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# Predictors for referral to physiotherapy from general practice

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*Objective* – **The aim of the study was to describe the referral rates from general practice to physiotherapists and to investigate possible predictors for referral.**
*Methods* – **Referral rates per 100 patients per year were obtained from the health insurance register of the county of Aarhus. General Practitioner (GP) characteristics were obtained via a questionnaire to all GPs in the county.**
*Results* – **A total of 38 231 referred patients from 260 practices were included. Twice as many women as men were referred. Referral rates varied from 1.6% to 13.2% between practices. Of the explored predictors "practice location", "female GP practices" and "GPs reporting frequent contact with physiotherapist regarding the treatment of individual patients" were statistically significant, but explained little of the variance in referral rates.**
*Conclusion* – **The examined practice and GP characteristics explain little of the substantial variation in referral rates. In view of increasing health care expenses and the need for quality assurance, the large variation in referral rates warrants reflection and further research on indications for and possible benefit from physiotherapy.**

*Key words: general practice, referral, physiotherapy, predictors,* **variation.**

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Musculoskeletal problems constitute 85–94% of conditions referred to physiotherapy (1,2). A Danish population-based survey has shown that within a year 69% of the population have experienced some sort of pain or discomfort related to the musculoskeletal system. More than half of these consider themselves ill, and 36% report visiting their own general practitioner (GP) within the last year because of musculoskeletal illness (3). In other words, 25% of the population report visiting their GP within a year because of a musculoskeletal problem. From 1987 until 1991 the proportion of the population in Denmark reporting musculoskeletal illness has increased. Forty-three per cent of the patients seeing their GP with a musculoskeletal illness report subsequent referral to a physiotherapist (1). Patients with musculoskeletal illness constitute 15% of the contacts to general practice (4). They therefore represent a workload comparable to cardiovascular disease (4).

Patients need referral from a GP to be partially reimbursed for physiotherapy expenses. Consequently, the GP plays a key role in determining the extent of use of physiotherapy.

The aim of this study was to describe the referral rates from GPs to physiotherapists based on existing health insurance registers and to investigate GP and practice characteristics as possible predictors for referral.

## MATERIAL AND METHODS

Ninety-seven per cent of the Danish population belong to one GP practice and can see a specialist only after referral by their GP (group 1). The remaining 3% of the population can freely choose any GP or specialist, but must pay a proportion of the fee themselves (group 2).

The following information was obtained from the health insurance register of the county of Aarhus from the period 1 September 1996 to 31 August 1997:

- Number of referred patients by gender and age for all practices
- Number of listed patients by gender and age for all practices
- Type of practice (single-handed or partnership practice)
- Practice location (postal code)
- Age and gender of GPs

Preliminary analysis showed that GP gender was possibly an important predictor for referral. To be able to control for GP gender not just in the analysis of single-handed practices, the variable "practice gender" was created. This divided the practices into pure female GP and pure male GP practices, excluding practices with both genders.

It was not possible to obtain information about referral rates for individual GPs in partnership practices, as billings in the health insurance register were registered by practice identification numbers. When

billing the health insurance only, some physiotherapists provide information about who referred the patient to them. This information is not valid, however, as nonexistent GP practice identification numbers were reported to the health insurance by some physiotherapist. To correct for this inaccuracy, and to unify the way GP practices are assigned to referrals, we corrected the referring GP practice to be the patient's own GP's practice at the time of referral. Patients of GP practices outside the county (3.8%) and patients not listed with a GP practice (group 2 patients) (4.4%) were excluded. We then counted, for each general practice, how many *persons* the public health insurance had reimbursed for a service by a physiotherapist.

A total of 279 practices in the county were active at some point during the inclusion period. Of these, 16 were excluded from the analysis as they either closed or opened during the registration period. Of the remaining 263 practice, 3 single-handed teaching practices were excluded from the analysis as they had more than one set of GP characteristics, which could thus not be related to the practice specific referral rate. The number of listed patients for each practice was recorded in the middle of the registration period.

GP characteristics were obtained by contacting all GPs in the county (n = 410) in 269 practices active at the beginning of the registration period. In a questionnaire GPs provided information about their age, gender, number of years in general practice, experience and education in psychotherapy and psychiatry, education and experience with manual therapy and rheumatology, self-assessed knowledge of physiotherapy, and frequency with which GPs consulted the physiotherapist about individual cases (three categorical levels). This questionnaire was part of a large multi practice study on patients with musculoskeletal illness in general practice.

Analyses involving GP characteristics were done on single handed practices only, as referral rates were practice specific and could not be related to individual doctors in partnership practices. Data from all practices were used when analysing practice characteristics. The project was approved by the Scientific Ethics Committee in the County of Aarhus and the Danish Data Protection Agency.

### *Statistical analysis*

Referral rates were calculated as percentages of practice population per year with 95% confidence intervals. To adjust for differences in age and gender composition of patients in different practices, referral rates were age and/or gender standardised using the population in the County of Aarhus as reference. First we performed a univariate analysis to test the relationship between individual predictors and the standardised referral rates grouped in quartiles. Chi$^2$ test and chi$^2$ test with test for trend were used. To control for the effect of other possible predictors (confounding), a multivariate analysis was performed. We fitted a linear regression model with a logarithmic transformation of the standardised referral rate as the dependent variable and relevant GP characteristics as predictor variables. We chose the logarithmic transformation, as we believe predictors are multiplicative and not additive. All variables resulting in a p-value lower than 0.20 in the univariate analysis were entered in a regression model. Two models were fitted. One for *practice characteristics* and one for *GP characteristics*. A statistical significance level of 5% was chosen. Model assumptions were investigated and were found to be fulfilled. The statistical computer software package used was SPSS® version 8 for Windows.

## RESULTS

A total of 38231 patients referred from 260 different practices representing 410 GPs were included in the analysis. After one written reminder, 368 (90%) GPs answered the questionnaire on GP characteristics. Of these, 119 (30%) were GPs in single-handed practices. A total of 11 single-handed practices either closed or opened during the registration period and were excluded leaving 108 (91%) single handed practices for the analysis.

### *Referral rates*

Fig. 1 displays the age and gender standardised referral rates from GPs to physiotherapists in the County of Aarhus. The most frequent referring half of GP practices had a referral rate of 7.6% versus 4.7% for the least referring half.

Fig. 2 shows that the rates increase with age group up to the age groups over 35 years of age and are fairly constant thereafter. Twice as many women were referred as men; a difference which is uniform for all age groups.

### *GP and practice characteristics*

The results of the univariate analysis are shown in Table I. The regression analysis of *practice* characteristics included *practice gender*, *practice location*, *practice type and practice size*. The results of the model are shown in Table II. When *practice gender* was included in the model, the effect of the variable *practice type* (*partnership practice*/*single handed practice*) decreased from 1.19 to 1.10 and became insignificant. *Practice location* remained significant when *practice gender* was included. The coefficients

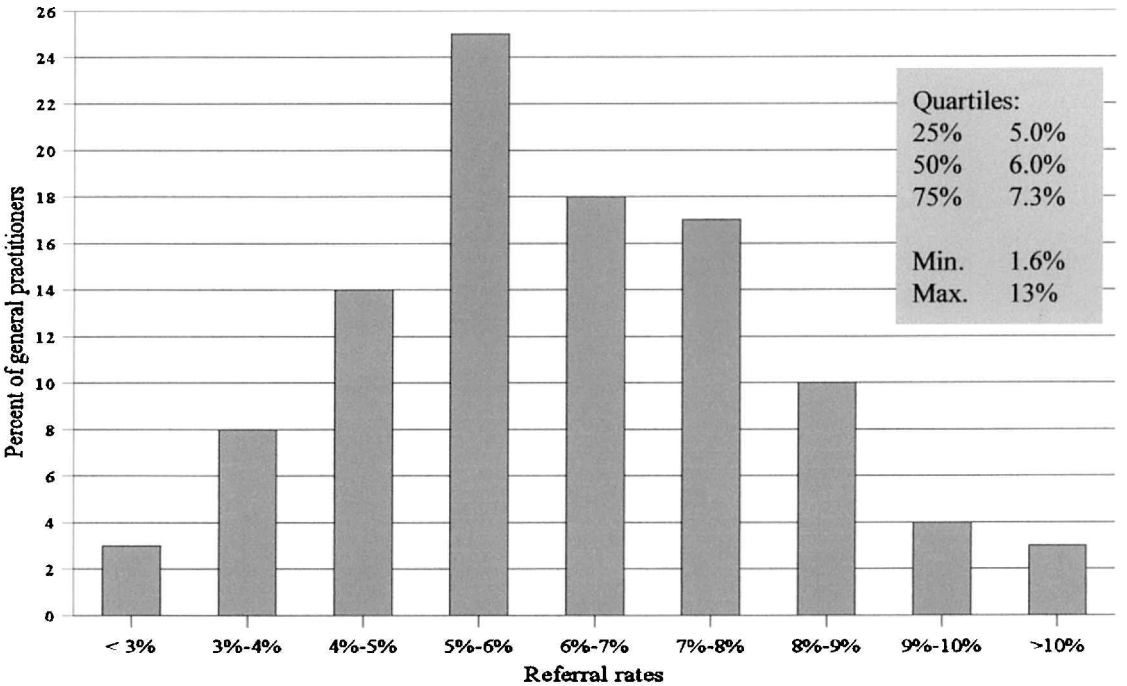


*Fig. 1.* Age and gender standardised referral rates by general practitioners to physiotherapists in the county of Aarhus, Denmark (September 1996 to August 1997), (n = 260).

for *practice type* and *practice location* both increased when entered together, indicating that both factors confounded each other negatively. In the final model only *practice location* and *practice gender* were significant, but accounted for only 6.7% (adjusted $R^2$) of the total variation in referral rates.

Table III displays the factors included in the regression model for *GP* characteristics. The variables ''Frequency of contact to physiotherapist regarding treatment of individual patient'' and ''Practice location'' remained significant, but explained only 9.2% of the variation in referral rates after controlling for the other variables in the model. The multivariate analysis confirmed the results of the univariate analysis. Adding other variables did not change the coefficients and the adjusted $R^2$ substantially.

## DISCUSSION

The results show that referral rates to physiotherapists from GPs depend on patient age and are twice as high for female as for male patients. Ehrmann-Feldman et al. (5) report that females are referred 1.8 times as often as men in a study on workers compensated for back injuries, whereas Akpala and Curran (6) find that women are referred 1.4 times as often as men in a general practice patient population. Referral rates varied between general practices with a factor of more than eight, and with a factor 1.6 between the most and least referring halves of practices. Akpala and Curran (6) report a fivefold difference in referral rates between the most and the least referring practices in Glasgow, UK. However, the mean referral rate was much lower in Akpala's study (2.2%). Kerssens and Gronewegen (2) from The Netherlands report that the most referring half of GPs refer three times as many patients as the least referring half of GPs.

A substantial number of GP and practice characteristics were explored, but did not explain much of

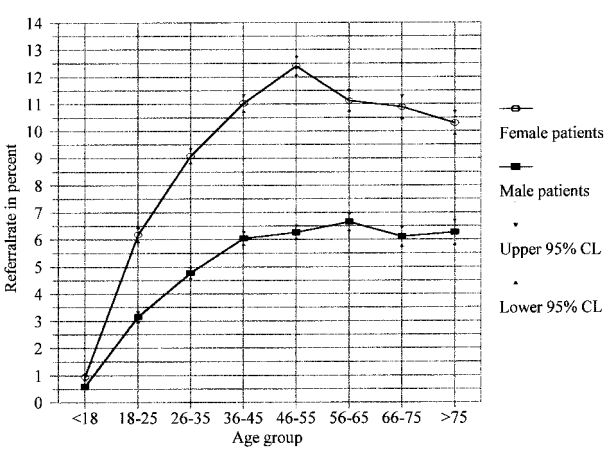


*Fig. 2.* Patient age and gender-specific referral rates by general practice to physiotherapists in Denmark.

Table I. Characteristics of general practitioners in relation to patient age and gender standardised referral rates to physiotherapy (in quartiles) in the county of Aarhus, Denmark (September 1996 to August 1997).

| GP and practice characteristics | GP practices in each quartile (%) | | | | $Chi^2$ test for trend | P-value |
|---|---|---|---|---|---|---|
| | 1st quartile | 2nd quartile | 3rd quartile | 4th quartile | | |
| *Practice gender (n = 198)*[1] | | | | | | |
| Pure female (n = 29) | 10% | 31% | 21% | 38% | 5.72 | 0.02 |
| Pure male (n = 169) | 31% | 24% | 26% | 19% | | |
| *Practice location (n = 260)* | | | | | | |
| City of Aarhus (n = 60) | 12% | 22% | 35% | 31% | 8.18 | 0.00 |
| Other location (n = 200) | 29% | 26% | 22% | 23% | | |
| *Practice type (n = 260)* | | | | | | |
| Single-handed (n = 169) | 30% | 23% | 24% | 23% | 4.94 | 0.03 |
| Partnership (n = 91) | 15% | 28% | 27% | 30% | | |
| *Contact to physiotherapist regarding treatment of individual patient (n = 107)*[2] | | | | | | |
| Rare (n = 26) | 35% | 19% | 23% | 23% | 4.48 | 0.03 |
| Sometimes (n = 55) | 20% | 27% | 31% | 22% | | |
| Often (n = 26) | 15% | 12% | 31% | 42% | | |
| *Tested variables having no influence on referral rates* | | | | | | |
| Number of patients per GP in the practice | | | | | | |
| GP age and number of years in general practice | | | | | | |
| Experience and education in psychotherapy and psychiatry | | | | | | |
| Experience and education in manual therapy and rheumatology | | | | | | |
| Self-assessment of knowledge of physiotherapy | | | | | | |

[1] Only data from practice with one GP gender, excluding practices with both genders.
[2] Only data from single-handed practices.

Table II. Results from linear regression analysis including practice characteristics. All practices except those with mixed GP gender included (n = 198). Logarithmic transformation of the standardised referral as dependent variable.

| Factor | Standardised coefficient ($\beta$) | Referral rate ratio (antilog($\beta$)) | p-value |
|---|---|---|---|
| City practice[1] | 0.210 | 1.234 | 0.003 |
| Partnership practice[2] | 0.097 | 1.102 | 0.166 |
| Pure male GPs practice[3] | −0.209 | 0.811 | 0.003 |
| 1300–1600 patients[4] | 0.031 | 1.031 | 0.736 |
| >1600 patients[4] | 0.090 | 1.094 | 0.325 |

Reference categories
[1] Outside city of Aarhus
[2] Single-handed practice
[3] Pure female GPs practice
[4] <1300 patients per GP

the variation in referral rates. Availability of physiotherapist services could be one explanation for the higher referral rate from practices in the city of Aarhus. O'Cathain et al. (7) report that increasing availability increases number of referrals considerably. The only GP-specific factor that remained significant in the multivariate analysis was the GPs' inclination to contact physiotherapists regarding the treatment of individual patients. The answer to the question in the GP questionnaire could be biased though. GPs referring many patients might be more prone to indicate frequent contact to physiotherapists than GPs referring few patients. Our results are equivalent to the results of Anderson et al. (8), who surveyed specialists' use of physiotherapy for children with cerebral palsy. Our results only partly confirm the results of Kerssens et al. (2), who found that variation in referral rates, apart from variation in age

Table III. Results from linear regression model including GP and practice characteristics. Single-handed practices only (n = 108). Logarithmic transformation of the standardised referral as dependent variable.

| Factor | Standardised coefficient ($\beta$) | Referral rate ratio (antilog ($\beta$)) | p-value |
|---|---|---|---|
| Sometimes contact to physiotherapist[1] | 0.081 | 1.084 | 0.523 |
| Often contact to physiotherapist[1] | 0.270 | 1.310 | 0.028 |
| City practice[2] | 0.221 | 1.247 | 0.023 |
| Male GP[3] | −0.112 | 0.894 | 0.254 |
| GP age 45–55 years[4] | 0.000 | 1.000 | 0.998 |
| GP age >55 years[4] | −0.027 | 0.973 | 0.819 |
| 1300–1600 patients[5] | −0.114 | 0.892 | 0.396 |
| >1600 patients[5] | −0.137 | 0.872 | 0.298 |
| Average knowledge about physiotherapy[6] | 0.141 | 1.151 | 0.364 |
| Above average knowledge about physiotherapy[6] | 0.177 | 1.194 | 0.253 |

Reference categories:
[1] Rare contact to physiotherapist regarding individual patients treatment
[2] Outside city of Aarhus
[3] Female
[4] GP age <45 years
[5] <1300 patients per GP
[6] Less than average knowledge about physiotherapy

and gender composition of patients, could be explained by highly referring GPs having busier practices, a more somatic approach to patients' complaints, higher self-rated knowledge of physiotherapy and closer cooperation with physiotherapists including having a physiotherapist in their social network (2).

*Data validity*

Generally, the information from the registers of the public health insurance is valid, as the registration is based on billings (9,10). Some of the variation in referral rates could be based on variation in patient characteristics between practices. This might not have been controlled for by standardising patient age and gender. Previous research has shown that patient variation explains very little of the variation in referral rates between GP practices (11).

To assess the changes invoked by the correction procedure, substantial subgroup analyses were undertaken (data not shown in analysis). The correction procedure resulted in a change of the referring health care provider for 11.4% of the patients. Most of these were changes from one GP to another (7.7%), thereby correcting for the above mentioned inaccuracy in the physiotherapists patient records. Changes from specialists and other non-GPs to GPs constituted only 3.7%, indicating that the risk of bias from this source is small.

It was not possible to determine how many patients were referred from their GP and ended up *not* attending a physiotherapist. Bias will tend to an underestimation of referral rates.

## CONCLUSION

We found a high overall referral rate to physiotherapy. Twice as many women as men were referred. Age and gender standardised referral rates varied considerably between GP practices. Exploring a substantial number of practice as well as GP specific characteristics revealed few predictors for referral, which explained very little of the variation in referral rates. The large variation warrants reflection and further research on indications for and possible benefits from physiotherapy. To gain a more profound insight into factors determining referral to physiotherapy, future research should focus on the GPs'' clinical decision process and the patient-GP interaction.

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