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From Lumbar Puncture to Pseudo-Fever: Diagnostic Cascades and Delayed Recognition of Psychosomatic Origins in Pediatric Fever of Unknown Origin

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Research Article

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From Lumbar Puncture to Pseudo-Fever: Diagnostic Cascades and Delayed Recognition of Psychosomatic Origins in Pediatric Fever of Unknown Origin

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Abbreviations: FUO, Fever of Unknown Origin; LP, Lumbar Puncture; BMA, Bone Marrow Aspiration; CD, Conversion Disorder; HPA, Hypothalamic-Pituitary-Adrenal; IQR, Interquartile Range; LOS, Length of Stay; SCARED, Screen for Child Anxiety Related Disorders.

Abstract

Objective: Pediatric fever of unknown origin (FUO) routinely triggers an infectious diagnostic cascade—laboratory testing, imaging, lumbar puncture (LP), bone marrow aspiration (BMA), and empiric antibiotics—before non-infectious etiologies are considered. This retrospective study quantifies the diagnostic intensity and healthcare resource utilization among hospitalized children with FUO ultimately suspected of having psychosomatic origins, and identifies opportunities for earlier multidisciplinary recognition.

Methods: Medical records of 80 hospitalized children aged 9–13 years (January 2023–January 2026) admitted for fever ≥37.5°C with negative infectious workups and eventual documentation of suspected conversion disorder or "pseudo-fever" were reviewed. Variables included invasive procedures, antibiotic exposure, diagnostic certainty at discharge, length of stay (LOS), and discharge outcomes. Categorical data were analyzed using chi-square or Fisher's exact tests.

Results: The cohort comprised 80 children (44 females, 55.0%; 36 males, 45.0%), with 67.5% aged 12–13 years. Before psychosomatic etiology was suspected, 30.0% underwent LP, 22.5% underwent BMA, and 95.0% received intravenous antibiotics. Median LOS was 12 days (IQR: 8–18). Only 40.0% received a definitive psychiatric diagnosis at discharge; 60.0% remained tentative. "Pseudo-fever" was documented in 58.8% of cases. Discharge outcomes were cured (25.0%), improved (62.5%), and unfavorable (12.5%). In exploratory analysis, females had higher cure rates (36.4% vs. 11.1%, $p = 0.021$), while males had more unfavorable outcomes (25.0% vs. 2.3%, $p = 0.003$).

Conclusions: Children with FUO ultimately suspected of psychosomatic etiology undergo substantial invasive testing and antibiotic exposure before psychiatric evaluation. These data support implementing early multidisciplinary pediatric–psychiatry pathways and standardized psychosomatic screening within

48–72 hours of admission when initial infectious workups return negative, to reduce unnecessary procedures and shorten diagnostic delay.

Keywords: Pediatric fever of unknown origin; Conversion disorder; Pseudo-fever; Diagnostic cascade; Overmedicalization; Psychosomatic medicine; Early recognition

1. Introduction

Fever of unknown origin (FUO) is among the most common reasons for pediatric hospital admission. The standard diagnostic pathway—serial laboratory testing, blood and cerebrospinal fluid cultures, imaging, lumbar puncture (LP), bone marrow aspiration (BMA), and empiric broad-spectrum antibiotics—has been carefully calibrated to minimize the risk of missing severe bacterial infection, meningitis, or hematologic malignancy (Kozlowska et al., 2007; Pehlivantürk & Unal, 2002). This infectious-first approach is appropriate when the probability of organic disease is high, but it carries a well-recognized risk of diagnostic cascade: once testing begins, each negative result tends to prompt escalation rather than reconsideration of the initial framework.

When exhaustive infectious and inflammatory workups return negative, the clinical team often continues to "add tests" rather than "change directions." Psychosomatic causes—including functional neurological symptom disorder, conversion disorder (CD), somatic symptom disorder, and factitious fever—are increasingly recognized as contributors to pediatric unexplained medical symptoms, yet they are typically among the last diagnoses considered in a hospitalist or infectious disease setting (Tang et al., 2021; Humtsoe & Deuri, 2025). This diagnostic delay translates directly into measurable patient harm: invasive procedures with procedural risk, unnecessary antibiotic exposure, prolonged hospitalization, and delayed access to effective psychological treatment.

A growing literature documents that functional somatic symptoms affect approximately 10–25% of children and adolescents in general medical settings (Veeraraghavan, 2022; Du et al., 2018). Yet fever, in particular, remains a symptom that almost universally triggers an infectious disease workup before any psychosomatic hypothesis is entertained. The phenomenon of "pseudo-fever"—elevated temperature recordings without corresponding inflammatory or physiologic markers—is well known to pediatric clinicians but has rarely been systematically characterized as a marker of diagnostic delay rather than as a distinct disease entity.

Rather than proposing a new diagnostic subtype, this retrospective cohort analysis addresses a more pragmatic clinical question: among hospitalized children whose fever ultimately leads to suspicion of psychosomatic etiology, what diagnostic intensity and healthcare resource utilization accumulate before that recognition occurs? We report rates of LP, BMA, and intravenous antibiotics, diagnostic certainty at discharge, length of stay, and discharge outcomes. The aim is to quantify the real-world cost of delayed psychosomatic recognition and to propose concrete steps for earlier multidisciplinary engagement.

2. Methods

2.1 Study Design and Setting

This retrospective chart review was conducted in the Pediatric Infectious Disease Unit of West China Second University Hospital, Sichuan University—a tertiary-level children's hospital in Chengdu, China—between January 2023 and January 2026.

2.2 Study Population

Eligible patients met all of the following criteria:

(1) Age 9–13 years at admission;

(2) Chief complaint of fever ≥37.5°C sustained for ≥24 hours;

(3) Complete negative laboratory, microbiologic, and imaging evaluations ruling out confirmed organic infection, autoimmune disease, hematologic disorder, or neoplasm;

(4) Clinical documentation by the attending physician suggesting conversion disorder, dissociative disorder, "pseudo-fever," or psychosomatic fever as a differential or discharge diagnosis; and

(5) Complete electronic medical records.

Patients were excluded if they had confirmed autoimmune, neurologic, hematologic, or neoplastic disease; established primary psychiatric diagnoses (schizophrenia, bipolar disorder, ADHD) predating admission; incomplete documentation; or self-discharge before completion of the minimum diagnostic evaluation. After applying these criteria, 80 patients were included in the final analysis.

2.3 Diagnostic Classification

Consistent with the study's pragmatic focus on diagnostic delay rather than diagnostic validation, patients were categorized by the level of diagnostic certainty documented at discharge:

• Definitive psychosomatic diagnosis: discharge diagnosis explicitly documented as "Conversion Disorder," "Dissociative [Conversion] Disorder," or equivalent (ICD-11 codes 6B60–6B6Z), without qualifying question marks or differential wording.

• Suspected/tentative: discharge documentation mentioning psychosomatic or conversion-related differential diagnoses (e.g., "fever of unknown origin: ? infection, ? conversion disorder") without definitive diagnostic confirmation.

2.4 Data Collection

The following variables were extracted from electronic medical records: age, sex, school level (primary vs. junior high), admission and discharge diagnoses, documentation of "pseudo-fever" (伪装热) or equivalent terms in physician notes, invasive procedures performed (LP, BMA, bronchoscopy, etc.), intravenous antibiotic exposure, psychiatric consultation records, length of hospital stay, and discharge outcomes.

Discharge outcomes were defined as follows: cured (complete resolution of fever and somatic symptoms with no recurrence at 1-month outpatient follow-up); improved (reduced fever frequency/severity with ongoing outpatient psychological support); and unfavorable (persistent symptoms at discharge, self-discharge against medical advice, or inter-hospital transfer for further workup).

2.5 Ethical Approval

This retrospective medical-record-based study used de-identified historical clinical data of pediatric patients. The study protocol, together with the application for waiver of parental/guardian informed consent, has been submitted to the Ethics Committee of West China Second University Hospital, Sichuan University (IIT receipt number: SL2026-363), and is currently under ethical review. Formal ethics approval and waiver documentation will be obtained and provided upon availability. All patient clinical records were fully de-identified prior to data extraction to protect participant privacy. The study will be conducted in accordance with the Declaration of Helsinki. No personally identifiable patient information is presented in this manuscript. Clinical trial number: not applicable.

2.6 Statistical Analysis

All analyses were performed using SPSS 26.0 (IBM, Armonk, NY, USA). Categorical data are presented as counts and percentages. Continuous variables are reported as median and interquartile range (IQR). Chi-square tests or Fisher's exact tests (when expected cell counts <5) were used for between-group comparisons. A two-sided p-value < 0.05 was considered statistically significant. Sex-stratified outcome comparisons were treated as exploratory given the small number of adverse events and the absence of multivariate adjustment.

3. Results

3.1 Demographic Characteristics

Among the 80 included children, the median age was 12 years (range: 9–13). There were 44 females (55.0%) and 36 males (45.0%). Children aged 12–13 years constituted 67.5% (n = 54) of the cohort, while those aged 9–11 years accounted for 32.5% (n = 26). Primary school students numbered 41 (51.2%) and junior high school students 39 (48.8%) (Figure 1).

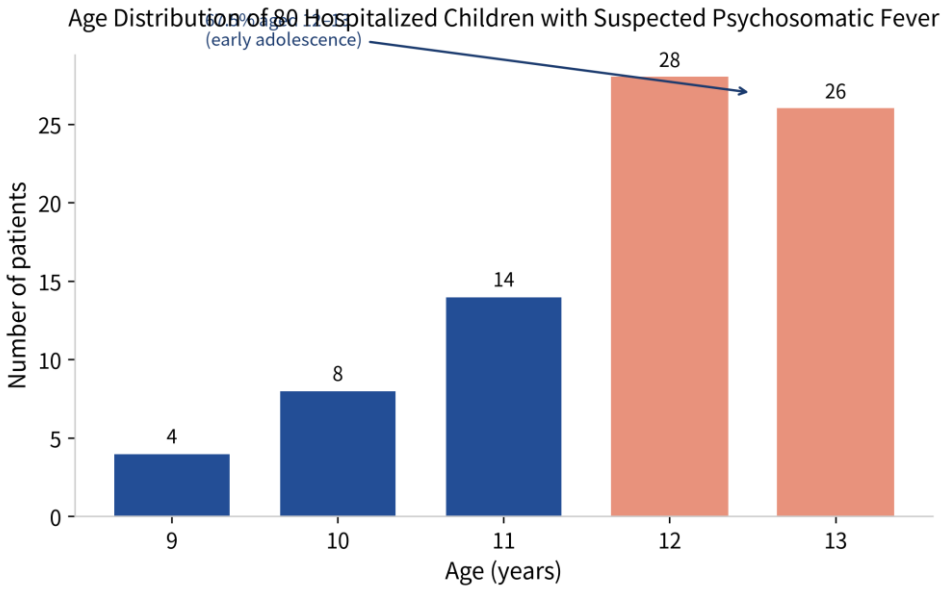


Figure 1. Age distribution of 80 hospitalized children with FUO and suspected psychosomatic etiology.

3.2 Diagnostic Cascade: Procedures and Antibiotic Exposure

The central finding of this study is the intensity of diagnostic and therapeutic intervention undertaken before psychosomatic etiology was recognized (Figure 2, Figure 5). Among the 80 children:

• Lumbar puncture was performed in 24 patients (30.0%);

• Bone marrow aspiration was performed in 18 patients (22.5%);

• Intravenous antibiotics were administered to 76 patients (95.0%);

• Median length of stay was 12 days (IQR: 8–18 days).

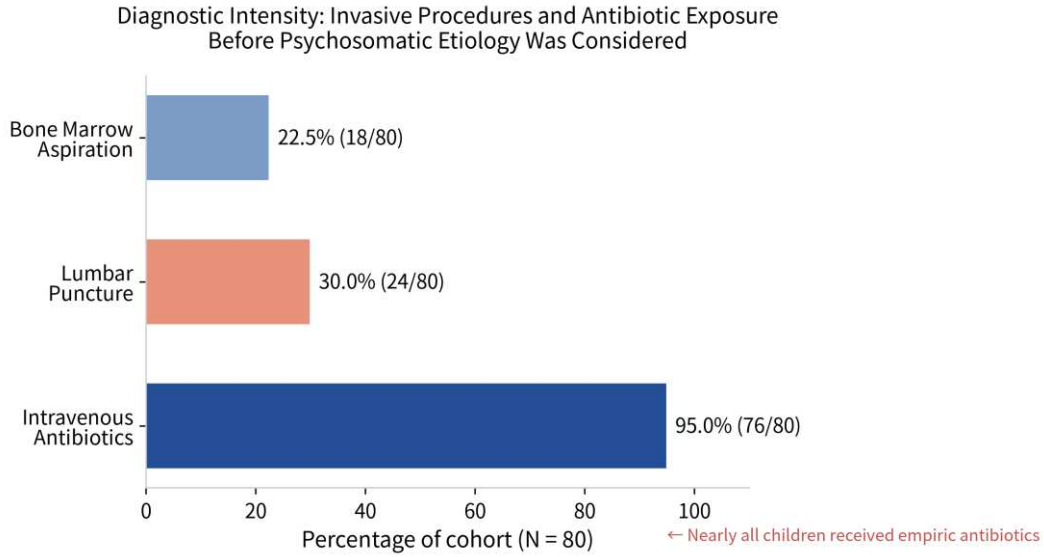


Figure 2. Invasive procedures and antibiotic exposure before psychosomatic etiology was considered.

These figures represent the cumulative burden of diagnostic escalation in a tertiary pediatric infectious disease unit: nearly every child received empiric intravenous antibiotics, nearly one in three underwent lumbar puncture, and more than one in five underwent bone marrow aspiration—all before psychosomatic causes were formally entertained.

3.3 Diagnostic Certainty at Discharge

Despite the extensive workup, only 32 patients (40.0%) received a definitive psychosomatic diagnosis at discharge. The remaining 48 (60.0%) left the hospital with psychosomatic etiology listed as a differential consideration rather than a confirmed diagnosis (Figure 3). This diagnostic uncertainty itself represents a clinical quality gap: after an average of 12 days of inpatient evaluation, the majority of children in this cohort still did not have a confirmed explanation for their fever.

The term "pseudo-fever" (伪装热) was explicitly documented in the attending physician's diagnostic reasoning notes for 47 patients (58.8%), including 23 males (63.9% of males) and 24 females (54.5% of females; $\chi^2 = 0.72$, $p = 0.396$). We emphasize that "pseudo-fever" is used here purely as a clinical documentation observation, not as a validated diagnostic subtype. The underlying phenomenon likely encompasses heterogeneous mechanisms—including measurement error, stress-related thermoregulatory changes, and deliberate temperature manipulation—that this retrospective dataset cannot disentangle.

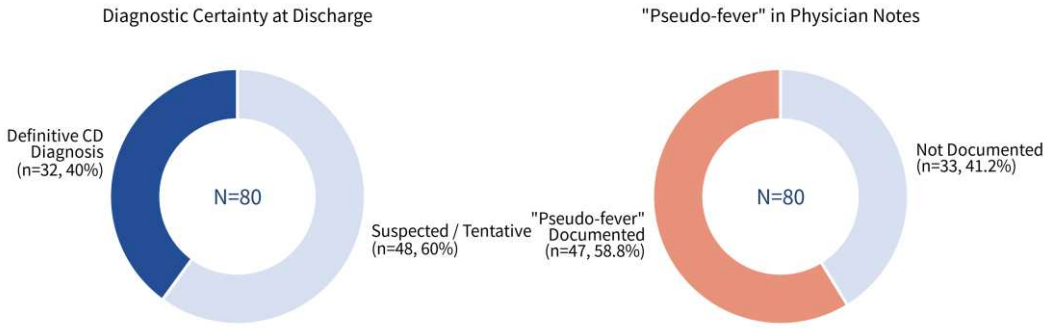


Figure 3. Diagnostic certainty at discharge (left) and pseudo-fever documentation rate (right).

3.4 Discharge Outcomes

Across the full cohort, discharge outcomes were: cured in 20 patients (25.0%), improved in 50 (62.5%), and unfavorable in 10 (12.5%). Median hospitalization duration did not differ significantly by sex (males: median 13 days vs. females: median 11 days; Mann–Whitney $U = 698.5$, $p = 0.382$).

In exploratory sex-stratified analyses (Figure 4), females had a significantly higher cure rate (16/44, 36.4%) compared with males (4/36, 11.1%; $\chi^2 = 6.85$, $p = 0.021$, OR = 4.54, 95% CI: 1.35–15.28). Conversely, males had a substantially higher rate of unfavorable outcomes (9/36, 25.0%) compared with females (1/44, 2.3%; Fisher's exact $p = 0.003$, OR = 14.06, 95% CI: 1.68–117.6). Improvement rates were comparable by sex (61.4% vs. 63.9%; $\chi^2 = 0.36$, $p = 0.548$). We interpret

these sex differences as hypothesis-generating only, given the small number of adverse events and the absence of covariate adjustment.

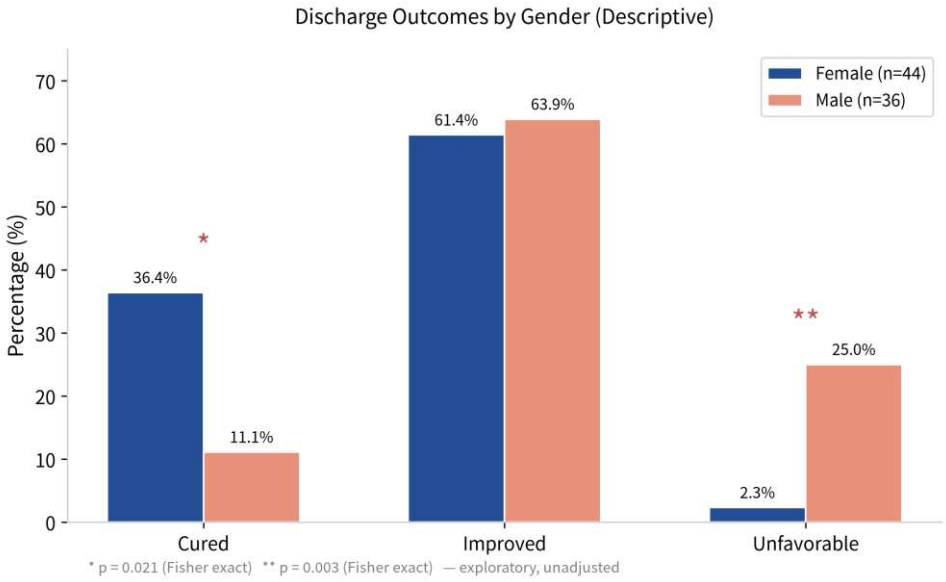


Figure 4. Discharge outcomes by sex (exploratory, unadjusted).

3.5 Pseudo-Fever Documentation and Outcomes

Among the 47 patients with pseudo-fever documentation, outcomes were: cured n = 10 (21.3%), improved n = 29 (61.7%), unfavorable n = 8 (17.0%). Among the 33 patients without pseudo-fever documentation: cured n = 10 (30.3%), improved n = 21 (63.6%), unfavorable n = 2 (6.1%). The difference in unfavorable outcome rates did not reach statistical significance ($\chi^2 = 2.34$, $p = 0.126$). Given the heterogeneous mechanisms potentially underlying pseudo-fever documentation, these results should not be interpreted as evidence for or against a distinct clinical subtype.

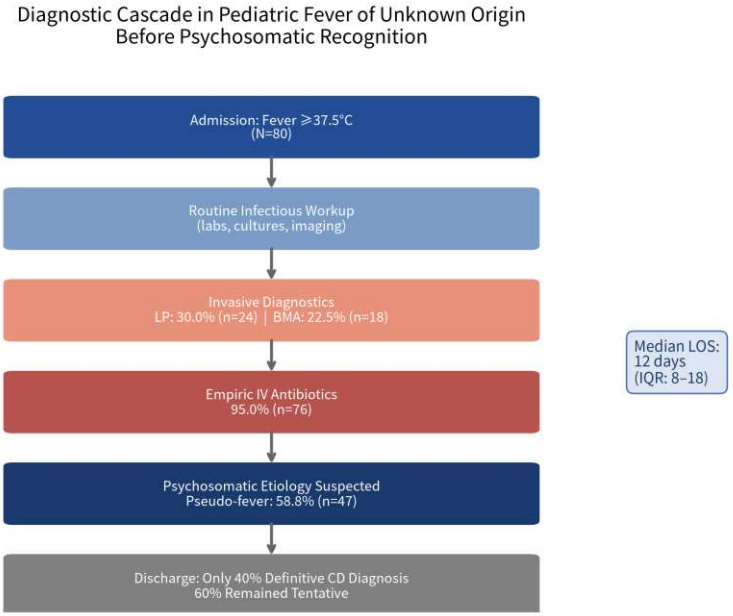


Figure 5. Diagnostic cascade flow: from admission for fever to discharge with suspected psychosomatic etiology.

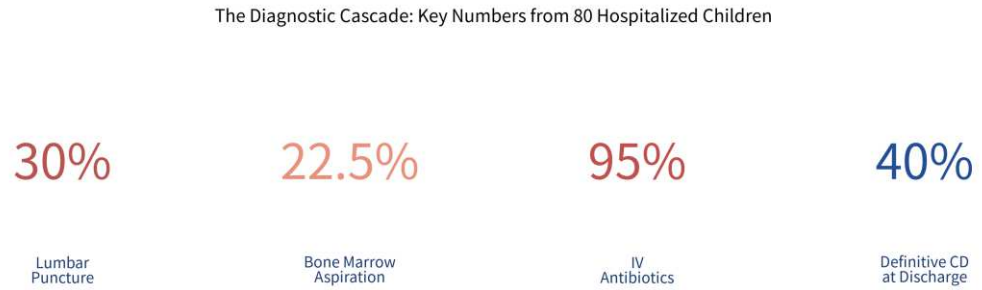


Figure 6. Key numerical findings summarizing the diagnostic cascade burden.

4. Discussion

4.1 Principal Findings

This retrospective cohort of 80 hospitalized children with FUO ultimately suspected of psychosomatic origin documents a substantial diagnostic cascade: 30.0% underwent lumbar puncture, 22.5% underwent bone marrow aspiration, and 95.0% received intravenous antibiotics, with a median hospitalization of 12 days. Yet only 40.0% left the hospital with a definitive psychosomatic diagnosis. The central message is not that fever itself is a marker of conversion disorder—far from it—but rather that the standard infectious-first diagnostic pathway in pediatric FUO frequently fails to incorporate psychosomatic consideration until after extensive and often unnecessary medical intervention has already occurred.

4.2 Why Does the Diagnostic Cascade Occur?

Several interlocking factors drive this pattern. First, clinical reasoning in pediatric infectious disease is structured around the imperative to rule out severe infection. The consequences of missing meningitis, sepsis, or leukemia are so serious that clinicians default to maximal diagnostic intensity. This defensive medicine posture is understandable but becomes self-reinforcing: each additional negative test result tends to trigger another test rather than a reappraisal of whether the initial framework was correct.

Second, the typical pediatric infectious disease physician receives little formal training in functional psychiatric disorders, and routine FUO workups do not include standardized psychosomatic screening instruments. Psychiatric consultation is conventionally initiated as a “last resort”—after exhaustive organic evaluation has been completed—rather than as an early parallel track (Chen & Yang, 2019). By the time psychiatry is consulted, the child has already accumulated invasive procedures, antibiotics, and prolonged hospitalization.

Third, caregiver stigma and cultural framing strongly influence diagnostic acceptance. In the Chinese cultural context, many parents prefer organic disease explanations over psychological ones, and resistance to a psychosomatic diagnosis can delay both acceptance and treatment engagement (Chen & Yang, 2019; Tang et al., 2021). This reluctance further encourages clinicians to continue organic workups rather than broach psychosomatic hypotheses early.

4.3 The "Pseudo-Fever" Phenomenon: Observation, Not Subtype

The high documentation rate of "pseudo-fever" (58.8%) is a noteworthy clinical observation but should not be overinterpreted. This term, used colloquially by Chinese pediatricians, likely encompasses a heterogeneous mix of phenomena: inaccurate temperature measurement by patients or caregivers; stress-induced autonomic thermoregulatory changes; genuine low-grade fever driven by stress-related cytokine dysregulation; and in some cases, deliberate manipulation of temperature readings. Our retrospective chart review cannot reliably distinguish among these mechanisms, and we explicitly do not propose "pseudo-fever" as a new diagnostic subtype. What it does represent is a clinical signal: when attending physicians consistently document this pattern in nearly 60% of a FUO cohort, it suggests that psychosomatic contributors to elevated temperature are far more common than the standard infectious workup acknowledges.

4.4 Toward an Earlier Multidisciplinary Pathway

These data support a concrete operational proposal: for pediatric FUO admissions, if initial infectious, inflammatory, and imaging workups return negative within the first 48–72 hours, psychosomatic evaluation should be initiated in parallel rather than deferred. This does not mean stopping the infectious workup entirely—serious infection must continue to be excluded—but it means adding a parallel track that includes: (1) observed, standardized temperature measurement to identify inconsistent readings; (2) brief psychosomatic screening using validated instruments such as the Screen for Child Anxiety Related Disorders (SCARED) or the Children's Somatization Inventory; and (3) early consultation with pediatric liaison psychiatry or a multidisciplinary psychosomatic team. Such an approach would be consistent with the integrated pediatric–neurology–psychiatry pathways described by Kozlowska and colleagues (Kozlowska et al., 2007, 2011), which have demonstrated reduced hospitalization duration and improved functional outcomes in children with functional somatic symptoms.

The age distribution observed here—67.5% of cases aged 12–13 years—reinforces the developmental rationale for this approach. The transition from primary to junior high school in Chinese education typically occurs at age 12, introducing a confluence of academic pressure, peer relationship reorganization, and pubertal HPA-axis maturation that collectively lower the threshold for stress-related somatization (Romeo, 2018; van Rens et al., 2025). Targeting psychosomatic screening to this high-risk developmental window within FUO admissions may yield particular benefit.

4.5 Sex Differences: Exploratory Observation

The sex-stratified outcome differences observed here—higher cure rates in females and higher unfavorable outcome rates in males—are consistent with broader literature on pediatric functional somatic symptoms, in which boys often externalize distress as behavioral problems and engage less readily with psychological interventions (Humtsoe & Deuri, 2025; Du et al., 2018). However, given the very small number of adverse events in this cohort (10 unfavorable outcomes total) and the absence of multivariate adjustment, these findings should be treated strictly as hypothesis-generating. They may warrant further investigation in larger, prospective, adequately powered cohorts with standardized psychometric assessment.

4.6 Clinical Implications

For practicing pediatricians and hospitalists, several practical implications follow from these data:

• When fever remains unexplained after 48–72 hours of standard infectious workup, consider psychosomatic etiology in the differential alongside continued infectious evaluation. Do not wait for every possible test to be negative before raising the question with the family.

• Observe temperature measurement conditions directly. Inconsistent temperature patterns, discrepancy between vital signs and clinical appearance, or isolated rectal/oral temperature elevations without corresponding tachycardia or inflammatory markers should prompt consideration of measurement manipulation or stress-induced temperature dysregulation.

• Introduce validated brief screening tools (e.g., SCARED) as part of routine FUO admission assessment, rather than reserving psychosocial inquiry for cases that have already consumed extensive resources.

• Frame psychosomatic consultation early as a collaborative "whole-child" assessment rather than as a rejection of the family's concerns about physical illness. This framing reduces stigma and improves acceptance.

4.7 Limitations

This study has several important limitations. First, the single-center retrospective design limits generalizability. The observed procedure rates likely reflect the diagnostic culture and case mix of a tertiary pediatric infectious disease unit, and may not be representative of community hospitals or primary care settings.

Second, and most importantly, diagnostic classification relied on attending physician documentation rather than standardized psychiatric assessment. The fact that only 40% received definitive diagnoses at discharge is itself the central problem this paper highlights—not a methodological flaw to be dismissed. We deliberately frame diagnostic uncertainty as the clinical reality that motivates improved pathways, rather than as a weakness of the data.

Third, "pseudo-fever" identification was based on narrative physician notes rather than prospective, standardized evaluation. This introduces documentation bias and precludes reliable

differentiation between the heterogeneous mechanisms that may underlie elevated temperature recordings in these patients.

Fourth, follow-up was limited to one month, precluding assessment of longer-term recurrence or functional recovery. Fifth, no control group of children with confirmed infectious fever was included for comparison. Finally, sex-stratified outcome comparisons are underpowered and unadjusted, and should not be overinterpreted.

Future multicenter prospective studies should incorporate validated psychosomatic screening instruments from admission, standardize psychiatric diagnostic assessment, track the timing of psychiatric consultation relative to procedures, and include long-term functional follow-up to quantify the downstream benefits of earlier recognition.

5. Conclusions

In this retrospective cohort of 80 hospitalized children with FUO ultimately suspected of psychosomatic etiology, 30.0% underwent lumbar puncture, 22.5% underwent bone marrow aspiration, and 95.0% received intravenous antibiotics before psychosomatic causes were formally considered. Median hospitalization was 12 days, and only 40.0% received a definitive psychiatric diagnosis at discharge. These findings quantify the substantial diagnostic cascade and healthcare resource burden associated with delayed recognition of psychosomatic fever in pediatric practice. We advocate for early, parallel psychosomatic evaluation—within 48–72 hours of FUO admission when initial infectious workups return negative—as a practical strategy to reduce unnecessary invasive procedures, antibiotic exposure, and prolonged hospitalization, while improving timely access to effective psychological care.

Acknowledgements

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Declarations

The de-identified dataset supporting the findings of this manuscript cannot be released publicly at this stage, as data sharing procedures are conditional upon final institutional ethical approval. Reasonable requests for aggregated, non-identifiable study data may be considered by the corresponding author after formal ethical clearance has been granted.

Ethics approval and consent to participate This retrospective observational study used de-identified historical medical records of pediatric patients. The study protocol together with the application for waiver of parental/guardian informed consent has been submitted to the Ethics Committee of West China Second University Hospital, Sichuan University (IIT receipt number:

SL2026-363), and the application is currently under ethical review. Formal ethics approval and waiver documentation will be obtained and provided upon availability.

Consent for publication: Not applicable.

Availability of data and materials: The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: Yaqi Zhang: Data curation, formal analysis, writing – original draft. Li Jin: Conceptualization, supervision, writing – review & editing, project administration. Both authors read and approved the final manuscript.

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