

# Foot problems in children presented to the family physician: a comparison between 1987 and 2001

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**Background.** In recent decades, studies on the management of common foot problems in children have suggested that in many cases, there is no indication for treatment. It is not known whether these studies have changed daily practice.

**Objective.** Our aim was to establish and compare incidence and referral rates for foot problems in children in 1987 and 2001.

**Methods.** A comparison was made of two large consecutive surveys in Dutch general practice performed in 1987 (86 577 children aged 0–17 years) and 2001 (87 952 children aged 0–17 years), which were carried out by The Netherlands Institute for Health Services Research. Both surveys included a representative sample of the Dutch population. Incidence and referral rates were calculated and, data were stratified for age group and gender.

**Results.** Compared to 1987, in 2001 the overall incidence rate of foot problems presented to the family physician (FP) decreased substantially from 80.0 [95% confidence interval (CI) 77.0–84.7] to 17.4 (95% CI 16.5–18.3) per 1000 person-years ( $P < 0.0001$ ). The incidence rate of flat feet decreased from 4.9 (95% CI 4.0–5.9) per 1000 person-years in 1987 to 3.4 (95% CI 3.0–3.8) per 1000 person-years in 2001 ( $P = 0.001$ ). The distribution of referrals to other primary health care professionals and medical specialists has almost reversed in favour of primary health care professionals.

**Conclusion.** Total incidence rate of musculoskeletal foot problems seen by the FP has decreased substantially, between 1987 and 2001.

**Keywords.** Children, family physician, foot, musculoskeletal, incidence.

## Introduction

Children's feet are not simply smaller versions of adult feet. Because their feet are still growing and developing, children have different foot problems than adults. Rapid growth occurs from 4-week gestation when the limb bud forms until 18 months of age when the foot is approximately half its adult size. A child's foot has a much greater range of motion than the adult foot, and joint laxity is common.<sup>1</sup> The longitudinal arch height of the foot increases with age; it is usually absent in the infant, low in the child and higher in the adolescent and adult foot.<sup>2</sup> In the feet of healthy

children, some normal variations/deviations can nevertheless cause great concern to their parents. However, some foot abnormalities do need treatment or are indicators of underlying neuromuscular disorders and syndromic conditions.<sup>3,4</sup> Therefore, it is expected that many parents will visit their family physician (FP) with a question about (supposed) foot deformities and other foot problems. Indeed, in 1995, Vijlbrief *et al.*<sup>5</sup> showed that the top 15 of most common diagnoses in musculoskeletal disorders in children in Dutch family practice not only contained non-specific diagnoses that might contain foot problems (e.g. tendinitis/synovitis) but also two specific foot-related diagnoses (sprain/strain of

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foot/toe and flat feet). Although there are publications on foot problems in children,<sup>3,4,6</sup> data on their incidence are scarce. The majority of reports discuss only one specific condition, most often flat feet and its treatment.<sup>7–14</sup> In the past 20 years, many studies explored the management of common foot problems.<sup>11–14</sup> Most authors suggest that treatment with orthopaedic soles or footwear should be restricted to those children with either serious malformations or foot pain and that this type of treatment does not aim to develop a better longitudinal foot arch or prevent musculoskeletal pain in the future.<sup>14,15</sup> Some even state that the ‘corrective shoe’ is harmful to the child<sup>11,14</sup> and that many unnecessary referrals are made.<sup>10</sup>

We were interested to explore whether increased knowledge on the management of musculoskeletal foot problems in children has influenced incidence and referral rates of these problems among children in family practice. Therefore, in the present study, we compare the results of two large consecutive surveys in Dutch family practice performed in 1987 and 2001, respectively, with the aim to answer the following questions:

- How often did the FP see children aged 0–17 years with musculoskeletal foot problems and to what extent did this change between 1987 and 2001?
- For which musculoskeletal foot problems did the FP refer children and did the referral rate change between 1987 and 2001?

## Methods

We analysed data from the first and second Dutch national survey of family practice, which were carried out by The Netherlands Institute for Health Services Research in 1987 and 2001, respectively. Both surveys included a representative sample of the Dutch population and the Dutch FP population: for further details see Westert *et al.*<sup>17</sup> In The Netherlands, family practices have a fixed list size, and all non-institutionalized inhabitants are listed in a general practice. FPs have a gatekeeping role, meaning that a medical specialist can only be consulted after referral by a FP. Thus, generally speaking, the first contact with health care is via the FP.

### *First Dutch national survey 1987*

A non-proportionally stratified sample of 161 FPs (103 practices) was selected randomly to participate in the survey. The FPs were divided into four groups and each group registered data (e.g. diagnosis, prescription and referrals) about all contacts between patient and practice on registration forms during one of four consecutive 3-month periods during 1987. The four registration

periods covered one calendar year to correct for seasonal variability of morbidity. Specially trained workers using the International Classification of Primary Care (ICPC) coded free-text diagnoses made by the FP. Data on patient demographics were obtained by a questionnaire. Because of the stratified sample, the population was weighted to the Dutch population of 1987.

### *Second Dutch national survey 2001*

In 2001, data on all FP—patient contacts during one calendar year—were derived from the electronic medical records of all listed patients of 195 FPs (104 practices). The FPs recorded all health problems presented within a consultation and coded the diagnosis themselves using the ICPC. In 2001, we excluded data from nine practices from the analysis because of technical problems with registration.

In 2001, because it was possible to search in the free text for the reasons for the consultation, an analysis was made (by the first author) of the contact with all children aged 0–17 years of age diagnosed with musculoskeletal foot problems and with one of the following ICPC codes: L17 (foot/toe symptom/complaint), L28 (limited function/disability), L29 (symptom/complaint musculoskeletal other), L98 (acquired deformity of limb) or L99 (musculoskeletal disease other). This enabled us to compile more subgroups of foot problems for 2001 than for 1987. All referrals made for all foot problems (to both primary and secondary care) in both surveys were analysed.

### *Statistical analysis*

The incidence rate was calculated by dividing the total number of new episodes (numerator) by the mid-time population (denominator). Data were stratified for age group and gender. Incidence rates were expressed per 1000 person-years. The 95% confidence intervals (CIs) were calculated assuming a Poisson distribution using STATA version 8.2. The statistical package SPSS 11.0 was used for all other analyses.

## Results

### *Study populations in 1987 and 2001*

The study population in 1987 consisted of 86 577 children aged 0–17 years (mean age 10.4 years) yielding 21 644 person-years; these children had 1749 contacts with the FP concerning foot problems. In 2001, the study population consisted of 87 952 children aged 0–17 years (mean age 8.3 years) yielding 81 716 person-years; these children had 1419 contacts with the FP concerning foot problems.

### *Incidence*

Table 1 shows the distribution of foot problems in Dutch general practice in 1987 and 2001 stratified by

gender. Compared to 1987, in 2001, the overall incidence rate of foot problems presented to the FP had substantially decreased from 80.0 (95% CI 77.0–84.7) to 17.4 (95% CI 16.5–18.3) per 1000 person-years ( $P < 0.01$ ).

The incidence rate of flat feet decreased from 4.9 (95% CI 4.0–5.9) per 1000 person-years in 1987 to 3.4 (95% CI 3.0–3.8) per 1000 person-years in 2001 ( $P < 0.01$ ). The incidence rate of hallux valgus decreased slightly from 0.6 (95% CI 0.3–1.0) per 1000 person-years in 1987 to 0.3 (95% CI 0.2–0.4) per 1000 person-years in 2001 ( $P = 0.05$ ).

For all foot problems, the incidence in 1987 was higher in girls (significant for hallux valgus  $P = 0.03$ , other foot problems  $P < 0.01$  and total foot problems  $P < 0.01$ ), whereas in 2001, this higher incidence of foot problems in girls was only observed in the hallux valgus subgroup.

In 2001, it was possible to distinguish more subgroups than in 1987. Table 2 gives gender-specific and subgroup-specific incidence rates for 2001, whereas hallux valgus has a higher incidence rate in girls, heel pain is more common in boys ( $P = 0.01$ ). Figure 1 shows the age distribution for the three major foot problems in 2001: flat feet (median age 10.0 years),

heel pain (median age 10.5 years) and hallux valgus (median age 14.0 years).

### Referrals

In 1987, 8.9% of the children with a foot problem were referred; in 2001, this percentage increased to 18.0% ( $P < 0.01$ ). Of the 152 children in 1987, 35.5% ( $n = 54$ ) were referred to another primary health care provider and 64.5% ( $n = 98$ ) to a medical specialist. In 2001, these percentages were 59.6% ( $n = 152$ ) and 40.4% ( $n = 103$ ), respectively. Table 3 presents data on the distribution of the specialties. Due to a procedural change during the studies (see Methods), it was not possible to maintain exactly the same division.

In 1987, 38.3% ( $n = 40$ ) of the children who visited the FP with flat feet were referred compared with 22.5% ( $n = 62$ ) in 2001 ( $P < 0.01$ ).

## Discussion

### Incidence

Between 1987 and 2001, the incidence rate of foot problems in children presented to the FP decreased drastically, from 80.0 to 17.4 per 1000 person-years,

TABLE 1 Incidence rates and confidence intervals of foot problems per 1000 person-years in children aged 0–17 years in Dutch general practice in 1987 and 2001, stratified by gender and diagnosis

Foot problem	1987, incidence rate (95% CI) Overall	1987, incidence rate (95% CI) Male	1987, incidence rate (95% CI) Female	2001, incidence rate (95% CI) Overall	2001, incidence rate (95% CI) Male	2001, incidence rate (95% CI) Female
Flat feet	4.9 (4.4–6.0)	4.5 (3.3–5.9)	5.4 (4.1–7.0)	3.4 (3.0–3.8)	3.7 (3.2–4.4)	3.0 (2.5–3.6)
Hallux valgus	0.6 (0.3–1.0)	0.4 (0.1–0.9)	1.1 (0.6–2.0)	0.3 (0.2–0.4)	0.1 (0.0–0.2)	0.5 (0.3–0.8)
Other foot problems	75.3 (71.7–79.1)	70.1 (65.3–75.2)	80.8 (75.5–86.5)	14.1 (13.3–14.9)	14.3 (13.2–15.5)	13.1 (12.0–14.3)
Total	80.8 (77.0–84.7)	74.9 (69.9–80.2)	87.0 (81.5–92.0)	17.4 (16.5–18.3)	18.1 (16.9–19.5)	16.5 (15.3–17.9)

TABLE 2 Number of cases, incidence rates and confidence intervals per 1000 person-years, of foot problems in children aged 0–17 years in Dutch general practice by gender and subgroup, in 2001

Subgroup	Total group			Boys			Girls		
	No. cases	Incidence rate	95% CI	No. cases	Incidence rate	95% CI	No. cases	Incidence rate	95% CI
Flat feet	275	3.4	3.0–3.8	157	3.7	3.2–4.4	118	3.0	2.5–3.6
Heel pain	140	1.7	1.4–2.0	87	2.1	1.7–2.6	53	1.3	0.9–1.7
Hallux valgus	23	0.3	0.2–0.4	4	0.1	0.0–0.2	19	0.5	0.3–0.8
Toe walker	10	0.1	0.1–0.2	8	0.2	0.1–0.4	2	0.1	0.0–0.2
Clubfoot	6	0.1	0.0–0.2	5	0.1	0.0–0.3	1	0.0	0.0–0.1
Poly-/Syndactily	7	0.1	0.0–0.1	4	0.1	0.0–0.2	3	0.1	0.0–0.2
Curly toes	22	0.3	0.2–0.4	11	0.4	0.1–0.5	11	0.3	0.1–0.5
Intoeing	36	0.4	0.3–0.6	16	0.3	0.2–0.6	20	0.5	0.3–0.7
Outtoeing	8	0.1	0.0–0.2	3	0.1	0.0–0.2	5	0.1	0.0–0.3
Foot deformity	50	0.6	0.5–0.8	26	0.6	0.4–0.9	24	0.6	0.4–0.9
Not specified									
Trauma	318	3.9	3.5–4.3	178	4.2	3.6–4.9	140	3.5	3.0–4.1
Pain	106	1.3	1.1–1.6	42	1.0	0.7–1.4	64	1.6	1.2–2.1
Other complaints	418	5.1	4.6–5.6	220	5.2	4.6–6.0	198	5.0	4.3–5.7
Total	1419	17.4	16.5–18.3	761	18.1	16.9–19.5	658	16.5	15.3–17.9

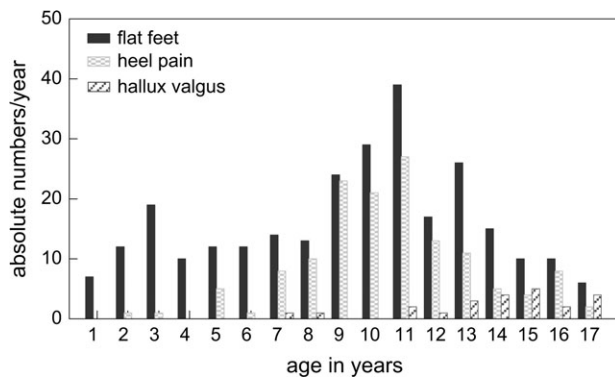


FIGURE 1 Age distribution of consultations for the three most common foot problems of children aged 0–17 years in Dutch general practice in 2001: flat feet, heel pain and hallux valgus

TABLE 3 Distribution among the specialties of referrals of foot problems in children aged 0–17 years in Dutch general practice

	1987, no. of referrals in 3 months (% among all referrals)	2001, no. of referrals in 1 year (% among all referrals)
Primary care		
Physiotherapy	23 (15.1)	70 (27.5)
Podiatry	NA	66 (25.9)
Other primary care specialties	31 (20.4)	16 (6.3)
Medical specialists		
Surgery	40 (26.3)	20 (7.8)
Orthopaedics	53 (34.9)	51 (20.0)
Pediatrics	4 (2.6)	27 (10.6)
Neurology	1 (0.7)	5 (1.9)

NA, not available

respectively. This decrease could partly be due to studies (during the last 20 years) reporting that most foot problems in children do not need treatment.<sup>11–14</sup> In The Netherlands, preventive youth health care is government controlled and free for all children. Children aged 0–4 years can attend a baby clinic to receive regular health check-ups and vaccinations. School-aged children receive regular health check-ups from special school physicians; these physicians together with FPs play an important role in educating people on health care issues.

In the present study, the marked decrease in the incidence of foot problems is probably due to the fact that having flat feet and other foot problems is not seen as such a medical problem as it was a generation ago, and we hypothesize that one of the reasons for that is that we as family doctors do a very good job educating our patients, based on our increased knowledge of the literature.

A decrease in the incidence of flat feet was also observed, but this was substantially smaller than the decrease in total foot problems. This result may appear

to conflict with the fact that most studies on foot problems focused on flat feet. It is, however, plausible that increased awareness that most foot problems do not need treatment made parents less inclined to visit a FP for other foot problems as well. In addition, in 1987, the group of ‘other foot problems’ may have also contained children with flat feet. Unfortunately, in the 1987 survey, it was not possible for us to search the free text for the reasons for consultation (see Methods) and exclude this latter possibility.

In our gender-specific comparison of incidence rates between 1987 and 2001, it appears that in 1987, all foot problems are more common in girls. This higher incidence in girls did not emerge in 2001; however, we have no explanation for this change.

Our gender-specific analysis shows that heel pain is more common in boys and hallux valgus is more common in girls. Foot pain and heel pain are a common problem in children,<sup>18</sup> but we were unable to find reports on (gender-specific) occurrence rates or a population-based incidence rate of hallux valgus among children aged 0–17 years. Some have reported a low occurrence in children, whereas others found valgus deformity in 4.7%–22.4% of school girls.<sup>19</sup> A higher incidence of hallux valgus in females than in males has also been reported.<sup>20,21</sup>

It was not possible to compare the age distribution of the three problems most often presented to the FP in our study (flat feet, hallux valgus and heel pain) with that of other studies. In a study on children, Craigmile<sup>19</sup> found hallux valgus to be most common in children aged 12–15 years. Although there are many publications on flat feet, the age distribution of the children presenting with this problem was lacking until now.

### Referrals

In 1987, 8.9% of the patients with a foot problem was referred compared with 18% in 2001; this increase is not consistent with the earlier decrease in total referral rates between these years for children in Dutch primary care.<sup>22</sup> The large decrease in the incidence of total foot problems presented to the FP may be due to the knowledge that treatment is usually not necessary. Consequently, most of the children who visit the FP will have a foot problem that does need treatment, resulting in an increase in the percentage of referrals. Also the fall in incidence is much larger than the increase of referrals; therefore, the actual number of referrals is less in 2001 than in 1987. Noteworthy is that the distribution of referrals between primary and secondary care has reversed; in 1987, approximately 65% were referred to secondary care compared with 40% in 2001. This is probably related to the fact that, in 1983, podiatry became a certified primary care profession in The Netherlands. After this date, FPs probably referred more patients to a podiatrist rather than to a medical specialist. This relatively new primary care

profession may also partially explain the increase in total referrals for foot problems, i.e. FPs may have a lower threshold to refer to a primary care professional than to a medical specialist. In 1987, 38.3% of the children with flat feet who visited the FP were referred compared with 22.5% in 2001. Thus, the total referral rate of foot problems increased, whereas for flat feet, this rate decreased enormously. This adds credibility to the assumption that increased knowledge through studies on flat feet, reporting that (invasive) treatment is not necessary in the majority of cases, has changed FPs' management of this problem.

#### *Implications for clinical practice and research*

This study has provided important epidemiological background data on foot problems in children, which is useful for research and clinical practice. We also think that this study shows that the increased knowledge in doctors through the literature can influence what we explain to our patients, and this can in some years increase the knowledge of our patients.

#### *Strengths and limitations of the study*

These two large, representative and comprehensive surveys enabled us to accurately evaluate epidemiological data on foot problems in children presenting in primary care. However, some differences in the design of the two national surveys might hamper comparability of data. For example, ICPC coding of the diagnosis was not performed in the same way in both surveys: in 1987, this coding was done by clerks after the consultation, whereas in 2001, FPs coded the diagnosis themselves during the consultation. The participating FPs were trained in correct coding. We assume that the coding by clerks in 1987 more often led to a specific diagnostic ICPC code than in 2001 when FPs did the coding themselves leading to more symptom codes. In addition, in 2001, it was possible to search in the free text for the reasons for the consultation; the first author analysed all possibly related ICPC codes (see Methods) thereby minimizing differences in the final coding. Therefore, it is possible to make a valid comparison of the incidence rates between 1987 and 2001.

## Conclusions

This study shows that the incidence rate of foot problems presenting in general practice dropped drastically between 1987 and 2001. The total referral rate for children with foot problems has increased between these years, in contrast to the decreasing overall referral rate of children in the same period. The distribution of referrals to other primary health care professionals and medical specialists has almost reversed in favour of primary health care professionals, probably partly due to recognition of the podiatric profession in The

Netherlands in 1983. While the total referral rate of foot problems increased, the referral rate of the subgroup with flat feet decreased. The decrease in the total incidence rate and referral rate of flat feet is probably a consequence of the current knowledge that for most foot problems no treatment is necessary. In addition, this study shows that heel pain has a higher incidence rate among boys and that hallux valgus has a higher incidence among girls.

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## Declaration

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**Conflicts of interest:** None.

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