

# Diagnoses and interventions in podiatry

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## Summary

In the present study a quantitative description is given of diagnoses and interventions in podiatry. Data are used from a survey on podiatry practice in The Netherlands. Data have been recorded by 36 podiatrists on 897 patients. Information was gathered on patient characteristics, the medical diagnoses, the podiatry diagnoses (impairments and disabilities), treatment goals derived from these diagnoses, and interventions. Impairments were recorded in nearly all patients. The interrelationship among impairments was analysed. Four dimensions of highly interrelated impairments were found. Disabilities were recorded in about one-third of the patients. Only one dimension of interrelated disabilities was identified. Podiatric soles were applied in the treatment of two-thirds of the patients, silicone devices in one-fifth of the patients and nail braces in only a few patients. Advice, instruction and exercise was given in one-third of the patients, while basic foot care was given in a quarter of the patients. Significant relationships between treatment goals and the application of interventions were found. The main conclusions from this study are: (1) the podiatry diagnosis is primarily at the level of impairments; (2) treatment goals derived from impairments determine which interventions are applied. The implications of these findings with regard to the further development of the podiatry diagnosis and the design of studies on the outcome of podiatric interventions are discussed.

## Introduction

Podiatrists are trained to diagnose and treat foot disorders. In the treatment, the initial step is the investigation of the patient's presenting problems. The investigation of the podiatrist includes the medical history and the determination of biomechanical factors contributing to the patient's condition. The assessment includes gait analysis, postural analysis and a detailed assessment of the anatomical relationships within the foot. The clinical examination of the podiatrist results in the podiatry diagnosis. The International Classification of

Impairments, Disabilities and Handicaps (ICIDH) is considered an adequate system to classify the podiatry diagnosis.<sup>1,2</sup>

Podiatrists make appliances that aid, protect, accommodate or functionally correct the condition of the patient's foot. Different materials are used in these appliances. In the treatment of structural and functional foot disorders flexible inlays (podiatric soles) made of leather with variable elements of cork and rubber are often used. In the condition of stance deviations of the toes devices made of silicones, latex polyurethane and other substances are applied. Nail problems, especially ingrowing and hyperconvex nails, are treated with nail braces. Basic foot care such as reduction of callus, dissection of corns, clipping of nails is also an element in the work of podiatrists. In addition, advice and patient education is given to reduce recurrence or to prevent more serious conditions.<sup>3,4</sup> In The Netherlands podiatric interventions have a conservative character, contrary to the situation in some other countries, podiatrists in The Netherlands are not permitted to do surgery.

Quantitative data on disorders which are treated by podiatrists are virtually non-existent. From a report on podiatric practice in The Netherlands,<sup>3</sup> it appears that the complaints seen by most podiatrists relate to stance deviations of the foot. Thirty-nine percent of the patients have stance deviation of the front of the foot and 41% have stance deviations of the back of the foot. Stance deviations of the toes, impairments of nails, excessive hard skin, and corns are seen in 14-24% of the patients.

The first intention of the present study is to give a description of the patient population with an emphasis on those aspects of the patient's health which are recorded in the podiatric examination. As podiatric treatment is concerned with removing or reducing impairments,<sup>1,3,4</sup> the emphasis in podiatric diagnoses is likely to be on these aspects and to a lesser degree on disabilities. As more than one impairment is likely to be present in an individual patient, analyses are carried out to group interrelated impairments. The second intention of the present study is to give a quantitative description of podiatric treatment in terms of treatment goals and interventions, which can give insight into podiatric practice. The third intention is to determine whether relationships exist between treatment goals and subsequent interventions (see Table 1).

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**Table 1** The relationship between diagnosis, treatment goals and treatment

| <i>Diagnosis</i>                                | <i>Treatment goals</i>   | <i>Treatment</i>  |
|---|--|---|
| All impairments which are observed in a patient | Subset of impairments; the treatment is primarily aimed at an improvement in these impairments | Application of interventions aimed at an improvement in the impairments chosen as treatment goals |

## Method

A survey has been conducted to collect data on patients applying for podiatric treatment in The Netherlands. In the period from January 1992 until March 1993, 36 podiatrists working in 33 practices participated in the survey (this is about one-quarter of the podiatrists working in The Netherlands). The participating podiatrists were selected at random from a list of all working members of the Dutch professional association of podiatrists. Twenty-nine (81%) of the participating podiatrists were female and seven (19%) were male. The mean age of the podiatrists was 33.6 years (s.d. 9.4) and the mean working experience was 5.8 years (s.d. 3.1). Most of the podiatrists worked in primary health care, only one worked in institutional care. A comparison of the data obtained for the participating podiatrists with data obtained for all podiatrists working in The Netherlands<sup>5</sup> indicated a good fit for gender, age, working experience and practice (workplace).

### REGISTRATION FORM

A standard registration form was used to obtain information on patients applying for podiatric treatment. The registration form consisted of three main categories.

The first category concerned general patient characteristics (age, sex, living situation, education and occupation) and referral data (the referrer, the reason for referral and the complaints as described by the patients themselves, and recent medical care). The indication for referral, as given by the referrer, was coded using the International Classification of Diseases, the ICD-10.<sup>6</sup>

The second category concerned the podiatry diagnosis. The basis of the classification of the podiatric diagnosis is the International Classification of Impairments, Disabilities and Handicaps.<sup>2</sup> The 'podiatric diagnosis' has two parts: impairments and disabilities. An impairment is defined in the ICIDH as 'any loss of abnormality of psychological, physiological or anatomical structure or function'. The ICIDH does not define foot impairments as they are treated by a specific profession such as podiatry. Therefore an adaptation of the ICIDH was made for use in podiatry. In preceding research the inter-observer reliability of the recording of impairments was tested. The results indicated

that reliability was satisfactory.<sup>1</sup> A disability is defined in the ICIDH as 'any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being'. The severity of the disability was assessed on a three point scale. However, prior to analysis these data were dichotomized: disability present or absent.

The third category of the registration is concerned with treatment. In this section information was gathered on treatment goals and the interventions which were applied to pursue the treatment goals. The podiatrists could indicate a maximum of five treatment goals. With each treatment goal the podiatrists could indicate two interventions which were chosen to pursue that treatment goal.

The data concerning general patient characteristics, complaints, indication for referral, the diagnosis made by the podiatrist and treatment goals were obtained at the first session of the patient's treatment. The data concerning treatment were obtained at the last session.

In total data were recorded for 897 patients. The podiatrists were instructed to register a consecutive group of patients. The number of patients registered by each podiatrist was agreed upon prior to the start of the survey. The mean number of patients registered by each podiatrist was 25.

### DATA ANALYSIS

Podiatrists were asked to record each impairment that was found in the podiatric examination. A large number of different combinations of impairments could thus be indicated. In order to summarize the large amount of information, the impairments were categorized into ten major groups. In combining the impairments, two criteria were used. In the first place the treatment of impairments within a major group should be as similar as possible. In the second place the major groups must not be too small. The categorization into ten major groups was discussed with an experienced podiatrist.

The ten major groups of impairments were analysed in terms of their interrelationships using PRINCALS.<sup>7-9</sup> PRINCALS (principal components analysis by means of alternating least squares) is a non-linear variant on the classical principal component analysis. The most important difference between PRINCALS and the classical method is that, in using this method, discrete variables can be analysed. Principal components analysis is basically intended to transform a

number of variables into a smaller number of new variables (dimensions). A measure for the amount of variation that is ascribed to a particular dimension is the eigenvalue. The number of dimensions to be distinguished is related to the eigenvalues of the dimensions. In this research the standard was that the eigenvalue of a dimension must be larger than 1 divided by the number of variables. The number of variables was equal to the number of categories that was analysed (i.e. 10). The relationship of a variable with a dimension is expressed in the component loading. The description of the interrelationships between major categories of impairments is restricted to the categories with a component loading higher than 0.50 or less than -0.50.

The analysis of disabilities was carried out in the same way as the impairments. In the first place the different disabilities were subdivided into four major groups. The four major groups of disabilities were analysed in respect of their interrelationships using PRINCALS.

The relationship between treatment goals and interventions was analysed by means of logistic regression. In these analyses the dependent variable was the application of a specific intervention. Each individual intervention was tested to determine whether the frequency of application of the intervention depended on which treatment goals were pursued. The significance of the overall test for logistic regression ( $\chi^2$  model) indicates that the treatment goals predict how often the intervention was applied. The exponents of the regression coefficients ( $\text{Exp}(B)$ ) are odds ratios and consequently measures of the strength and direction of the relationship. An odds ratio higher than 1 indicates a positive relationship: with that particular treatment goal the intervention was applied more frequently than without that treatment goal. An odds ratio less than 1 indicates a negative relationship: with that particular treatment goal the intervention was applied less frequently than without that treatment goal. To test that the odds ratio is not equal to 1, the Wald statistic was used. This statistic has a  $\chi^2$  distribution. For both the overall test and the partial test the significance level was set at 0.05.

## Results

### GENERAL PATIENT CHARACTERISTICS

In Table 2 an overview is given of the general characteristics of patients which were recorded by the podiatrists. More than two-thirds of the 897 patients were women (69.4%). The average age of the patients was 46.2 (s.d. 20.7). Male patients are on average younger than the female patients. The average age for men was 40.2 and for women 48.9. The difference is statistically significant (*t*-test, *p* smaller than 0.00). More than half (56.5%) of the patients

were publicly insured, 43.1% had a private insurance and 0.5% had no health insurance. The greater part of the patients lived at home; only 4.1% of the patients lived in a special form of housing (nursing home/old people's home, etc). Approximately one-sixth of the patients lived in a one-person household. Half of the patients had an educational level higher than (lower level) secondary vocational training.

### REFERRALS

Approximately two-thirds of the patients were referred by their GP (64.1%). The specialist referred 7.2% of the patients. The three medical specialisms with the biggest share in this were internal medicine, orthopaedics and general surgery, respectively. More than 28% of the patients were not referred: 13% were introduced generally by a physiotherapist or foot specialist and 15% came of their own initiative.

### REASONS FOR REFERRAL

The referrer summarizes the reasons for referring in a medical diagnosis. For 46.2% of the patients no reason for referral was recorded. The chapter of the ICD-10 within which fall most reasons of referral is chapter XIII: 'Diseases of the musculoskeletal system and connective tissue', which accounted for 34.8% of the patients. Chapter XII: 'Diseases

Table 2 Characteristics of the patients applying for podiatric treatment (*n* = 897)

| Characteristic   | %    |
|--|------|
| Gender:  |      |
| —male  | 30.6 |
| —female  | 69.4 |
| Age:   |      |
| —0–19 years  | 12.8 |
| —20–39 years   | 23.4 |
| —40–64 years   | 41.6 |
| —≥ 65 years  | 22.2 |
| Insurance:   |      |
| —health insurance funds                                | 56.5 |
| —private health insurance                              | 43.1 |
| —no insurance  | 0.5  |
| Housing:   |      |
| —private households                                    | 95.9 |
| —other   | 4.1  |
| Households:  |      |
| —one person  | 16.9 |
| —with others   | 83.1 |
| Education:   |      |
| —basic education or less                               | 22.2 |
| —secondary education/vocational training, lower level  | 24.4 |
| —secondary education/vocational training, higher level | 37.7 |
| —college and university                                | 14.9 |

**Table 3** Indications for referral (ICD-10)<sup>a</sup> (n = 897)

| Indications  | %    |
|--|------|
| M21.6 Other acquired deformities of ankle and foot             | 13.4 |
| M79.6 Pain in limb   | 9.4  |
| L84 Corns and calluses   | 5.6  |
| M20.1 Acquired deformities of toe(s) unspecified               | 3.8  |
| L60.0 Ingrowing nail   | 1.9  |
| R26 Abnormalities of gait and mobility                         | 1.8  |
| M70 Soft tissue disorders related to use, overuse and pressure | 1.8  |
| M25.9 Joint disorder, unspecified                              | 1.6  |
| M20.4 Other hammertoe(s), acquired                             | 1.4  |
| M77.3 Calcaneal spur   | 1.4  |

<sup>a</sup> For 46.2% of the patients no indication for referral was recorded.

of skin and subcutaneous tissue' accounted for 9.2% of the patients. Ten of the most common reasons for referral are given in Table 3. In addition to 'other acquired deformities of the ankle and foot', 'pain in the limb' occurred rather frequently.

#### IMPAIRMENTS

An average of 4.6 impairments were recorded per patient. Six patients (0.7%) had no impairment. Table 4 gives an overview of the occurrence of the impairment. In particular pain, stance deviation of foot, stance deviation of the toes and impairments in gait occurred frequently.

The relationship between the major groups of impairments was analysed using PRINCALS. The ten major groups of impairments can be reduced to four combinations (dimensions). The results of this analysis are given in Table 5. The following relationships were found. The first combination consisted of stance deviations of the foot, motor impairments and postural impairments. The second combination consisted of: stance deviations of the toes, impairments of the skin and pain. Impairments of nails and the category 'other impairments' did not combine with another impairment and formed two separate dimensions.

#### DISABILITIES

Disabilities were less frequently recorded by podiatrists than impairments. Only 35% of the patients showed a disability. Table 6 gives an overview of the percentage of patients with a particular disability. A disability preventing participation in sport occurred most frequently, i.e. among 24% of the patients. The disabilities were categorized into four major categories. An analysis using PRINCALS indicated that these categories of disabilities

are all related to one another: only one combination (dimension) was found, consisting of all four categories of disabilities.

#### IMPAIRMENTS AND DISABILITIES

The relationship between the major groups of impairments and major groups of disabilities were also examined using PRINCALS. The results indicated that the disabilities showed no relationship to the impairments.

#### TREATMENT

On average, the patients visited their podiatrist twice. In 45% of the patients there was only one visit and in 24% of the patients there were more than two visits. The period

**Table 4** Impairments<sup>a</sup> (n = 897)

| Impairment                        | %           |
|-----------------------------------|-------------|
| Stance deviation of foot          | <b>58.3</b> |
| Stance deviation of toe(s)        | <b>38.2</b> |
| Impairments of skin               | <b>46.7</b> |
| Callus                            | 26.6        |
| Verruca                           | 3.5         |
| Corns                             | 13.5        |
| Scar tissue                       | 3.6         |
| Ulcer, decubitus                  | 1.6         |
| Swelling                          | 12.7        |
| Atrophia of the sole of the foot  | 7.1         |
| Impairments of nails              | <b>9.3</b>  |
| Impairments of bone tissue        | <b>13.4</b> |
| Heelspur                          | 3.0         |
| Exostosis                         | 9.9         |
| Amputation of (toe(s))            | 0.7         |
| Postural impairments              | <b>25.8</b> |
| Kyphosis                          | 1.8         |
| Lordosis                          | 5.2         |
| Scoliosis                         | 7.9         |
| Other postural impairments        | 7.4         |
| Impairment of pelvic-torsion      | 11.1        |
| Deviation of leg length           | 13.3        |
| Impairments of motor action       | <b>54.7</b> |
| Restricted range of joint motion  | 16.5        |
| Hypermobility                     | 15.2        |
| Impairments of muscle strength    | 6.5         |
| Deviation of muscle length        | 4.1         |
| Deviation of muscle tone          | 4.0         |
| Contracture                       | 3.7         |
| Impairment of gait                | 37.2        |
| Impairments of coordination       | 2.3         |
| Pain                              | <b>70.8</b> |
| General impairments               | <b>32.1</b> |
| Fatigue                           | 21.2        |
| Numbness (including paraesthesia) | 10.5        |
| Impairment of blood circulation   | 7.0         |
| Other impairments                 | 7.1         |

<sup>a</sup> Impairments are subdivided into ten major groups. The percentages of patients within these groups are printed in bold.

Table 5 Results of the principal components analysis (PRINCALS) with impairments<sup>a</sup> (n = 897)

| Impairment                  | Component loadings |              |             |             |
|-----------------------------|--------------------|--------------|-------------|-------------|
|                             | Dimension 1        | Dimension 2  | Dimension 3 | Dimension 4 |
| Stance deviations of foot   | <i>0.649</i>       | 0.146        | 0.188       | - 0.166     |
| Stance deviations of toe(s) | - 0.286            | <i>0.584</i> | 0.235       | - 0.265     |
| Impairments of skin         | - 0.271            | <i>0.659</i> | - 0.183     | 0.074       |
| Impairments of nails        | - 0.381            | - 0.145      | - 0.543     | 0.335       |
| Impairments of bone tissue  | - 0.112            | 0.423        | 0.285       | 0.076       |
| Postural impairments        | <i>0.529</i>       | - 0.099      | - 0.212     | - 0.357     |
| Impairments of motor action | <i>0.657</i>       | 0.291        | 0.032       | 0.182       |
| Pain                        | 0.155              | <i>0.530</i> | - 0.423     | 0.148       |
| General impairments         | 0.435              | 0.068        | - 0.424     | 0.191       |
| Other impairments           | - 0.152            | 0.051        | - 0.407     | - 0.787     |
| Eigenvalue                  | 0.168              | 0.138        | 0.107       | 0.105       |

<sup>a</sup> Component loadings higher than or equal to 0.500 (positive or negative) are italicized.

between the first and the last contact lasted 13.6 weeks on average.

Table 7 shows the application of podiatric intervention. The most frequently applied intervention was the construction of podiatric soles. Podiatric soles were applied in about two-thirds of the patients. Silicone devices (orthoses) were applied in about one-fifth of the patients. In about one-third of the patients advice, instruction and exercise was given. In about one-quarter of the patients basic foot care was applied.

Table 8 shows how often interventions were indicated in combination with treatment goals. The percentages in Table 8 refer to all 897 patients. It should be noted that five treatment goals could be indicated, with each treatment goal having two interventions. The reduction of pain and the application of podiatric soles was the most frequently indicated combination. Podiatric soles were also frequently applied to pursue other treatment goals. For example for the reduction of fatigue podiatric soles were applied in 17.5% of

the patients (this is about 95% of the patients in which the treatment goal 'the reduction of fatigue' was pursued). Also, podiatric soles were frequently used for the improvement of posture and the correction of stance deviations of the foot. In nearly all patients in which these treatment goals were indicated, podiatric soles were applied. To correct a stance deviation of the toes, silicone devices were most frequently used. In order to reduce nail disorders, nail treatment (e.g. nail braces) was—as expected—most frequently used.

Logistic regression was used to test the relationship between treatment goals and interventions. This analysis was done separately for each intervention. Table 9 shows the results. All overall tests were significant. Thus, the appli-

Table 7 Interventions<sup>a</sup> (n = 897)

| Intervention                                 | %           |
|--|-------------|
| Construction of podiatric soles              | <b>67.1</b> |
| Silicone devices                             | <b>22.4</b> |
| Construction of a protective silicone device | 8.5         |
| Construction of a corrective silicone device | 15.8        |
| Construction of a prosthesis                 | 0.1         |
| Nail treatment                               | <b>3.9</b>  |
| Nail braces                                  | 2.9         |
| Artificial nail                              | 1.8         |
| Basic foot care                              | <b>25.8</b> |
| Instrumental care                            | 16.2        |
| Temporary therapy                            | 9.8         |
| Wound treatment                              | 2.7         |
| Caustic treatment                            | 2.2         |
| Advice/instruction/exercise                  | <b>36.8</b> |
| Exercise of muscle strength                  | 27.2        |
| Shoe education                               | 36.8        |
| Preventive advice                            | 21.6        |
| Other interventions                          | <b>0.7</b>  |

<sup>a</sup> The percentages refer to all patients. Interventions are divided into major groups: the percentages of patients with at least one of the interventions in these groups are printed in bold.

Table 6 Disabilities<sup>a</sup> (n = 897)

| Disability  | %           |
|---|-------------|
| Disabilities in locomotion                          | <b>15.3</b> |
| Walking   | 11.8        |
| Climbing stairs                                     | 13.9        |
| Disabilities in basic motor skills                  | <b>24.6</b> |
| Body transfer                                       | 8.4         |
| Standing for long periods                           | 22.5        |
| Keeping balance                                     | 12.8        |
| Disability in exercise tolerance/physical endurance | <b>17.8</b> |
| Disabilities in other (social) activities           | <b>28.0</b> |
| Household activities                                | 11.0        |
| Profession  | 13.3        |
| Sports activities                                   | 23.9        |
| Hobbies   | 9.2         |

<sup>a</sup> Disabilities are subdivided into four major groups. The percentages of patients with at least one of the disabilities in these groups are printed in bold.

Table 8 Treatment goals and interventions<sup>a</sup> (n = 897)

| Treatment goal                           | Intervention |           |           |            |            |            |
|--|--------------|-----------|-----------|------------|------------|------------|
|  | soles<br>%   | sili<br>% | nail<br>% | basic<br>% | a/i/e<br>% | other<br>% |
| Reduction of pain                        | 58.2         | 16.8      | 2.6       | 19.0       | 15.8       | 0.3        |
| Reduction of fatigue                     | 17.5         | 0.3       | —         | 0.1        | 4.3        | —          |
| Improvement of posture                   | 14.0         | 0.2       | —         | 0.4        | 2.3        | 0.2        |
| Correction of stance deviation of foot   | 45.4         | 0.6       | 0.1       | 0.4        | 9.0        | —          |
| Correction of stance deviation of toe(s) | 5.0          | 12.8      | 0.1       | 0.7        | 3.2        | —          |
| Reduction of skin disorders              | 2.6          | 1.9       | 0.3       | 10.8       | 1.8        | 0.1        |
| Reduction of nail disorders              | 0.4          | 0.6       | 3.2       | 3.0        | 1.0        | —          |
| Patient education                        | 2.5          | 0.3       | 0.1       | 0.7        | 12.3       | 0.1        |
| Other                                    | 3.1          | 0.8       | 0.1       | 0.3        | 2.1        | —          |

soles, Podiatric soles. sili, Silicone devices. nail, Nail treatment. basic, Basic foot care. a/i/e, Advice/instruction/exercise. other, Other interventions.

<sup>a</sup> The percentages refer to all patients. A maximum of five treatment goals could be indicated, and a maximum of two interventions for each treatment goal.

cation of an intervention (e.g. podiatric soles) was dependent on which treatment goal was pursued. An odds ratio higher than 1 indicates a positive relationship: with that particular treatment goal the intervention was applied more frequently than without that treatment goal. This, for example, occurred with the treatment goal 'reduction of fatigue' and the application of podiatric soles. An odds ratio less than 1 indicates a negative relationship: with that particular treatment goal the intervention was applied less frequently than without that treatment goal. This, for example, occurred with the treatment goal 'reduction of fatigue' and the application of silicone devices. Based on the positive relationships the following conclusions can be drawn:

To pursue a correction of stance deviation of the foot, the improvement of posture, the reduction of fatigue and the reduction of pain, podiatric soles are applied.

To pursue the correction of stance deviation of the toe(s), silicone devices are applied.

To pursue a reduction of nail disorders, nail treatment is applied.

To pursue the reduction of skin disorders, basic foot care is applied.

With the treatment goal 'patient education' (education of good health habits and to give insight into the patient's complaints), advice, instruction and exercise are applied.

## Discussion

The first intention of this study is to give a description of the patient population within podiatry in The Netherlands. As

far as age and sex distribution of the patient population is concerned, the investigation confirms what was already known from earlier research.<sup>3</sup> More than two-thirds of the patients are women and for the most part in the older age categories.

Among the patients who receive podiatric treatment, the percentage of publicly-insured (health insurance funds) is lower than the national average.<sup>10</sup> An explanation for this can be found in the fact that the greater part of the patients are not eligible for restitution of costs for podiatric care. Podiatry is not part of the regular insurance package. This is true for both publicly-insured patients and privately-insured patients. The costs of podiatric treatment will however constitute a greater impediment for the publicly-insured because these people come from the lower income groups. Despite this situation, more than half of the patients are publicly-insured. Clearly these patients find podiatric care important enough to be prepared to pay for it themselves.

The use of referrals to describe podiatric patients appears to be inadequate. There is no referral indication for the greater part of the patients. This is mainly because of the fact that these patients were not referred but went of their own initiative. Furthermore, among these patients who were referred, the reasons for referral were not always given. The available referral indications were classified with the help of the ICD-10.<sup>6</sup> This very extensive classification system does not appear to be specific enough for classification of the reasons for referral in podiatry. A great number of the reasons for referral fall into the miscellaneous categories such as 'other acquired deformities of the ankle and foot'.

Table 9 Logistic regression analysis with treatment goals and interventions (n = 897)

|  | Intervention |            |            |            |            |            |
|--|--------------|------------|------------|------------|------------|------------|
|  | soles        | sili       | nail       | basic      | a/i/e      | other      |
| Overall test ( $\chi^2$ )                | 670.9*       | 496.2*     | 179.4*     | 545.2*     | 298.5*     | 19.9*      |
| Treatment goal                           | Odds ratio   | Odds ratio | Odds ratio | Odds ratio | Odds ratio | Odds ratio |
| Reduction of pain                        | 5.84*        | 1.97*      | 0.61       | 1.49       | 0.24*      | 0.28       |
| Reduction of fatigue                     | 12.81*       | 0.11*      | 0.00       | 0.01*      | 0.71       | 0.00       |
| Improvement of posture                   | 18.41*       | 0.04*      | 0.00       | 0.11*      | 0.59       | 3.37       |
| Correction of stance deviation of foot   | 88.76*       | 0.02*      | 0.08*      | 0.01*      | 0.52*      | 0.00       |
| Correction of stance deviation of toe(s) | 0.15*        | 17.75*     | 0.15       | 0.07*      | 0.39*      | 0.00       |
| Reduction of skin disorders              | 0.22*        | 0.55       | 0.25       | 14.96*     | 0.32*      | 0.94       |
| Reduction of nail disorders              | 0.07*        | 0.23*      | 83.15*     | 1.80       | 0.45*      | 0.00       |
| Patient education                        | 0.31*        | 0.13*      | 0.22       | 0.26*      | 14.68*     | 1.07       |
| Other                                    | 1.48         | 0.42       | 1.45       | 0.10*      | 1.01       | 0.00       |
| Constant                                 | -1.61*       | -0.97*     | -3.15*     | -0.23      | 0.69*      | -3.08*     |

\* Significance level less than or equal to 0.05.

soles, Podiatric soles. sili, Silicone devices. nail, Nail treatment. basic, Basic foot care. a/i/e, Advice/instruction/exercise. other, Other interventions.

Impairments were registered by podiatrists in virtually all patients; disabilities, on the other hand, only in approximately one in three patients. This confirms our expectation, that the podiatry diagnosis is primarily at the level of impairments and to a lesser extent at the level of disabilities.

On the basis of the relationship between impairments, four combinations (dimensions) of interrelated impairments have been distinguished. As would be expected stance deviations of the foot, stance deviations of the toes, nail impairments and miscellaneous impairments are relatively independent. Stance deviations of the toes and impairments of the skin showed a strong interrelationship. A likely explanation is that a deviant stance of toes (for example a hallux valgus, or overlapping big toe) caused the formation of excess hard skin or other impairments of skin.

Postural impairments relate to stance deviations of the foot. Motor impairments also belong to this group. Possibly motor impairments (e.g. an impairment in gait) and postural impairments are both caused by a stance deviation of the foot.

The disabilities showed a strong interrelationship. When a disability was recorded, another disability was also often recorded. As a result, no separate dimensions of disabilities could be distinguished.

In summary, the podiatry diagnosis is primarily at the level of impairments and to a lesser extent at the level of disabilities. Four dimensions of interrelated impairments

could be distinguished. Only one dimension could be distinguished on the basis of disabilities.

The second intention of the present study was to give a quantitative description of podiatric treatment. In this study interventions are categorized in five major groups: podiatric soles, silicone devices, nail braces, basic foot care and advice/instruction/exercise. Podiatric soles were applied in the treatment of two-thirds of the patients. Nail braces were applied in only a few patients. Certainly this was affected by the occurrence of impairments: impairments of nails were infrequently indicated. Because a patient must be referred by a doctor to be treated by a podiatrist, this phenomenon was possibly influenced by the unfamiliarity of referring physicians with podiatric appliances, especially with the appliance of nail braces for ingrowing nails.

The third intention of this study was to describe the relationship between treatment goals and interventions. Clear relationships between treatment goals and interventions were found. To pursue the correction of stance deviation of the foot or to pursue the improvement of posture, podiatric soles were applied. To pursue the correction of stance deviation of the toe(s), silicone devices were applied. To pursue the reduction of nail disorders, nail braces were applied. In the treatment of skin disorders basic foot care was applied. It can be concluded that the application of interventions was dependent upon which treatment goals were pursued.