

Management of fever in children under 5 years of age within paediatric emergency department

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Abstract

Objectives: This audit aimed to (1) assess the management of children aged up to 5 years presenting with fever to the Paediatric Emergency Department (PED) at Mater Dei Hospital, and (2) assess the awareness of NICE guidelines on fever management amongst paediatric doctors and nurses.

Method: Data was collected from PED Assessment Sheets in January 2017. An online questionnaire based on the NICE guidelines for fever management in children under 5 years of age was completed by staff working within the Department of Child and Adolescent Health.

Results: 255 children aged up to 5 years presented with fever $\geq 37.5^{\circ}\text{C}$ at the Paediatric Emergency Department in January 2017. 22.7% of children were aged between 24 months up to 3 years. The average time for first medical contact was 51 minutes. 23.9% presented with fever of 1 day duration. Respiratory rate was not recorded in 62% of cases whilst blood pressure was only recorded in 19.1% where applicable. Antipyretics were given in 73.8% of febrile cases despite distress only being documented in 6.8%. NICE guidelines would recommend measurement of respiratory rate as part of routine assessment of children presenting with fever and blood pressure measurement in cases of abnormal heart rate or capillary refill time. Antipyretic use is recommended only in the presence of distress secondary to fever.

Conclusion: More education is required on proper antipyretic use and pre-discharge advice. Routine measurement and documentation of all parameters should be encouraged both on initial assessment and pre-discharge.

Keywords

fever, child, antipyretics, NICE guideline

Introduction

Fever can be defined as an increase in body temperature above 37.5°C . It is one of the commonest medical signs, with causes ranging from trivial to potentially life threatening, and usually indicating the presence of an underlying infection in the case of young children. In Malta, almost 50% of children admitted to hospital are less than 5 years of age, and of these 33% have fever with 32% suffering from respiratory tract infections and febrile convulsions.¹

Fever in young children can be diagnostically challenging when it comes to elucidating the cause

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despite overall progress in healthcare in recent years. Although trivial causes account for the majority of cases, potentially serious bacterial infections such as meningitis still need to be ruled out, and infection still remain the leading cause of death in children under 5 years of age.² Moreover, a significant number of febrile children have no obvious cause despite detailed assessment, presenting a further challenge to management. All this highlights the need to formulate guidelines in order to assist staff in improving recognition of potentially serious disease and to assist in the treatment of feverish young children.

The presence of fever often leads to widespread use of antipyretics by parents.³ With parents often administering treatment unilaterally, the importance of advice on fever management from staff cannot be over-emphasised. Studies have shown that only 13% of paediatricians specifically cite child discomfort as a reason to administer antipyretics, with a large percentage administering treatment in an attempt to maintain normothermia.⁴ Therefore, awareness of established guidelines on fever management amongst healthcare professionals working with children is of utmost importance in order to ensure proper use of antipyretics and fever management advice to parents.

Objectives

This audit aimed to assess the management of children aged 5 years or less presenting with fever to the Paediatric Emergency Department at Mater Dei Hospital, including the assessment of staff awareness of NICE guidelines on fever management in children in this age group. It specifically aimed to assess:

- Documentation of symptoms accompanying fever if present
- Documentation of parameters (temperature, heart rate, respiratory rate, capillary refill time) on presentation as part of routine assessment of a feverish child and documentation of blood pressure when applicable
- Repetition of parameters pre-discharge
- Types and indications for antipyretics when

administered

- Documentation of fever management advice given to parents pre-discharge
- Awareness of NICE guidelines amongst staff working within the Department of Child and Adolescent Health focusing on proper temperature recording, parameter charting, antipyretic use and fever management advice

Guidelines

The guidelines used in this audit were the “NICE Guidelines Fever in Under 5s: Assessment and Initial Management”, published in May 2013. Recommendations in this guideline against which the data collected was assessed are shown in Table 1.

Methodology

Permission to access records and carry out this audit was obtained from the Data Protection Unit, the Chairman of the Department of Child and Adolescent Health and from the Director of Nursing and Midwifery Services at Mater Dei Hospital. Data collected for this audit was obtained from two different sources:

A. *Paediatric Emergency Department (PED) Assessment Sheets*

Paediatric Emergency Department Assessment sheets for January 2017 were obtained from within the ED Records and the required clinical data was extracted and then compared to established NICE guidelines.

A proforma was used and data collected included:

- ID of patient
- Date
- Time of registration
- Time of triage
- Time of first medical contact
- Age
- Gender
- Presenting Complaint(s)
- Duration of fever pre presentation to casualty
- Temperature at presentation
- Heart rate recorded – yes/no
- Oxygen saturation recorded – yes/no

- Respiratory rate recorded – yes/no
- GCS/AVPU recorded – yes/no
- CRT recorded –yes/no
- Blood pressure recorded if abnormal HR/CRT – yes/no/not applicable
- Antipyretics given
- Reason for antipyretics if given
- Repetition of parameters pre-discharge
- Documentation of advice given to parents/carers

Inclusion criteria for data collection included:

- Children up to 5 years of age
- Children presenting with documented fever $\geq 37.5^{\circ}\text{C}$ at home or found to have fever on presentation to casualty
- Children who were discharged home after assessment
- Results for documented parameter charting were obtained solely from doctor assessment sheets. Parameters taken at triage were excluded.

Exclusion criteria for data collection included:

- Children admitted to hospital after initial assessment in casualty
- Children who were registered in the ED but failed to attend when called

B. Questionnaire distributed to staff working within the Department of Child and Adolescent Health at Mater Dei Hospital

An online anonymous questionnaire was sent to 74 doctors and nurses working within the Department of Child and Adolescent Health at Mater Dei Hospital in March 2017.

Questions were aimed to assess practices and awareness of:

- Proper temperature monitoring in children under 5 presenting with fever
- Vital parameters that should be recorded as part of routine assessment for young feverish children

- Scenarios in which blood pressure measurement would be applicable
- Proper administration of antipyretic agents and their indications for use
- Advice that should be given to parents/carers pre-discharge

Results

A. Data Collected from Paediatric Emergency Department Assessment Sheets

A total of 255 children aged up to 5 years who presented with fever $\geq 37.5^{\circ}\text{C}$ documented at home or in casualty were seen at the Paediatric Emergency Department between 1st January 2017 and 31st January 2017. The busiest day was the 7th January with a total of 16 children being assessed with fever, the least busy day being 5th January with only 3 children. 56.1% (143 children) of those assessed were males.

The average time taken for children to be assessed at triage once registered, was 21 minutes (median of 16 minutes, range of 0 waiting time to 1 hour 40 minutes). Time of triage was not documented on 3 triage sheets. The average time for first medical contact once triaged was 51 minutes (median 31 minutes, range 0 waiting time to 4 hours). The time of first medical contact was not recorded in 90 assessment sheets (35.3%).

Figure 1 demonstrates peak times for attendances for the month of January 2017 to the Paediatric Emergency Department. A peak in patient numbers can be seen at 19:00 hours, with the least amount of patients attending during the early morning hours.

The most common age group presenting with fever was children aged between 24 months up to 3 years of age ($n=58$ (22.7%)). The age of the child was not documented in 2 (0.8%) cases and there were no children aged less than 4 weeks.

The most common symptoms associated with fever were cough and upper respiratory tract symptoms (Figure 2).

Table 1: Recommendations of NICE Guidelines Fever in under 5s: Assessment and Initial Management May 2013

NICE Guidelines Fever in Under 5s: Assessment and Initial Management May 2013	
Recommendations	
Temperature Monitoring	<p>Oral and rectal routes should NOT be routinely used to measure the body temperature of children aged 0–5 years.</p> <p>In infants under the age of 4 weeks, measurement of body temperature should be carried out with an electronic thermometer in the axilla.</p> <p>In children aged 4 weeks to 5 years, measurement of body temperature should be carried out by one of the following methods:</p> <ul style="list-style-type: none"> ✓ electronic thermometer in the axilla ✓ chemical dot thermometer in the axilla ✓ infra-red tympanic thermometer.
Parameter Charting	<p>Routine assessment of a child with fever should include measurement and documentation of temperature, heart rate, respiratory rate and capillary refill time</p> <p>Blood pressure should be measured if the heart rate or capillary refill time is abnormal and the facilities to measure blood pressure are available.</p>
Antipyretic Use	<p>Antipyretic agents do not prevent febrile convulsions and should not be used specifically for this purpose.</p> <p>Paracetamol or ibuprofen should be considered in children with fever who appear distressed.</p> <p>Antipyretic agents should NOT be used with the sole aim of reducing body temperature in children with fever.</p> <p>When using antipyretics:</p> <ul style="list-style-type: none"> ✓ Should be continued only as long as the child appears distressed ✓ Changing to the other agent should be considered if the child's distress is not alleviated ✓ Both agents should NOT be given simultaneously ✓ Alternating these agents should only be considered if the distress persists or recurs before the next dose is due.
Advice Pre-Discharge	<p>Advice to parents or carers looking after a feverish child at home should include:</p> <ul style="list-style-type: none"> ✓ Offering the child regular fluids (where a baby or child is breastfed the most appropriate fluid is breast milk) ✓ How to detect signs of dehydration, to encourage their child to drink more fluids and consider seeking further advice if they detect signs of dehydration ✓ Warning signs such as a non-blanching rash and when to reseek medical advice ✓ Nursery/school advice

Figure 1: Number of children presenting to casualty against time

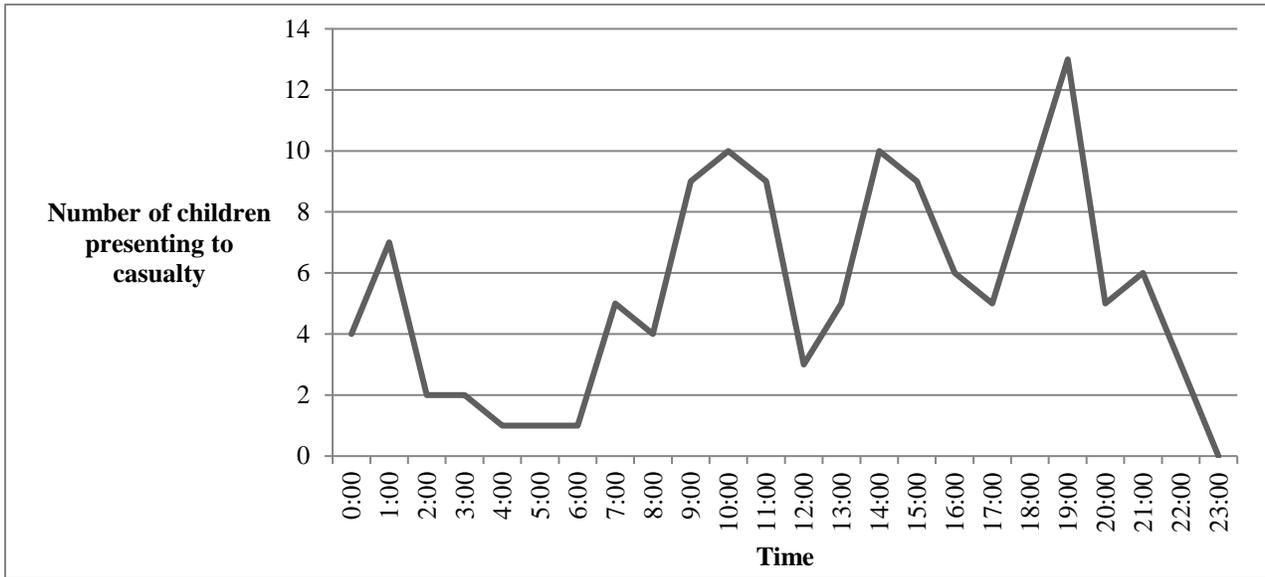
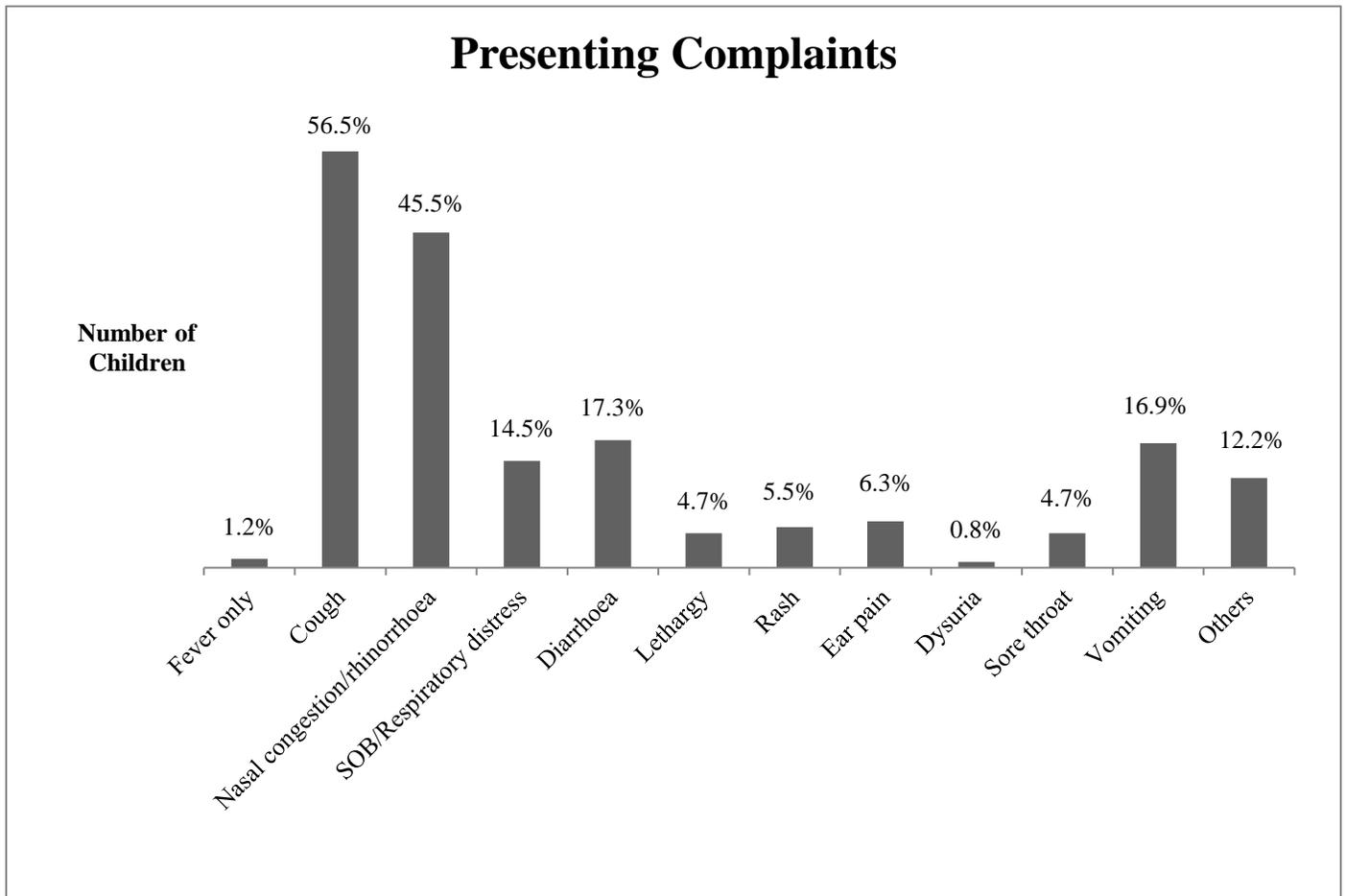


Figure 2: Associated symptoms for children presenting with fever to casualty.



Most children (23.9%) presented with a fever of 1 day duration, followed by 15.3% presenting with fever of 2 hour duration.

45.5% of children presenting to casualty were afebrile on initial assessment. The temperature was not recorded in 1.2% of assessment sheets (Figure 3).

The NICE guidelines stipulate that routine assessment of a child with fever should include measurement and documentation of temperature, heart rate, respiratory rate and capillary refill time together with blood pressure measurement in cases of abnormal heart rate and CRT. Figure 4 shows documentation of these parameters on the doctor assessment sheets analysed in this audit. Figure 5 demonstrates results for blood pressure documentation should be performed in those with an abnormal heart rate and CRT.

Temperature was the parameter most commonly rechecked pre-discharge (67.6%), followed by oxygen saturation (14.1%), heart rate (12.7%) and respiratory rate (9.9%).

Antipyretic use and reasons documented for its administration were also assessed. No antipyretics were administered in casualty in 65.5% of cases (Figure 6) since these children were afebrile. In two cases, it was specifically documented that antipyretics had already been given by the parents/carers at home a few hours before bringing the child for assessment, at which point the next dose of antipyretics was not yet due.

Advice given to parents or carers re warning signs to look out for whilst caring for the child at home was documented in 64.3% of cases. Regular antipyretic use purely for fever control, irrespective of the presence or absence of distress in the child was given in 22% of cases. Parents were advised to administer antipyretics only if the child appeared to be distressed, as per guidelines, in just 6.7% of cases. Fluids were only encouraged in 14.9% (Figure 8).

Figure 3: Duration of fever before presentation for doctor assessment

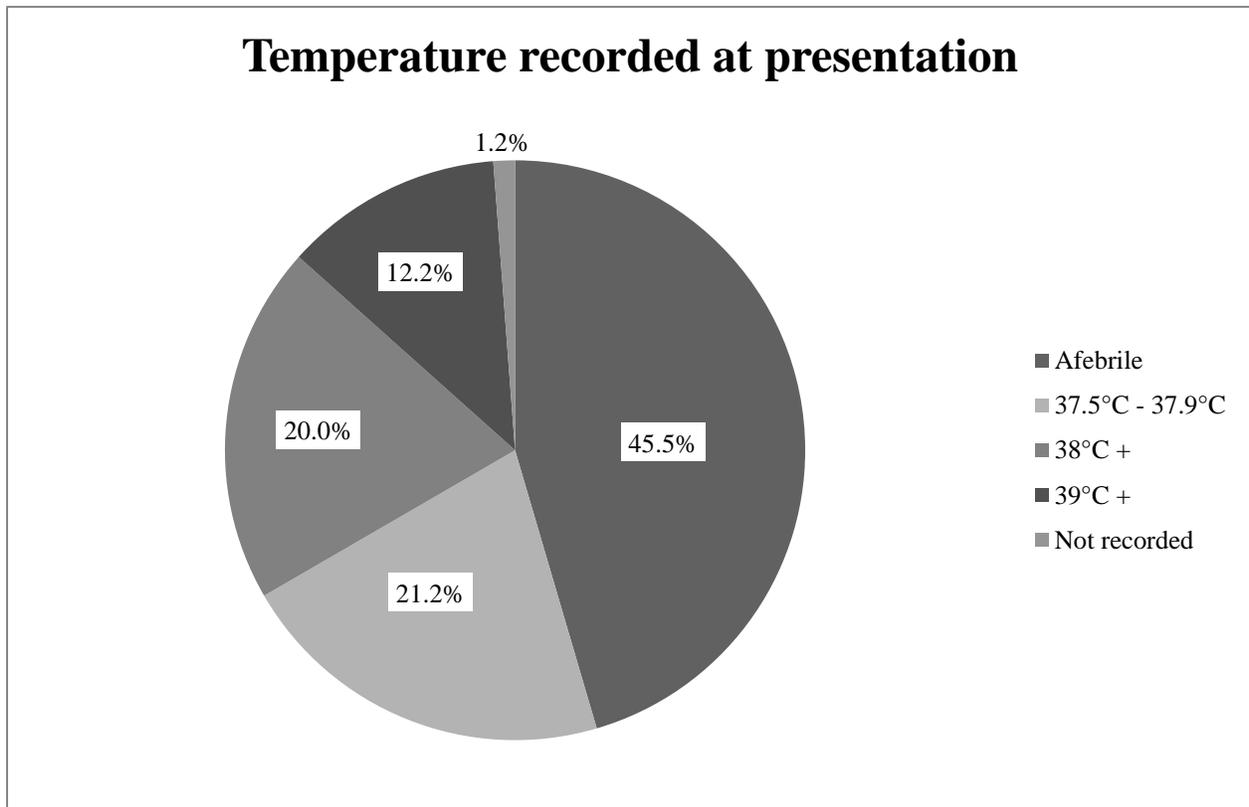


Figure 4: Parameters recorded by doctors on initial assessment

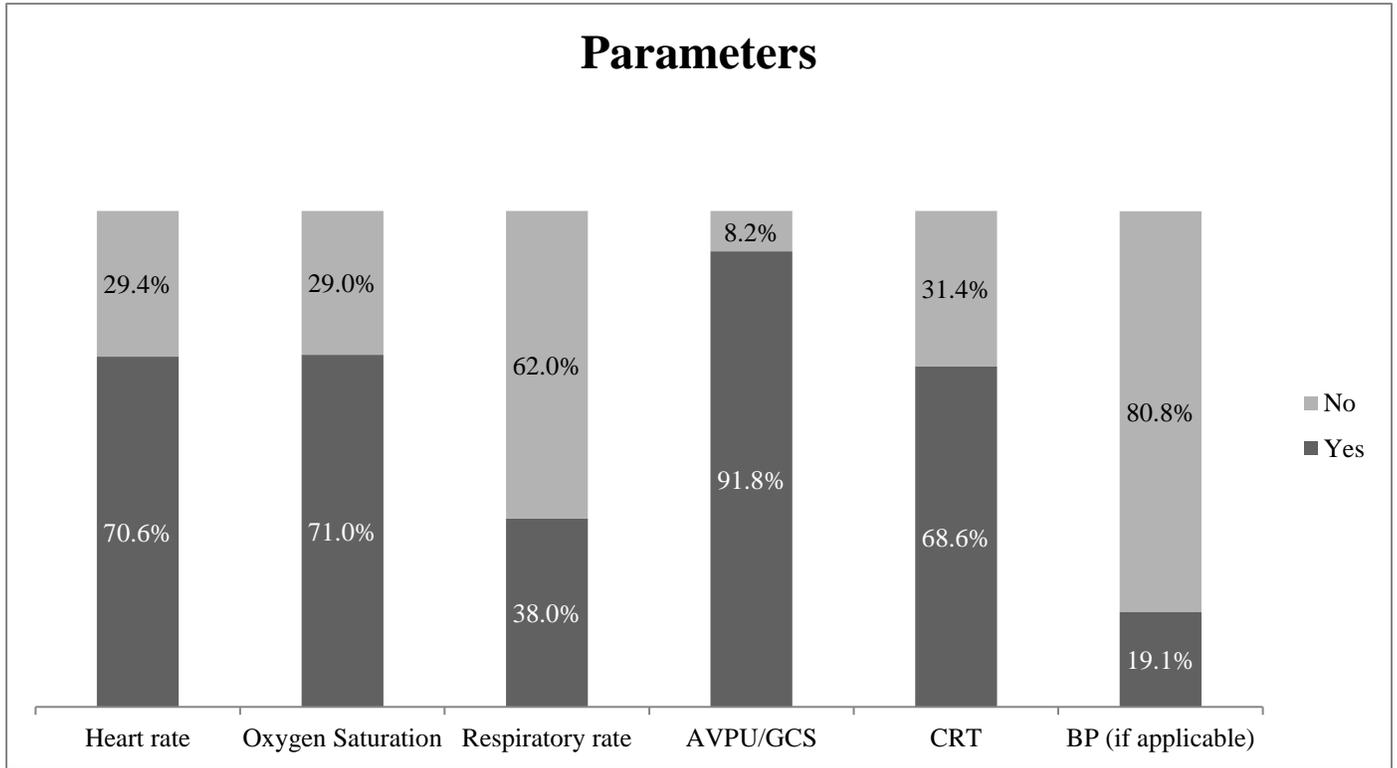


Figure 5: Blood pressure measurement and documentation

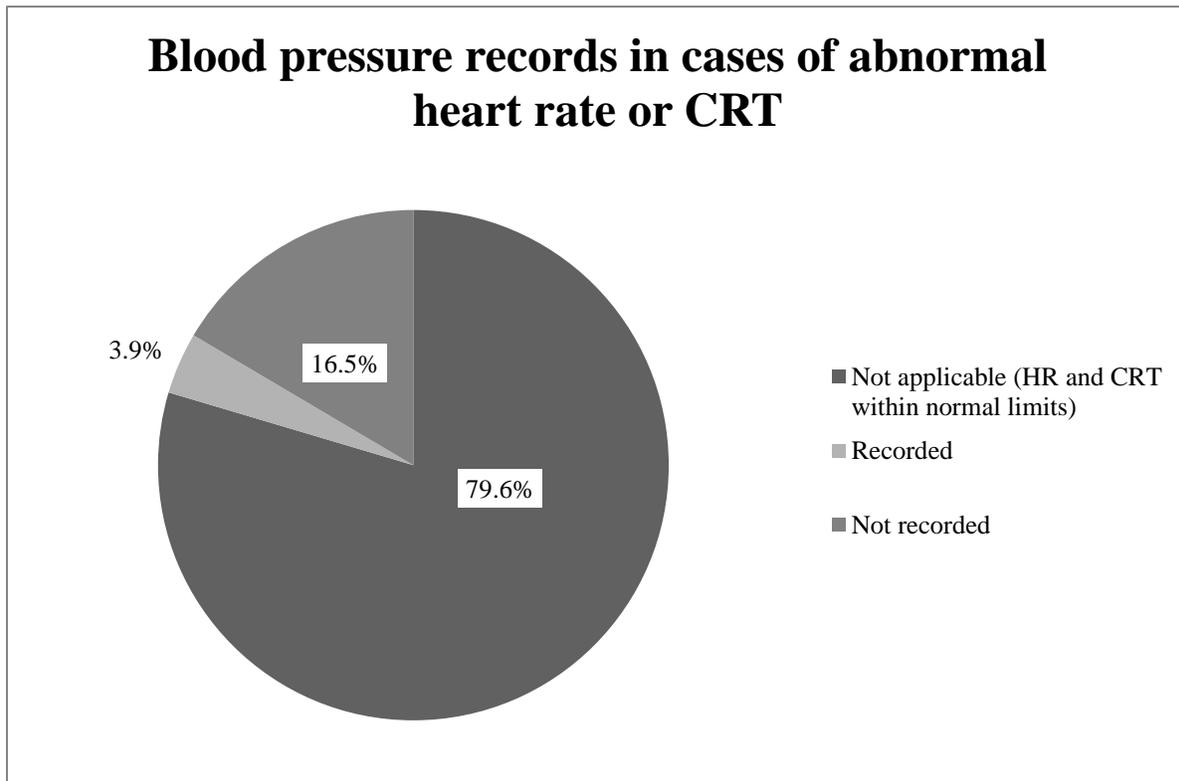


Figure 6: Antipyretic use within the Paediatric Emergency Department

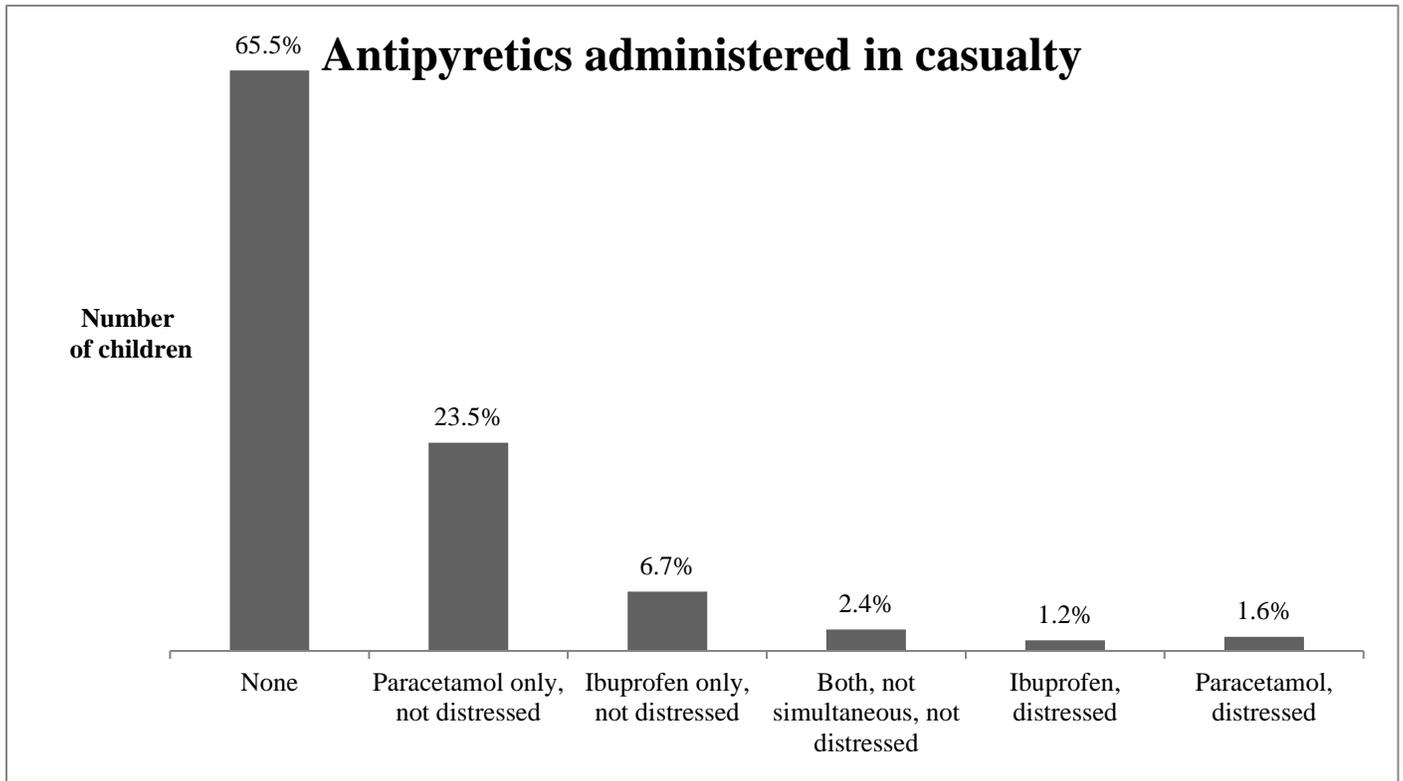


Figure 7: Reasons for antipyretic use

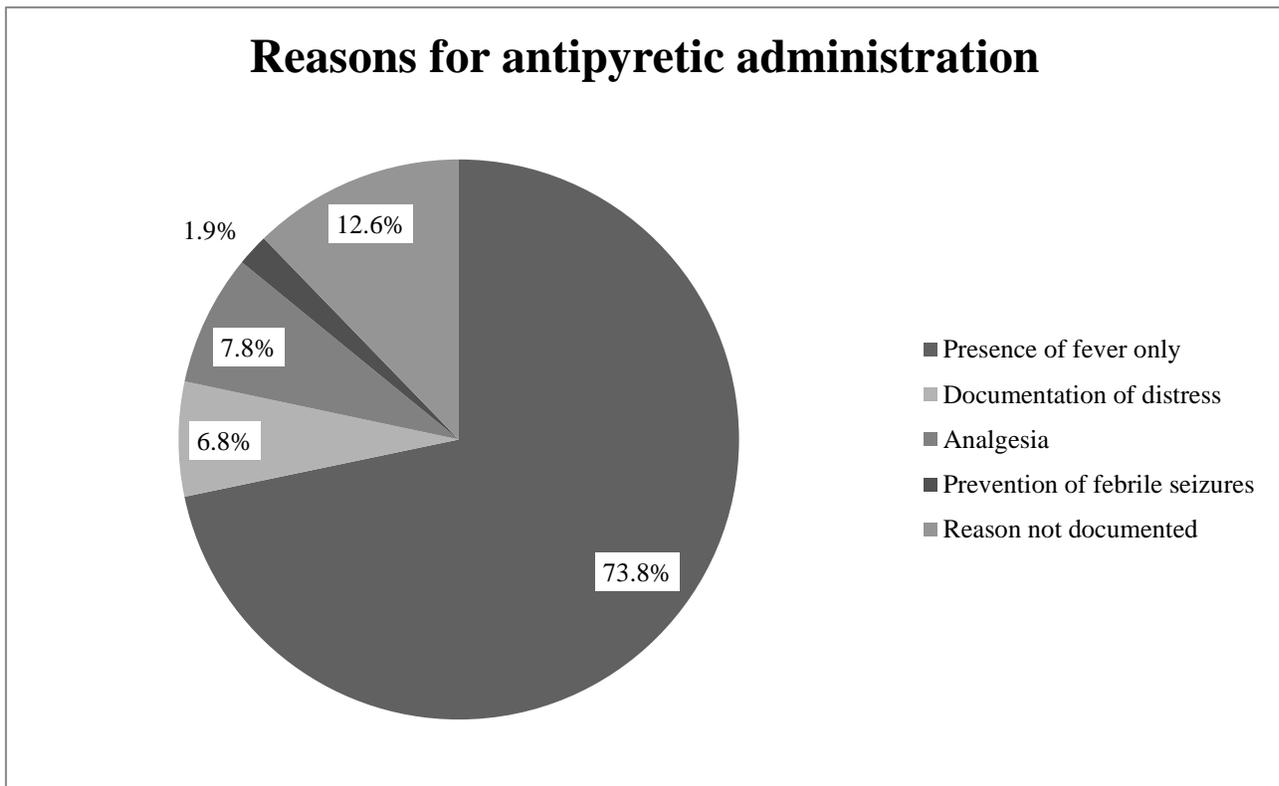
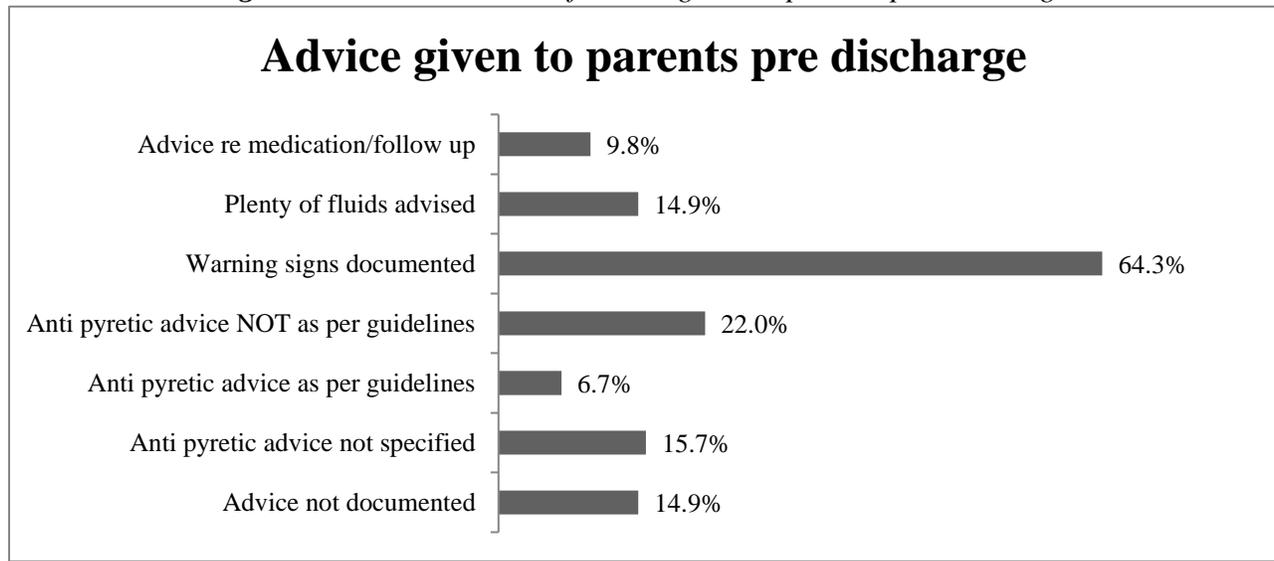


Figure 8: Documentation of advice given to parents pre-discharge

B. Data collected from questionnaires distributed to doctors and nurses working within the Department of Child and Adolescent Health at Mater Dei Hospital

An online questionnaire was distributed to 74 doctors and nurses working within the Department of Child and Adolescent Health at Mater Dei Hospital. 40 staff members participated in the study (10 consultants, 3 resident specialists, 6 HSTs, 6 BSTs, 7 foundation doctors and 8 paediatric nurses) giving a response rate of 54%. They were questioned regarding methods of temperature measurement, vital parameters routinely monitored in a feverish child, indications for antipyretics and advice for home care pre-discharge.

97.5% ($n=39$) of participants correctly identified the axilla as an appropriate route of temperature measurement in children under 5 years of age. Correct choice of thermometer type (electronic thermometer) was also identified by the majority of participants for the different age groups (83% for infants less than 4 weeks of age and 90% for infants between 4 weeks up to 5 years).

Heart rate (97.5%, $n=39$) was identified as a routine vital parameter that should be measured in a feverish child, followed by temperature (87.5%, $n=35$) and respiratory rate (77.5%, $n=31$). Capillary refill time was only mentioned by 37.5%

($n=15$) of respondents followed by blood pressure monitoring (22.5%, $n=9$). 72.5% ($n=29$) identified abnormal CRT as an indication for blood pressure measurement, followed by 65% ($n=26$) for abnormal heart rate.

72.5% ($n=29$) identified distress secondary to fever as the only indication for antipyretic use, whilst 5% ($n=2$) opted for antipyretic administration as long as fever beyond 38°C is present and another 5% irrespective of temperature grade.

Use of multiple antipyretic agents in cases of distress recurring before the next dose is due, or distress not alleviated by one agent was correctly chosen by 57.5% ($n=23$) and 52.5% ($n=21$) respectively. 35% ($n=14$) advised multiple antipyretic use in cases of fever not being alleviated by one agent or fever recurring before the next dose is due (20%, $n=8$).

All participants identified the importance of encouraging parents to increase oral fluids in feverish children. The identification of a non-blanching rash (95%, $n=38$) together with detecting signs of dehydration (90%, $n=36$), were also popular pre-discharge advice. Nursery/school advice was mentioned in 77.5% ($n=31$) of cases. Tepid sponging and over/underdressing advice was interestingly mentioned by 32.5% ($n=13$) and 42.5% ($n=17$) respectively.

Discussion

The high-impact on healthcare systems brought about by young children presenting with fever is undisputable. With fever being one of the commonest complaints of young children presenting to the paediatric emergency department⁵, the importance of guideline awareness amongst staff and ensuring proper public education is of utmost importance. It is well known from various studies, that inconsistent fever management approaches are still found even within the most established paediatric emergency departments.⁶⁻⁷

This study aimed to assess fever management within the paediatric emergency department at Mater Dei Hospital covering both aspects of documentation and awareness of NICE guidelines amongst paediatric staff. It also sought to explore patterns in the presentation of young children with fever in an attempt to better understand and improve our current healthcare system.

The average time for first medical contact was 51 minutes, ranging from no waiting time to a waiting time of 4 hours. This might reflect recent attempts to reduce waiting times to a maximum of 4 hours, including the introduction of a computerised patient tracking system, in order to ensure reasonable time frames for review. The wide difference in waiting times might be a reflection of both differences in staff availability and peak attendances to casualty. In fact, further detailed analysis shows longer waiting times between 11am and 2pm and also between 10pm and midnight, mirroring peak attendance times taking place at 10am and 7pm respectively. Such peak attendances especially in the early evening, possibly correlate to more convenient times for parents to bring their children for review after school or work, and this is also reflected in the low number of attendances observed during the early morning hours. Longer waiting times were recorded for weekends especially Sundays, possibly suggesting lack of availability of community physicians and paediatricians during the weekend.

The commonest age group of children presenting with fever was as expected - that

between 24 months and 3 years of age (22.7%), when children start nursery and school and there is increased contact with other children. Upper respiratory tract symptoms followed by symptoms of gastroenteritis were the commonest associated symptoms, reflecting their easy transmission. This was also the finding in a study in England by Nademi *et al.* in 2001, who reported 71% of children presenting to casualty with fever from a trivial viral infection, with tonsillitis and gastroenteritis being amongst the commonest diagnosis.⁸

23.9% of children had a fever of only 1 day duration, followed closely by 18.3% presenting with a 2 hour history of fever possibly reflecting parental anxiety, and might warrant further study into possible lack of awareness on proper fever management and recognition of warning signs amongst carers of children within the community. 45.5% of children assessed were afebrile, however it was difficult to determine whether this was due to previous administration of antipyretics at home, as information regarding the time of last antipyretic administration was only recorded in 2 cases. In view of this, antipyretics were not administered in casualty in 65.5% of cases.

Paracetamol was the commonest drug administered (23.5%) followed by ibuprofen (6.7%), since most presented with low grade fever. Antipyretics were administered by staff in 73.8% of children whilst distress was specifically documented in only 6.8% and were only withheld in 12.6% of cases. 35% of staff opted for use of multiple antipyretics in persistent fever irrespective of distress. Possible explanations for this might be either lack of documentation of distress in the child or an attempt to alleviate parental and possibly also staff concern.

Heart rate, oxygen saturations and CRT were documented in over 70% of assessments, possibly reflecting the ease with which these parameters can be quickly obtained using available equipment. In contrast, respiratory rate was not recorded in 62% of cases and this was surprising given the fact that the majority of children presenting with fever had upper respiratory tract symptoms. However, analysis of data obtained via

the questionnaire distributed to staff showed that 77.5% included respiratory rate as part of their routine assessment. Possible explanations for such inconsistencies may be the effort and time it takes to measure respiratory rate in distressed children. Moreover, one must consider that the paediatric emergency department at Mater Dei Hospital is run by basic specialist trainees, foundation year doctors and nurses, and the returned questionnaires were largely not representative of this group. Therefore, such data might be reflecting differences in awareness in different cohorts of staff.

Temperature was the most common parameter to be repeated pre-discharge (67.6%) in contrast to heart rate (12.7%). This might reflect the misconception by staff that response to antipyretic therapy helps in categorizing seriously ill children from those who are not, a common misconception also highlighted by other studies.⁹

Blood pressure was not recorded in 80.8% of cases with abnormal heart rate or CRT. This was further reflected in the questionnaires - only 22.5% of staff recognized blood pressure as being one of the vital parameters to record in young feverish children, thus emphasizing the need for more awareness in this regard.

Misconceptions regarding temperature control were also mirrored on analysis of advice given to the parents by staff pre-discharge. Whilst warning signs were documented in 64.3% of cases, regular antipyretics were advised in 22% versus 6.7% who advised antipyretic use only in cases of distress as per guidelines. Encouragement of oral fluid administration was documented only in 14.9% despite 100% positive responses in the questionnaire distributed, which again might reflect management differences in staff cohorts.

Limitations

The data on which this study is based was obtained over a one month period. Data obtained over a longer period would allow better assessment of changes in patterns of both presentation and clinical practices within the department including seasonal changes. Moreover, the response rate for the questionnaire

was 54% - a higher response rate would ensure more representative data.

Conclusion

This study showed that whilst there is good overall staff awareness of NICE guidelines on fever management in young children, there is room for improvement when it comes to implementation of such practices. Whilst the recent introduction of an educational leaflet on fever management aimed at parents within the PED is a step in the right direction, further continuing medical education is required on indications for antipyretic use and proper pre-discharge advice. Measurement of parameters especially blood pressure should be encouraged and documented both on initial assessment and pre-discharge.

References

1. National Statistics Office Malta. 2010. Children 2010. [online] Available at: https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/C1_Living_Conditions_and_Culture_Statistics/Children_2010.pdf. [Accessed 5th July 2017].
2. NICE guidelines Fever in Under 5s: assessment and initial management. 2013. [online] Available at: <https://www.nice.org.uk/guidance/cg160>. [Accessed 5th July 2017].
3. Sullivan, J.E., Farrar H.C., Section on Clinical Pharmacology and Therapeutics, Committee on Drugs. 2011. Clinical Report—Fever and Antipyretic Use in Children. *Pediatrics*. [e-journal] 1098-4275 Available through: American Academy of Pediatrics <<http://pediatrics.aappublications.org/content/pediatrics/127/3/580.full.pdf>> [Accessed 15th April 2018]
4. Mayoral, C., Marino, R., Rosenfeld, W., Greensher, J. 2000. Alternating antipyretics: is this an alternative? *Pediatrics*. [e-journal] 105(5):1009–1012. Available through: PubMed Library <<https://www.ncbi.nlm.nih.gov/pubmed/10790455>> [Accessed 24th October 2017].
5. Poirier, M.P., Davis, P.H., Gonzalez-Del Rey, J.A., Monrow, K.W. 2000. Pediatric emergency department nurses' perspectives on fever in children. *Pediatric Emergency Care*. [e-journal] 16(1):9-12. Available through: PubMed Library <<https://www.ncbi.nlm.nih.gov/pubmed/10698135>> [Accessed 23rd October 2017].

6. Seow V.K., Lin, A.C., Lin, I.Y., Chen, C.C., Chen, K.C., Wang, T.L., Chong, C.F. 2007. Comparing different patterns for managing febrile children in the ED between emergency and pediatric physicians: impact on patient outcome. *Am J Emerg Med.* [e-journal] 25(9):1004-8. Available through PubMed Library
<<https://www.ncbi.nlm.nih.gov/pubmed/18022493>> [Accessed 23rd October 2017].
7. Goldman, R.D., Scolnik, D., Chauvin-Kimoff, L., Farion, K.J., Ali, S., Lynch, T. Gouin, S., Osmond, M.H. Johnson, D.W., Klassen, T.P. 2009. Practice variations in the treatment of febrile. infants among pediatric emergency physicians. *Pediatrics.* [e-journal] 124(2):439-45. Available through Medscape Library <https://reference.medscape.com/medline/abstract/19620201?src=ogm_ret_dsk_push&pl=1>. [Accessed 23rd October 2017].
8. Nademi, Z., Clark, J., Richards, C.G.M., Walshaw, D., Cant, A.J. 2001. Causes of Fever in Children Attending Hospital in the North of England. *Journal of Infection.* [e-journal] 43: 221±225. Available on: <http://www.idealibrary.com>. [Accessed 23rd October 2017].
9. Torrey, S.B., Henretig, F., Fleisher, G., Goldstein, R.M., Ardire, A., Ludwig, S., Ruddy, R. 1985. Temperature response to antipyretic therapy in children: relationship to occult bacteremia. *Am J Emerg Med.* [e-journal] 3(3):190-2. Available through PubMed Library
<<https://www.ncbi.nlm.nih.gov/pubmed/3873245>> [Accessed on 23rd October 2017].