


Early recognition of PIMS-TS: a single centre retrospective review

Roshni Mistry ¹, Nicola Scanlon,² James Hibberd,^{3,4} Fionnghuala Fuller²

To cite: Mistry R, Scanlon N, Hibberd J, *et al.* Early recognition of PIMS-TS: a single centre retrospective review. *BMJ Paediatrics Open* 2021;**5**:e001011. doi:10.1136/bmjpo-2020-001011

Received 30 December 2020
Accepted 9 February 2021

ABSTRACT

Introduction Research into paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS) has focused on tertiary level management. This review reports on symptoms and investigations at presentation.

Methods Single centre retrospective case note analysis of patients fulfilling PIMS-TS diagnostic criteria from March to May 2020 in a London district level university hospital.

Results Six patients presented in the week prior to their final diagnosis with fever and non-specific symptoms. Raised C-reactive protein (CRP), lymphopenia and hyponatraemia were noted. Kawasaki-like symptoms were under-represented in all patients.

Interpretation The results suggest that a proportion of children with early PIMS-TS present with a non-specific febrile illness and abnormal blood results. Further research is needed to determine the most appropriate identification and follow-up of these children.

While most children experience only mild symptoms after contracting SARS-CoV-2 infection,¹ a small number suffer from severe disease characterised by an exaggerated inflammatory response leading to multiorgan dysfunction termed paediatric inflammatory multisystem syndrome temporally associated with SARS-CoV-2 (PIMS-TS).² Most previous studies have focused on children's presentation and subsequent investigations at admission to tertiary centres. This review of 11 cases of PIMS-TS at a District University Hospital analyses clinical features at admission as well as previous presentations to explore if there are any early features of the disease.

Retrospective data were analysed for all children (aged 0–16 years) seen in North Middlesex University Hospital paediatric emergency department (PED) between March and May 2020 who fulfilled the Royal College of Paediatrics and Child Health (RCPCH) case definition criteria for PIMS-TS.² Data were collected based on the RCPCH guideline including patient

Key Messages

- ▶ Children with early PIMS-TS can present with a non-specific febrile illness a few days before they become severely unwell.
- ▶ Certain abnormal blood test results may indicate early PIMS-TS.
- ▶ Further research is needed to ascertain the significance of these findings and their application to clinical practice

demographics, presenting symptoms and relevant laboratory findings.²

Eleven patients met the criteria for inclusion. Five were female and six were male. The mean age at presentation was 7.8 years (range 18 months–13 years). Six children had been seen and discharged in the week prior to their subsequent diagnosis. Their initial diagnoses were COVID-19 infection, scarlet fever, migraine, viral upper respiratory tract infection, suspected bacterial sepsis and bacterial tonsillitis. The mean time between first presentation and admission was 2.7 days (range 0–5 days). The most common symptoms at first presentation for these six patients were fever (six patients), vomiting (four patients), headache (three patients) and rash (three patients) (table 1). Two patients were ambulated on intravenous antibiotics while the remaining were discharged with no follow-up. All three patients who had blood tested on first presentation had a raised C-reactive protein (CRP) (range 58–137 mg/L) and lymphopenia (range $0.63\text{--}0.83 \times 10^9/\text{L}$), two had hyponatraemia (results 132 and 134 mmol/L).

At admission, the most common symptoms were fever (11 patients), abdominal pain (8 patients), rash (6 patients), vomiting (6 patients) and difficulty in breathing (6 patients) (table 1). Ten patients had a raised CRP (range 7.5–328 mg/L, mean 212 mg/L), five were lymphopenic (range $0.45\text{--}3.3 \times 10^9/\text{L}$) and eight were hyponatraemic (range 125–137 mmol/L). Fibrinogen, D-dimer,



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¹Paediatrics, Whittington Health NHS Trust, London, UK

²Paediatrics, North Middlesex University Hospital, London, UK

³General Practice, Andover Medical Centre, London, UK

⁴General Practice, The Northern Medical Centre, London, UK

Correspondence to

Dr Roshni Mistry; roshni.mistry@nhs.net

**Table 1** Symptoms and observations on first presentation and admission

	At first presentation (n=6)	On admission (n=11)
Symptoms		
Vomiting	4	6
Headache	3	3
Rash	3	6
Abdominal pain	2	8
Sore throat	2	2
Confusion	2	2
Diarrhoea	2	4
Cervical lymphadenopathy	1	2
Breathing difficulties	0	6
Cough	0	2
Conjunctivitis	0	3
Mucous membrane changes	0	1
Observations		
Fever >38	6	11
Fever >39	5	9
Fever >40	2	4
Hypotension	0	4
Tachycardia	4	7
Tachypnoea	4	6

ferritin, pro b-type natriuretic peptide (pro-BNP) and erythrocyte sedimentation rate (ESR) were raised in all patients in which they were tested. Seven patients had positive SARS-CoV-2 antibody tests.

The results of this review present interesting comparisons with the current literature. A recent systematic review showed that fever (100%), abdominal pain (73.7%) and vomiting (68.3%) were the most frequent symptoms at presentation. These symptoms were also common in this cohort. Additionally, consistent with previous reviews, most patients had a raised CRP, lymphopenia and hyponatraemia at presentation.³

In contrast with early descriptions of PIMS-TS which highlighted similarities to Kawasaki disease,⁴ these symptoms were under-represented in this review. One large case series reported shock (87%) as the second most common presenting feature in PIMS-TS⁵; however, only four patients in this review were hypotensive on admission, suggesting presentation earlier in the disease course.

The results of this review suggest that children with early PIMS-TS can present to PED with a non-specific febrile illness a few days before they become unwell with the more severe later features. Certain abnormal blood test results at this point may indicate early PIMS-TS; however this review is limited by the small case numbers making generalisation difficult. Further research is needed to ascertain the significance of these findings to determine whether current accepted practices for investigation and follow-up for patients with fever and non-specific symptoms are adequate to ensure timely diagnosis of PIMS-TS.

Contributors RM: Substantial contributions to the conception and design of the work. Substantial contributions in the acquisition, analysis and interpretation of data for the work. Substantial contributions in drafting, revising and final approval of the version to be published. NS and JH: Substantial contributions in the analysis and interpretation of data for the work. Substantial contributions in drafting, revising and final approval of the version to be published. FF: Substantial contributions in drafting, revising and final approval of the version to be published.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting or dissemination plans of this research.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

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ORCID iD

Roshni Mistry <http://orcid.org/0000-0002-8639-7306>

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