

# Self-Referral and Serious Illness in Children With Fever

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## KEY WORDS

emergency medical services, general practitioners, referral and consultation, illness severity, triage, resource utilization, fever, hospitalization

## ABBREVIATIONS

CI—confidence interval  
ED—emergency department  
GP—general practitioner  
IV—intravenous  
MTS—Manchester Triage System  
OR—odds ratio

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**WHAT'S KNOWN ON THIS SUBJECT:** General measures discourage all self-referrals to the emergency department. For adults, self-referral to the emergency department has been associated with nonsevere disease, whereas severity of illness of self-referred children is still unknown.



**WHAT THIS STUDY ADDS:** One in four parents properly judged and acted on their febrile child's illness by presentation to the emergency department on their own initiative. Measures to discourage parents from self-referral may potentially result in delayed or missed diagnoses.

## abstract

FREE

**OBJECTIVE:** The goal of this study was to evaluate parents' capability to assess their febrile child's severity of illness and decision to present to the emergency department. We compared children referred by a general practitioner (GP) with those self-referred on the basis of illness-severity markers.

**METHODS:** This was a cross-sectional observational study conducted at the emergency departments of a university and a teaching hospital. GP-referred or self-referred children with fever (aged <16 years) who presented to the emergency department (2006–2008) were included. Markers for severity of illness were urgency according to the Manchester Triage System, diagnostic interventions, therapeutic interventions, and follow-up. Associations between markers and referral type were assessed by using logistic regression analysis. Subgroup analyses were performed for patients with the most common presenting problems that accompanied the fever (ie, dyspnea, gastrointestinal complaints, neurologic symptoms, fever without specific symptoms).

**RESULTS:** Thirty-eight percent of 4609 children were referred by their GP and 62% were self-referred. GP-referred children were classified as high urgency (immediate/very urgent categories) in 46% of the cases and self-referrals in 45%. Forty-three percent of GP referrals versus 27% of self-referrals needed extensive diagnostic intervention, intravenous medication/aerosol treatment, hospitalization, or a combination of these (odds ratio: 2.0 [95% confidence interval: 1.75–2.27]). In all subgroups, high urgency was not associated with referral type. GP-referred and self-referred children with dyspnea had similar frequencies of illness-severity markers.

**CONCLUSIONS:** Although febrile self-referred children were less severely ill than GP-referred children, many parents properly judged and acted on the severity of their child's illness. To avoid delayed or missed diagnoses, recommendations regarding interventions that would discourage self-referral to the emergency department should be reconsidered. *Pediatrics* 2012;129:e643–e651

Worldwide, emergency departments (EDs) are challenged by increasing numbers of patients who bypass primary care and present to the ED on their own initiative (self-referral).<sup>1–9</sup> For adult patients, self-referral has been associated with nonurgent symptoms that can easily be handled in primary care.<sup>8,10</sup> Consequently, interventions to redirect self-referrals to fast-track areas, placement of primary care facilities next to EDs, or governmental policies for self-payment of ED visit costs by self-referrals have been introduced.<sup>2,11</sup> Such interventions will reduce the number of adult self-referrals; however, they may also discourage parents from self-referring their child to the ED, even though knowledge on the severity of illness of self-referred children is scarce.

Fever is one of the main presenting problems at pediatric EDs.<sup>12–14</sup> Among febrile children, ~15% are diagnosed with bacterial infections (eg, meningitis, bacteremia, urinary tract infection), severe dehydration (caused by gastroenteritis), or dyspnea.<sup>15</sup> For these illnesses, diagnostic or therapeutic interventions or hospitalization are often required.<sup>3,15–17</sup> Delay in diagnosing these conditions by discouraging parents from self-referring their child to the ED may result in significant morbidity and mortality.<sup>18–20</sup>

This study aimed to assess the severity of illness of febrile children who were self-referred to the ED by their parents compared with those referred by the general practitioner (GP). We hypothesized that parents are capable of assessing their child's severity of illness and adequately decide to present their child to the ED. Urgency according to the Manchester Triage System (MTS), diagnostic interventions, therapeutic interventions, and follow-up were used as markers for severity of illness and were compared between GP-referred and self-referred children.

## METHODS

### Study Design

In this cross-sectional observational study, we compared severity of illness of children with fever referred by a GP with those who presented to the ED on their parent's initiative on the basis of markers for severity of illness. This study is part of an ongoing prospective study on triage of pediatric patients.<sup>1</sup> Institutional medical ethics committees reviewed the study, and the requirement for informed consent was waived.

### Health Care System in the Netherlands

In the Netherlands, both primary care (provided by GPs) and secondary care (provided by medical specialists [eg, pediatricians]) function as emergency care facilities. All inhabitants are registered with a local GP, who is available during office hours. Out-of-hours primary care (5 PM to 8 AM daily and the entire weekend) is organized in general practitioner cooperatives, in which GPs rotate shifts.<sup>21,22</sup> Similar large-scale cooperatives have been observed in the United Kingdom, Scandinavia, and Australia.<sup>23–25</sup>

In principle, patients should first consult their local GP or telephone the general practitioner cooperative. After (telephone) triage by a trained nurse,<sup>26</sup> the patient receives telephone advice or consultation. The availability of acute diagnostic and therapeutic interventions in primary care is predominantly limited to analysis of urine dipstick test results and administration of rescue medication (eg, adrenaline, antihistaminic agents). In the event a specialist consultation, laboratory examinations, radiologic examinations, or extensive therapeutic interventions (eg, aerosol treatment, intravenous [IV] medication) are necessary, the patient is referred to the ED, accompanied with a referral note (ie, gatekeeping). Referral is required for ~5% to 10% of all primary care

consultations,<sup>22,27</sup> similar to data from the United Kingdom, the United States, and Canada.<sup>28,29</sup>

In addition, patients can directly present to the ED on their own initiative (self-referral). Only in life-threatening situations should patients call the national emergency number for ambulance services. Ambulance personnel judge the patient's acuity of illness on arrival and bring the patient directly to the ED when necessary. At the ED, all children with medical problems are consulted by a pediatrician or resident in pediatrics supervised by a pediatrician.

### Study Setting and Participants

Our study population comprised all GP-referred or self-referred children with fever (aged <16 years) who presented to the ED of 2 large inner-city hospitals located in the southwest of the Netherlands. The Erasmus MC/Sophia Children's Hospital (Rotterdam) is a university hospital with a pediatric ED that provides 90% general pediatric care to ~9000 patients annually.<sup>13</sup> The inclusion period at this hospital ran from January 2006 to January 2007 and May 2007 to April 2008. The Haga Hospital/Juliana Children's Hospital (The Hague) is a large teaching hospital with a mixed pediatric–adult ED that delivers care to nearly 15 000 children annually. In this hospital, the inclusion period ran from January to August 2006 and August to December 2007. To avoid inclusion of patients who did not receive “usual care,” we excluded children “referred by others.” This group mainly comprised children with comorbidities and children referred by pediatric specialists (eg, cardiologist, oncologist).

### Manchester Triage System

The MTS is a triage algorithm that consists of 49 flowchart diagrams suitable for children. Each flowchart is

specific to a patient's presenting problem and contains 6 key discriminators (life threat, pain, hemorrhage, acuteness of onset, consciousness level, and temperature) and specific discriminators (signs and symptoms) relevant to the presenting problem. Selection of a discriminator leads to 1 of the 5 urgency categories and maximum waiting time. Both participating hospitals used the first edition of the MTS (official Dutch translation).<sup>30</sup> Compliance with triage with the MTS was 99% (14 078 of 14 276), as in our MTS validation study.<sup>1</sup>

### Data Collection

We obtained information on demographic and contact characteristics, referral type, flowchart, discriminators, and urgency category from the computerized MTS. Parents were informed about the assigned urgency level. Only 0.5% of the parents left before being seen by the physician. These patients were not followed up because this number was very small. Over a 2-month period, the reason for self-referral was recorded by the triage nurses at Sophia Children's Hospital. Clinical data on diagnostic and therapeutic interventions and follow-up were recorded on structured electronic or paper ED forms by nurses or physicians. We obtained data on laboratory tests from the hospital information systems. Trained medical students entered these data in a separate database (SPSS data entry version 4.0 [SPSS Inc, Chicago, IL]), independent of triage outcome or referral type. The database was checked for outliers and consistency.

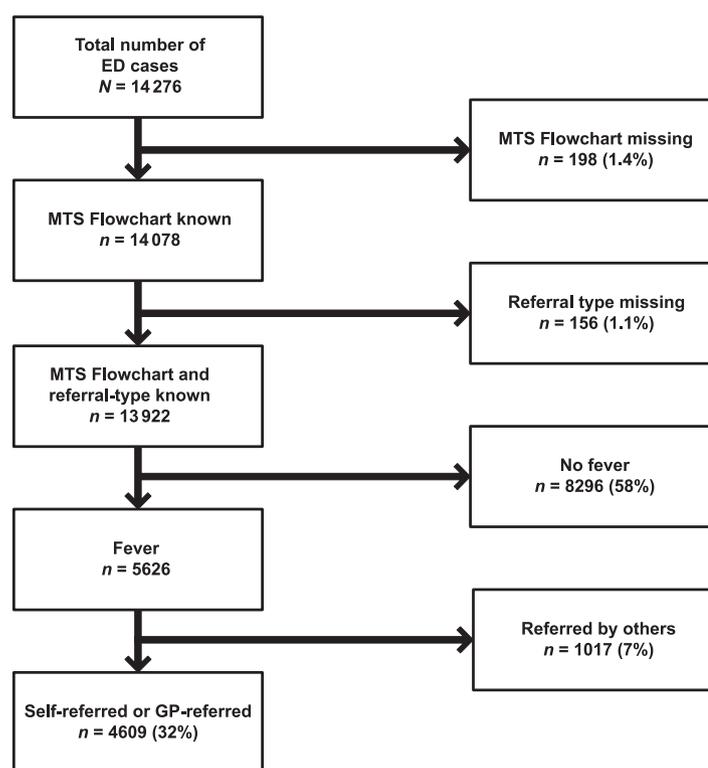
Referral type was documented for 13 922 of 14 078 (99%) triaged children. Demographic and clinical characteristics were comparable between patients with missing data ( $n = 354$ ) and complete data ( $n = 13 922$ ). Selection of all febrile self-referred and GP-referred children resulted in a study population of 4609 children (Fig 1). Eight percent

(354 of 4609) of all eligible children presented to the ED more than once during the study period. Only 14 (0.3%) children presented frequently ( $\geq 4$  presentations). Children who presented more than once were younger (median age: 1.4 vs 1.8 years) and slightly more frequently self-referred (68% vs 61%) than those who presented once. Because the MTS urgency distribution and frequency of hospitalization (as measures of severity of illness) were similar for both groups and the number of children with  $>1$  visit was small, we decided not to exclude these patients.

### Definitions

Fever was defined as "fever as reason for attendance,"<sup>31,32</sup> "fever selected as triage discriminator," or a body temperature rectally measured at the ED  $\geq 38.5^{\circ}\text{C}$ . Referral type was recoded into the following: (1) self-referred: children who presented to the ED on their parent's initiative and children

brought in by ambulance after their parents had telephoned the national emergency number; (2) referred by GP: children referred to the ED after consultation by a GP; and (3) referred by others: children referred to the ED by other health care workers (eg, pediatric specialists [eg, cardiologist, oncologist], police physician, or midwife). MTS flowcharts were categorized into 9 presenting problems (Table 1). We defined high MTS urgency as "immediate" or "very urgent" classification. As reported in our MTS validation study,<sup>1</sup> diagnostic interventions were categorized into simple laboratory (complete blood cell count, electrolytes, liver enzymes, renal function, urine/stool cultures, and nasal swabs), simple radiology (radiograph or ultrasound imaging), extensive laboratory (blood culture, cerebral spinal fluid puncture, or a combination of  $\geq 2$  simple laboratory tests), and extensive radiology (computed tomography or MRI).



**FIGURE 1**  
Selection of the study population.

**TABLE 1** MTS Flowcharts Categorized Into Presenting Problems

Presenting Problem	Flowchart
Dyspnea	Asthma, shortness of breath, shortness of breath in children
Gastrointestinal	Vomiting, abdominal pain, abdominal pain in children, diarrhea, gastrointestinal bleeding
Neurologic	Headache, fits, neck pain, unwell child, irritable child, behaving strangely
Ear, nose, and throat	Sore throat, nasal problems, ear problems
Rash	Rashes
Urinary tract	Urinary problems
Local infection/abscess/wound	Local infection/abscess, wounds, burns
Fever without specific symptoms	General, worried parent or crying infant with a positive "fever" discriminator
Other	Other remaining flowcharts

Therapeutic interventions were categorized into self-care advice (no medication), medication on prescription (eg, antibiotics), oral medication at ED (eg, prednisone), and extensive therapeutic interventions (eg, IV medication, aerosol treatment). Follow-up was categorized into no follow-up, hospital admission, outpatient clinic appointment, and other (eg, telephone appointment, appointment by GP). Both EDs used similar criteria for hospitalization: (1) abnormal or threatened vital signs; (2) requirement of IV medication or IV fluids; and (3) inability to ingest prescribed medication (eg, need for nasogastric tube). Hospitalization was further subdivided into admission to the medium care unit or intensive care unit. MTS urgency, diagnostic interventions, therapeutic interventions, and follow-up were considered as markers for severity of illness.

### Sample Size

We assumed that the percentage of GP-referred patients who needed extensive medical interventions or hospitalization was 50%.<sup>3,5,17</sup> To find at least a 5% difference in outcome measure between GP-referred and self-referred children, we calculated the sample size for each referral group to be at least 1561 patients ( $\alpha = 0.05$ ;  $\beta = 0.20$ ).

### Statistical Analysis

Where appropriate, demographic characteristics, contact characteristics, and

illness-severity markers of GP-referred and self-referred patients were compared by using  $\chi^2$  tests (categorical variables) and Mann-Whitney *U* tests (continuous variables). To evaluate the association between referral type and illness-severity markers, multivariate logistic regression analyses were performed. Self-referred children were chosen as the reference category. We considered age (continuous), gender, presenting problem, time of contact (day, evening, or night), and day of contact (weekday or weekend) as potential confounders, as they may be related to both the decision to refer the child to the ED (by GP or parent) and physicians' decisions on diagnostic or therapeutic interventions or hospitalization. The associations between illness-severity markers and referral type did not significantly change when children brought in by ambulances ( $n = 378$ ) were excluded from the analysis (data not shown). We included these children in our main analyses. Statistical analyses were performed by using SPSS PASW software version 17.0.2. *P* values  $< .05$  were considered significant.

### RESULTS

Thirty-eight percent of the 4609 eligible children with fever were referred by a GP and 62% were self-referred. Gender was comparable between groups (Table 2). Median age was 1.5 years (interquartile range: 0.7–3.8) for GP-referred children and 1.9 years (interquartile

range: 1.0–3.8) for self-referred children ( $P = .16$ ). Self-referred children were presented significantly more often during out-of-hours periods and more of them were brought in by ambulance services than GP-referred children ( $P < .01$ ). In both referral groups, the most common presenting problems that accompanied the fever were dyspnea, gastrointestinal complaints, neurologic symptoms, and fever without specific symptoms. Table 2 displays differences in illness-severity markers between GP-referred and self-referred children. Parents of a subsample of 88 self-referred children (response: 68%) were asked to give their main reason for ED attendance. Eighty-five percent of them reported that they considered the ED to be the most appropriate place to present their child (ie, they thought their child would need a pediatrician's expertise or diagnostic and therapeutic interventions only available at the ED), 8% had been unable to contact their own GP or general practitioner cooperative, and 4% had other reasons.

### Associations Between Referral Type and Illness-Severity Markers

Forty-three percent of GP-referred children needed extensive diagnostic interventions, IV medication/aerosol treatment, hospitalization, or a combination of these compared with 27% of self-referred children (odds ratio [OR]: 2.0 [95% confidence interval (CI): 1.75–2.27]). Table 3 displays the associations between referral type and illness-severity markers separately. GP-referred children were classified as high urgency in 46% of the cases and self-referred children in 45% (OR: 1.2 [95% CI: 1.02–1.35]). Compared with self-referrals, GP-referred children required significantly more extensive diagnostic interventions (OR: 2.0 [95% CI: 1.74–2.38]) and IV therapy or aerosol treatments (OR: 1.6 [95% CI: 1.39–1.93]) and were

**TABLE 2** Distribution of Illness-Severity Markers in GP-Referred and Self-referred Children With Fever

Characteristic	GP-Referred (n = 1774)	Self-Referred (n = 2835)	P
Gender <sup>a</sup>			
Male	997 (56)	1630 (58)	.40
Age, y <sup>b</sup>			
≤1	655 (37)	759 (27)	<.01
1–3	707 (40)	1399 (49)	<.01
4–7	265 (15)	489 (17)	.04
8–16	147 (8)	188 (7)	.04
Time of consultation			
Out-of-hours	917 (52)	2203 (78)	<.01
Transport to ED			
Ambulance services	64 (4)	314 (11)	<.01
Presenting problem <sup>b</sup>			
Dyspnea	387 (22)	396 (14)	<.01
Gastrointestinal	240 (14)	323 (11)	.03
Neurologic	131 (7)	317 (11)	<.01
Ear, nose, and throat	53 (3)	178 (6)	<.01
Rash	59 (3)	79 (3)	.30
Urinary tract problems	60 (3)	45 (2)	<.01
Local infection/abscess/wound	11 (1)	13 (1)	.46
Fever without specific symptoms	611 (34)	1101 (39)	<.01
Other problem	222 (13)	383 (14)	.33
MTS urgency <sup>b,c</sup>			
Immediate	28 (2)	69 (2)	.05
Very urgent	783 (44)	1216 (43)	.41
Urgent	610 (34)	861 (30)	<.01
Standard	341 (19)	658 (23)	<.01
Nonurgent	12 (1)	31 (1)	.15
Diagnostic interventions <sup>b</sup>			
No diagnostic intervention	555 (31)	1435 (51)	<.01
Simple laboratory <sup>d</sup>	461 (26)	661 (23)	.04
Simple radiology <sup>e</sup>	310 (18)	318 (11)	<.01
Extensive laboratory or extensive radiology <sup>f</sup>	284 (16)	292 (10)	<.01
Extensive laboratory and any radiology	164 (9)	129 (5)	<.01
Therapeutic interventions <sup>b</sup>			
No therapy	159 (9)	259 (9)	.84
Self-care advice	256 (14)	425 (15)	.60
Medication on prescription	756 (43)	1470 (52)	<.01
Oral medication at ED <sup>g</sup>	171 (10)	262 (9)	.65
IV medication/aerosol treatment <sup>h</sup>	432 (24)	419 (15)	<.01
Follow-up <sup>b</sup>			
No follow-up	696 (39)	1723 (61)	<.01
Outpatient clinic	375 (21)	396 (14)	<.01
Hospital admission <sup>b</sup>			
MCU <sup>i</sup>	444 (25)	396 (14)	<.01
ICU	13 (1)	15 (1)	.39
Other follow-up	246 (14)	305 (11)	<.01

Data are presented as n (%). MCU, medium care unit. ICU, Intensive Care Unit.

<sup>a</sup> One missing value.

<sup>b</sup> Overall  $\chi^2$   $P < .01$ .

<sup>c</sup> MTS urgency classification (and maximum waiting time): immediate, 0 min; very urgent, 10 min; urgent, 60 min; standard, 120 min; and nonurgent, 240 min.

<sup>d</sup> Complete blood cell count, electrolytes, liver enzymes, renal function, urine/stool cultures, and nasal swabs.

<sup>e</sup> Radiography and/or ultrasound.

<sup>f</sup> Extensive laboratory: blood culture, cerebrospinal fluid puncture, or combination of  $\geq 2$  simple laboratory tests. Extensive radiology: computed tomography and/or MRI.

<sup>g</sup> Examples include oral rehydration salts, prednisone, or antibiotics.

<sup>h</sup> Examples of IV medication include fluids and antibiotics.

<sup>i</sup> All admissions to the hospital other than ICU admissions.

more frequently hospitalized (OR: 2.0 [95% CI: 1.74–2.39]). Due to small numbers, we could not analyze medium care unit and intensive care unit admissions separately in our regression analysis (Table 2).

### Presenting Problems

Table 4 presents a subgroup analysis of children with the 4 most common presenting problems that accompanied the fever. The proportion of children classified according to the MTS as high urgency was comparable between GP-referred and self-referred children in all presenting problem groups. The odds of requiring extensive diagnostic interventions or IV medication were higher for GP-referred children than for self-referred children with gastrointestinal complaints, neurologic symptoms, or those without specific symptoms that accompanied the fever. In these subgroups, hospitalization ranged from 20% to 37% among GP-referred children and from 11% to 22% among self-referred children. The frequencies of all illness-severity markers for feverish children with dyspnea were comparable between GP-referrals and self-referrals.

### DISCUSSION

Our study revealed that even though self-referred children with fever were less severely ill than GP-referred children, at least 1 in 4 self-referrals needed extensive diagnostic interventions, IV medication/aerosol treatment, or hospitalization. The most common presenting problems that accompanied the fever as well as classification according to the MTS as high urgency were similar for GP-referred and self-referred children. Our subgroup analyses further revealed that for children with fever and dyspnea, severity of illness was similar in both referral groups. Obviously, many parents properly judged and acted on their child's severity of illness by

**TABLE 3** Associations Between Referral Type and Illness-Severity Markers for Children Who Presented to the ED With Fever

Illness-Severity Markers	GP-Referred (n = 1774)	Self-Referred <sup>a</sup> (n = 2835)	Unadjusted OR (95% CI)	Adjusted OR <sup>b</sup> (95% CI)
High MTS urgency <sup>c</sup>	811 (46)	1285 (45)	1.0 (0.90–1.14)	1.2 (1.02–1.35)
Extensive diagnostic interventions <sup>d</sup>	448 (25)	421 (15)	1.9 (1.67–2.25)	2.0 (1.74–2.38)
IV therapy/aerosol treatment	432 (24)	419 (15)	1.9 (1.60–2.16)	1.6 (1.39–1.93)
Hospital admission	457 (26)	411 (15)	2.1 (1.76–2.38)	2.0 (1.74–2.39)

<sup>a</sup> Reference category: self-referred children.

<sup>b</sup> Adjusted for gender, age, presenting problem, time of contact (day, evening, or night), and day of contact (weekday or weekend).

<sup>c</sup> High MTS urgency (maximum waiting time): immediate (0 min) or very urgent (10 min) category.

<sup>d</sup> Extensive laboratory or radiology examinations.

presenting their child to the ED on their own initiative.

The majority of parents self-referred their child because they thought their child needed pediatrician's expertise or diagnostic or therapeutic interventions, for which they had to visit the ED anyway, which is comparable to previous reports.<sup>4,33</sup> We further observed that 11% of the self-referred children were brought in by ambulance services. In all of these cases, the ambulance dispatch center assessed and agreed on the urgent need for medical care, indicating the child was seriously ill and parents adequately decided to telephone the national emergency number.

### Comparison With Literature

Our results support, to some extent, the findings of Rinderknecht et al<sup>5</sup> that GP-referred children with fever are more severely ill than self-referred children; however, the magnitude of the difference in our population was much smaller. Their study revealed that febrile children referred by a GP to their quaternary, international referral center had higher triage acuties and higher frequencies of abnormal vital signs and hospitalizations than self-referred children. On the basis of these results, they suggested incorporating referral type in triage algorithms used at the ED. It is likely that our much smaller difference in severity of illness between GP-referred and self-referred

children can be explained by the difference in study settings. Children referred to their quaternary care center are likely to be more seriously ill and to need more specialized care than children referred to our study EDs, which mainly provide basic pediatric care.<sup>13</sup> According to our finding that the frequency of high-urgent classification was comparable between GP-referred and self-referred children, we disagree with the recommendation to use referral type alone to influence triage algorithms at community EDs.

Although the health care system is organized differently in the Netherlands compared with other countries, we think our results are generalizable to community EDs of countries in which primary care and ED care are both available as emergency care facilities. In other European countries,<sup>3,4,25,34</sup> Australia,<sup>6,7</sup> the United States,<sup>8,9</sup> and Canada,<sup>5,35</sup> ED populations constitute a case-mix of referred and nonreferred children, with numbers of self-referrals ranging from about 30% to 80%,<sup>3,8,34–38</sup> comparable with the frequency of self-referrals in the Netherlands.<sup>1,33,39</sup>

Our finding that 1 in 4 self-referred children required some form of extensive intervention or hospitalization is much higher than one would expect if parents were unable to judge their child's medical need. In addition, it is only slightly lower than the frequency found among GP-referred children. Primary care, which is only provided

**TABLE 4** Association Between Referral Type and Illness-Severity Markers Categorized According to the Most Common Presenting Problems Among Children Who Presented to the ED With Fever

Illness-Severity Markers	Dyspnea			Gastrointestinal			Neurologic			Fever Without Specific Symptoms		
	GP (n = 387)	SR (n = 396)	OR <sup>a</sup> (95% CI)	GP (n = 240)	SR (n = 323)	OR <sup>a</sup> (95% CI)	GP (n = 131)	SR (n = 317)	OR <sup>a</sup> (95% CI)	GP (n = 611)	SR (n = 1101)	OR <sup>a</sup> (95% CI)
High MTS urgency <sup>b</sup>	199 (51)	200 (51)	1.1 (0.82–1.48)	13 (5)	12 (4)	1.4 (0.59–3.25)	99 (76)	252 (80)	0.8 (0.49–1.34)	382 (63)	648 (69)	1.2 (0.97–1.48)
Extensive diagnostic interventions <sup>c</sup>	52 (13)	46 (12)	1.2 (0.77–1.92)	65 (27)	47 (15)	2.0 (1.27–3.04)	56 (43)	99 (31)	1.6 (1.06–2.52)	180 (30)	151 (14)	2.4 (1.90–3.13)
IV medication/aerosol treatment	168 (43)	160 (40)	1.1 (0.79–1.44)	36 (15)	31 (10)	1.7 (1.02–2.98)	38 (29)	58 (18)	1.9 (1.17–3.10)	127 (21)	110 (10)	2.1 (1.61–2.85)
Hospital admission	111 (29)	102 (26)	1.3 (0.92–1.79)	49 (20)	45 (14)	1.5 (0.97–2.45)	49 (37)	68 (22)	2.5 (1.55–3.89)	174 (29)	125 (11)	2.9 (2.22–3.80)

GP, GP-referred patients; SR, self-referred patients.

<sup>a</sup> Adjusted for age, gender, time of contact (day, evening, or night) and day of contact (weekday or weekend). Reference category: self-referred children.

<sup>b</sup> High MTS urgency (maximum waiting time): immediate (0 min) or very urgent (10 min) category.

<sup>c</sup> Extensive laboratory or radiology examinations.

by GPs in the Netherlands, has been shown to be adequate,<sup>22,27</sup> safe,<sup>40</sup> and satisfactory.<sup>22,25,41</sup> Because in our health care system GPs only refer patients who need specialist care, we have used GP-referred children as a reference group of true severely ill patients. This study revealed that many parents, who could choose between primary or secondary care facilities for emergency care, presented to the ED adequately and were capable of judging their child's severity of illness. Therefore, we believe that our results and the medical implications are important for community EDs in other countries as well.

Because increasing numbers of self-referrals at the ED cause a high workload for ED nurses and physicians, future research should focus on demographic and clinical characteristics of self-referred febrile children that point toward severe illness. By knowing these characteristics, one can distinguish severely ill from nonseverely ill children on arrival at the ED. For example, our subgroup analyses already revealed that GP-referred and self-referred children with fever and dyspnea were equally ill. Such determinants, rather than general measures on the basis of referral type alone, should be used to guide decisions on accepting or diverting self-referrals at the ED.

### Study Weaknesses and Strengths

The first limitation of this study is our use of MTS urgency, diagnostic interventions, therapeutic interventions, and follow-up as proxies for severity of illness. However, because such proxies have been extensively used to validate triage systems worldwide,<sup>42–45</sup> we believe this method is valid to approximate true severity of illness.

Second, we had no information on whether self-referred children were seen by a GP (but not referred) before their presentation at the ED. Possibly, parents were instructed by the GP about specific symptoms to be aware of or to go to the ED when symptoms worsened. Potentially, this information could have influenced our results toward more severely ill patients in the self-referred group.

Third, our interpretation that 1 in 4 self-referred children who required at least some extensive medical intervention or hospitalization is a significant number is primarily based on our own clinical experience and intuition. We concluded that discouragement of all parents to self-refer their feverish child to the ED is unacceptable. Unfortunately, this statement is not evidence based, because cutoff values for what we generally consider to be an acceptable number of patients to delay or miss diagnosis in (eg, by discouragement of self-referral) are unavailable.

We are, however, to the best of our knowledge, the first to report differences in severity of illness between GP-referred and self-referred children with fever who presented to a large community ED. Our study sample constitutes a good case-mix selected from a multicultural, inner-city ED population of >14 000 children. In addition, our subgroup analysis is the first to demonstrate that self-referral is justifiable for a considerable number of febrile children with specific accompanying symptoms, especially for those with dyspnea.

Data collection was complete for 98% of all children who presented to the ED during our study period. General patient and clinical characteristics of children with and without missing data

were comparable, indicating that selection bias was unlikely.

Differences in the level of expertise between residents and pediatricians may have led to differences in diagnostic management.<sup>46</sup> At our study EDs, all residents were supervised by a pediatrician, and we found no differences in the number of diagnostic interventions performed by residents or pediatricians ( $\chi^2$  test:  $P = .28$  [data not shown]).

The magnitude of the difference in diagnostic and therapeutic interventions performed between self-referred and GP-referred children is similar to that of the number of hospitalizations required. Because hospitalization depends on the patient's clinical condition rather than referral type, information bias (ie, pediatricians will perform more diagnostic and therapeutic interventions when they know a child is referred by a GP) is unlikely.

### CONCLUSIONS

Our study emphasized that many parents properly judged and acted on their febrile child's severity of illness by presenting to the ED on their own initiative. Self-referred children with fever must not be generalized and approached as a uniform group of nonseverely ill patients. General measures to discourage self-referrals from presenting to the (community) ED are undesirable for children with fever; this action may result in delayed or missed diagnoses and potentially increase morbidity and mortality.

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