged to a higher socioprofessional category. This can likely be explained in part by the fact that the training for pediatricians is focused specifically on the health of children, while although training for general practitioners is much more extensive, some may be specialized in treating children to a greater or lesser extent. This correlation could already be seen in the 2007 INSERM study.

The influence of care by a pediatrician on the awareness of the "under 3 months old" severe symptom is likely linked to the fact that the children they treat are statistically younger. It was also found that this correlation is more significant in untrained parents with a child younger than 3 months old than those with older children ($P < 0.001$).

The more significant gaps in knowledge in less privileged socioeconomic conditions have already been demonstrated in several studies [6,21]. This reinforces the importance of general practitioners in informing and educating this specific population that they take care of preferentially in comparison to pediatricians.

This could start with better use of the child health record booklet, which is not completed by almost 13% of general practitioners, compared to less than 2% of pediatricians ($P < 0.001$). This difference could potentially be explained by the fact that pediatricians treat younger children on average and the 20 compulsory medical examinations up to the age of 6 must be recorded in the child health record booklet [22].

The fever card in the 2006 child health record booklet was little used by parents, with only 33% stating that they had used it at least once. The explanations given were, in particular, forgetting about the existence of this card, the limited information (46% of parents did not find it to be sufficiently comprehensive), and sometimes finding it not very accessible to a public that does not work in the healthcare sector. Despite this, almost 14% of the untrained population that had never used it stated that reading it would have changed the way that they managed their child's fever (it should be noted that 68% of this specific population considers that their management is already in line with the advice on the fever card).

The changes proposed by parents to improve the advice dispensed by this card and the points to reinforce in terms of information on managing a fever are largely in line with those given on the current card in the new booklet in effect since 1 April 2018. Two points in particular are largely endorsed by parents and would improve the distribution of instructions on treating children with fever. First of all, they request a standardization of practices and discourse by healthcare professionals, who are the primary actors in healthcare education. They must convey clear messages in accordance with current recommendations. Lack of knowledge on the latest recommendations leads to the spread of incorrect information by the general population and therefore to inadequate treatment for a fever by parents, as well as probable increased anxiety related to varying information from the different professionals consulted. The memo card on treating a child with fever published in October 2016 by HAS that is aimed at healthcare professionals clarifies these main inconsistent points.

The second point concerns prompting healthcare professionals to produce the fever card in the child health record booklet. Sixty percent of the untrained population stated that they would like the healthcare professional who monitors their child to inform them of the existence of this card. The child health record booklet that came into effect in 2006 had been accompanied by a usage guide for healthcare professionals stipulating that the messages should be read with parents and explained, and that they must not hesitate to recommend referring to these pages. This should be emphasized to parents so that they relay these messages to the people who take care of their child, even occasionally [23]. This desire to promote dialogue with parents was reconfirmed in the usage guide for healthcare professionals for the child health record booklet that became valid in 2018. The child health record booklet should be a support for regular dialogue developed between healthcare professionals and families for the purpose of promoting the health of children and teenagers [24]. It might be interesting to introduce the fever card during every doctor's appointment for a fever and, more generally, to take advantage of follow-up appointments for children to promote the preventative messages in the child health record booklet. In 2015, a study carried out in Paris demonstrated that the systematic introduction of an information booklet in a primary care situation, regardless of the context of treatment, in general medicine, in mother and infant welfare institutions (PMI), or in a childcare center, is useful and improves parental knowledge in the event of a fever in their child [25]. It may also make sense for this card to appear in the top results of internet searches with the key words "fever + child" or for it, or a phrase giving advice to consult it, to be placed in packages of paracetamol or the inserts in the boxes. Lastly, this card could be put in a different position in the child health record booklet so that it can be accessed more quickly. For example, by combining the advice for parents at the start or the end of the booklet or by adding dividers so it can be found more easily.

The strength of this study lies in the large number of parents surveyed and its distribution on a national scale.

The results of this study provide paths to improving the practices of parents and therefore avoiding the healthcare system being overwhelmed when its help is unnecessary. However, this can be contrasted with some inherent biases when carrying out the study. The main one was selection bias. The population studied differed from the French population in a number of ways:

- the respondents were primarily female (92%). This bias was anticipated because it usually the mothers who are responsible for taking care of children. According to a 2010 INSEE study [26], women dedicate 95 min/day to parenting time (54 min of which is for care), whereas it is only 41 min/day on average for men (14 min of which is for care);
- slight overrepresentation of the Île-de-France region. Twenty-four percent of our population versus 18% according to the INSEE report of 1 January 2018. This bias was anticipated due to the initial recruitment from those close to the investigator. However, the overall regional distribution is close to that of France's population as of 1 January 2018 (Fig. 1).;
- executives and highly qualified professions were over-represented. Our population presented 1.2 times more (54% vs. 44%) executives and intermediate professions and 1.4 times fewer (40% vs. 56%) employees, workers, and farmers than in the general population in 2017, according to INSEE [27]. This bias is linked to recruitment from the investigator's professional circle and close family and friends. It could also be explained by a more pronounced interest in participating in a

university study among this population. This bias was limited by an analysis in subgroups to assess the influence of the socioprofessional category on the knowledge of parents;

- healthcare professionals in all categories were over-represented overall. They accounted for 49%, of which 26% were professionals trained in treating a child with fever over the course of their studies (doctor, pharmacist, nurse, midwife, and childcare worker). This bias is linked to recruitment from the investigator's professional circle and was limited by a subgroup analysis separating professionals considered to be trained from those who are untrained;
- those without internet access were automatically excluded given that the questionnaire was only available online. However, targets that do not have internet access are increasingly rare and this is mainly the case for older people, marginalized populations, and those with very low incomes.

The second significant bias is linked to the technique chosen for collecting data. The use of an online questionnaire brings the risk of respondents looking up the answers to the questions and leads to responses being based only on these practices that have been found and not those that have been followed. The use of mostly closed questions makes it possible to facilitate analysis but consequently loses precision or information for certain questions, as well as possible suggestion bias for the answers. It was therefore decided to include an open question at the end of the questionnaire in order to offer greater freedom and not to direct the answers.

5. Conclusion

Despite the recent update of recommendations on treatment for a child with fever, these are still not fully understood by both parents and healthcare professionals. Healthcare professionals' knowledge of this treatment must be updated, possibly through the fever memo card published by HAS in 2016, in order for them to be able to convey a clear and uniform message to parents. The "fever" advice card updated in the child health record booklet in place since 1 April 2018 provides the main information that parents are still lacking. One of the essential roles of healthcare professionals in contact with children is to inform parents of the existence of this information card in the child health record booklet, which should be a support for regular dialogue developed with families for the purpose of promoting children's health.

Disclosure of interest

The authors declare that they have no competing interest.

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