

# Implementation of a shared care guideline for back pain: effect on unnecessary referrals

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## Abstract

**Objective.** To determine the effect of the implementation of a shared care guideline for the lumbosacral radicular syndrome (LRS) on unnecessary early referrals and the duration of the total diagnostic procedure.

**Design.** Introduction of shared care guideline in November 2005. Pre-test in 2005 (April to October), a first post-test in 2006 (April to October) and a second post-test in 2007 (April to October).

**Setting and Intervention.** The introduction of a shared care guideline derived from national guidelines for GPs and several medical/paramedical specialists in two Dutch regions. Three hundred and sixty GPs, 550 physiotherapists and two hospitals (9 neurologists and 18 radiologists) were involved. The essential component of the guideline was a trade-off: if the GP complied with the conservative management approach in the first 6 weeks, the hospital guaranteed a priority appointment with the neurologist after 6 weeks, if still required.

**Main Outcome Measures.** The neurologists in both hospitals registered whether a patient had been unnecessarily referred during the first 6 weeks. The duration of the total diagnostic procedure was defined as the number of days between referral by the GP and the consultation when the neurologist made the final diagnosis.

**Results.** The percentage of patients being unnecessarily referred within 6 weeks fell significantly from 15% in 2005 to 9% in 2006 and 8% in 2007. The duration of the total diagnostic procedure also fell significantly in both the long and short terms.

**Conclusions.** The introduction of a shared care guideline for all care providers in a region reduces the number of unnecessary early referrals for patients with LRS.

**Keywords:** implementation, guideline adherence, hospitals, primary health care, quality of health care, sciatica

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## Introduction

The symptoms of the lumbosacral radicular syndrome (LRS) are severe back pain with radiation to the legs, mainly caused by a herniated disk. The estimated incidence in Western countries is 5 per 1000 inhabitants [1]. Direct and indirect costs related to the LRS in the Netherlands are estimated to be 1.18 billion euros a year [2]. Studies of the treatment of LRS show that there is no evidence supporting referral, magnetic resonance imaging (MRI) or an operation during the first 6 weeks after the onset of the symptoms [3–5]. The

Dutch College of General Practitioners published an evidence-based national guideline on LRS in 1996 and updated it in 2005 [6, 7]. The treatment of LRS should be conservative in the first 6 weeks. Treatment consists of adequate pain management and mobilizing the patient. Referral to the neurologist and MRI is not advised during the first 6 weeks. Criteria for instant referral are: (i) cauda equine syndrome or (ii) progressive paresis within a few days. Criteria for referral within 6 weeks are: (i) severe pain in spite of adequate medication, (ii) severe paresis or progressive paresis or (iii) suspected other severe syndrome [7]. A consensus

guideline was issued in 1996 also for the conservative treatment of LRS involving several medical/paramedical specialists, including physiotherapists, neurologists and radiologists [2, 8].

Although care providers in the Netherlands have the same guidelines for the conservative treatment of LRS referred to here, adherence is not optimal [2]. The main reasons for non-adherence are patient pressure on the GP for referral and the lack of coordination between GPs, physiotherapists and medical specialists in terms of standardizing information and treatment [2, 9]. As a result, unnecessary referrals take place, and waiting times become longer for a first consultation with a neurologist for patients who require referral. Since there is sound evidence supporting conservative LRS treatment, it is clear that the problem relates to implementation.

To address these problems, a shared care guideline was developed for all care providers who play an important role in the chain of care for LRS patients [9]. An essential component was a trade-off between the medical specialists and the GPs: if the GP complied with the conservative management guideline in the first 6 weeks, the hospital guaranteed a priority consultation with the neurologist after 6 weeks if referral was still necessary. We conducted a feasibility study, looking at the implementation of this shared care LRS guideline in the Geldrop region in the south-east of the Netherlands. The results showed that the number of unnecessary referrals within 6 weeks decreased from 25% in 1998 to 4% in 2003 [9]. Furthermore, the average duration of the total diagnostic procedure—the number of days between referral by the GP and the consultation in which the neurologist makes the final diagnosis—was reduced from 14 weeks in 1998 to 8.7 days in 2003. Although these results were encouraging, they may be explained by the possibility that the Geldrop region is innovation minded. We therefore introduced the shared care guideline in two other regions in the south east of the Netherlands—Eindhoven and Helmond—for all GPs, physiotherapists, hospital neurologists and radiologists.

The probability of the actual implementation of innovations such as the shared care guideline is maximized if they are introduced systematically [10–13]. The four main stages in innovation processes (dissemination, adoption, implementation and continuation) can be thought of as failure points where the desired change may not occur. The transition from one stage to the next can be affected, positively or negatively, by various factors or ‘determinants’ [10, 11]. Determinants can be broken down according to association with: (i) the context (e.g. patient cooperation), (ii) the organization (e.g. available expertise, financial resources), (iii) the adopting person (e.g. skills, outcome expectations) and (iv) the innovation (e.g. complexity, relative advantage) [11]. A detailed understanding of critical determinants is a prerequisite for designing an innovation strategy that can achieve real change. An analysis of this kind is possible by assessing which determinants both non-users and users encounter when trying to adhere to the innovation [11]. If a determinant analysis is not conducted and/or the applied innovation strategy does not take the relevant determinants into

account, the innovation process might fail [10–12]. Firstly, the applied innovation strategy may focus on determinants that are irrelevant to the innovation process. Secondly, the chosen strategies may be inappropriate as a way of steering the relevant determinants of the innovation process. We applied these insights in the present study (see Section Methods).

The fast-track procedure included two procedural components: (i) if the GP adhered to the shared care guideline (i.e. conservative management in the first 6 weeks), the hospital guaranteed a priority consultation with the neurologist and an MRI if these were still required at the end of the initial 6 weeks, and (ii) when referring the patients, the GPs had to label them as ‘fast-track patients’, otherwise the patients would enter the standard procedure, including standard waiting times.

The objective of the project was threefold. Firstly, to determine the effect of the implementation of the shared care guideline with regard to the possible reduction in the percentage of unnecessary early referrals. Secondly, to determine whether redesigning the care process in hospital is feasible and whether this indeed led to a reduction in the duration of the total diagnostic procedure for ‘fast-track patients’. Thirdly, we assessed the costs of implementing the guideline. On the basis of the Geldrop study, we expected the rate of early referrals (including unnecessary early referrals) to fall from 20 to 5%. Furthermore, in order to be in a position to explain the effects, we studied the implementation process.

## Methods

### Participants and study design

Patients who were referred by GPs in the study region—Eindhoven and Helmond—were registered by the neurologists in the hospitals. Patients referred by GPs from outside the region or specialists (orthopaedics or the accident and emergency department) were excluded from the study. Before the introduction of the shared care guideline in November 2005, a pre-test was conducted in the period April to October 2005. To measure the effect of the guideline, a first post-test was performed in April to October 2006 and a second one in April to October 2007. The neurologists in each hospital registered prospectively over a period of 6 months (April to October) all the patients who were referred with symptoms of LRS and who were visiting the neurologist for the first time (new episodes).

### Implementation of the shared guideline

In each region an implementation coordinator was responsible for implementing the shared care guideline among the hospital neurologists and radiologists, the GPs and the physiotherapists, and for redesigning the hospital care process. The coordinators received coaching throughout the project from an implementation expert and the coordinator of the former Geldrop project.

Before the actual implementation of the guideline in November 2005, a determinant analysis was conducted in the spring/summer of 2005. This was done to tailor the innovation strategies used in the previous Geldrop study to the local circumstances in the Eindhoven and Helmond regions. First, the neurologists and radiologists in the hospitals were consulted individually. They were also involved in redesigning the care process, meaning that a few priority places were reserved for LRS patients each week. Two focus interviews were subsequently conducted with GPs and physiotherapists. The most important remarks from these interviews were that GPs and physiotherapists thought that the shared care guideline would alleviate patient pressure to be referred because they would be able to offer fast referral if necessary. In addition, all the care providers in the chain of care would provide the same information about conservative management. Furthermore, they said patients would accept conservative management only if they were not in severe pain. In this respect, the pain medication as advised in the national guideline was thought to be too conservative. The following strategies were tailored to these determinants.

- (i) To enhance knowledge awareness, all GPs and physiotherapists received a personal letter and general meetings were organized. Furthermore, a patient information brochure was developed for distribution by all care providers in the chain of care and a general public information campaign was put into place.
- (ii) All care providers received the shared care guideline, the referral procedure and patient brochures.
- (iii) To enhance adoption and implementation, meetings with small GP and physiotherapist groups were organized to discuss the shared care guideline. Adaptations were also made to the prescription of pain medication.
- (iv) To further enhance implementation and continuation, all care providers received several newsletters during the project. GPs/practices who had not used the fast-track procedure for one or more patients received phone calls (see Sections Implementation measures and Results).

A total of about 360 GPs, 550 physiotherapists, 9 neurologists and 18 radiologists were involved in the project.

### Outcome measures

*Unnecessary early referral.* Immediately after a consultation, neurologists made a record indicating whether the patient had been referred within 6 weeks without a medical indication (non-adherence), within 6 weeks with a medical indication (adherence) or after 6 weeks (adherence). We used the criteria in the national GP guideline to assess medical indications for referral (see Section Background). As a consequence, the variable 'unnecessary early referral' comprised two categories: yes or no. The implementation coordinators checked all records afterwards using individual patient records. In cases of doubt, the records were discussed with the neurologists.

*Duration of total diagnostic procedure.* All hospitals registered the following information for all referred patients: (i) the admission time—the number of days between referral by the GP and the first time they saw the neurologist (first consultation)—and (ii) the duration of the diagnostic procedure in the hospitals—the number of days between the first consultation with the neurologist and the consultation in which the neurologist made the final diagnosis. The total diagnostic procedure was calculated by adding up the admission time and the time of the diagnostic procedure in the hospital.

*Costs.* All costs associated with the organization and actual implementation of the guideline were assessed using registration forms. The coordinators in Eindhoven and Helmond, the coordinator of the Geldrop project and the implementation expert recorded the number of hours associated with the implementation, travelling costs and other items such as catering, sending mail, etc. The coordinators also registered the costs incurred by the GPs, physiotherapists, neurologists and radiologists relating to, for example, attending meetings. Time invested was multiplied by the gross salary (including social premiums and pension contributions) of the persons involved [14]. Costs were reported in 2008 euros.

### Implementation measures

In 2006 and 2007, the implementation researcher interviewed GPs, in a structured telephone interview and supported by the patient's medical records, about adherence/non-adherence to the shared care guideline and the referral procedure. On the basis of the neurologists' records, we selected both users and non-users. The first questions addressed knowledge awareness, and the adoption of the guideline and referral procedure. The GPs then stated for each key activity in the guideline and referral procedure whether that activity had been performed and what the determinants were for adherence/non-adherence. Special attention was paid to patient cooperation and support from other care providers. Furthermore, GPs were asked how adherence could be improved.

To evaluate the fast-track procedure in the hospital, the implementation coordinators interviewed several radiologists and neurologists.

### Statistical analyses

Differences between the hospitals at pre-test were assessed using chi-square or independent *t*-tests. To determine the overall effect of the guideline, logistic regression analysis and analysis of variance were performed, using 'unnecessary referral' and 'duration of the total diagnostic procedure', respectively, as the outcomes. The second variable was positively skewed and so the square root transformed variable was used. The data from the measurement periods, which were derived from different patients, were combined into one independent factor with three categories referring to the three periods: pre-test (1), first post-test (2), second post-test (3). A second independent factor was created with two levels referring to the hospitals.

The short- and long-term effects of the shared care guideline were studied using simple contrast coding (2 versus 1 and 3 versus 1). Both independent factors and their interaction term were included in the analyses to investigate whether the effect of the guideline differed between the hospitals. If the interaction effect was significant, multiple comparison tests were performed to determine for each hospital which change from pre-test to post-test was significant. A Bonferroni correction was used for these multiple tests.

To determine whether the effect was different for the fast-track patients compared with the patients referred using the standard procedure, two independent factors were created: one for the short-term effect with three levels: pre-test (1), first post-test fast-track referral (2), first post-test standard referral (3); and one for the long-term effect: pre-test (1), second post-test fast-track referral (2), second post-test standard referral (3). Analyses were performed using SPSS (version 14.0). In all analyses, a two-sided  $\alpha$  of 0.05 was adopted as the significance level.

## Results

### Participants

A total of 723 patients were registered in the period 2005–2007 (Table 1). Table 2 shows that half the patients were labelled by their GP as ‘fast-track patients’ on referral and went through the ‘fast-track’ procedure.

### Registration of unnecessary early referrals

In Eindhoven, three neurologists made records for all years; a fourth neurologist made records only for 2006 and 2007, while a fifth neurologist made no records at all. In Helmond, three neurologists made records for all years; a fourth neurologist made records only for the 2005 and 2006, while the fifth and sixth neurologists only made records for 2007. The neurologists—10 in total—did not differ in terms of assigning the outcome variable ‘unnecessary early referral within 6 weeks’ ( $P = 0.28$ ).

### Effect of guideline on unnecessary early referrals

At the pre-test, the hospitals did not differ with respect to the percentage of patients being unnecessarily referred within

**Table 1** Number of patients registered at both hospitals together (bold) and separately

|           | 2005:<br>pre-test | 2006:<br>First<br>post-test | 2007:<br>Second<br>post-test |
|-----------|-------------------|-----------------------------|------------------------------|
| Totals    | <b>178</b>        | <b>224</b>                  | <b>21</b>                    |
| Eindhoven | 83                | 108                         | 137                          |
| Helmond   | 95                | 116                         | 184                          |

**Table 2** Numbers (percentages) of patients registered at both hospitals together (bold) and separately, and whether patients were referred under the fast-track or standard procedure

|                     | Pre-test       | First post-test | Second post-test |
|---------------------|----------------|-----------------|------------------|
| Fast-track referral | <b>0 (0)</b>   | <b>119 (53)</b> | <b>160 (50)</b>  |
| Eindhoven           | –              | 42 (39)         | 57 (42)          |
| Helmond             | –              | 77 (66)         | 103 (56)         |
| Standard referral   | <b>0 (100)</b> | <b>105 (47)</b> | <b>161 (50)</b>  |
| Eindhoven           | 95             | 66 (61)         | 80 (58)          |
| Helmond             | 83             | 39 (34)         | 81 (44)          |

6 weeks ( $P = 0.31$ ). The overall percentage fell from 15 to 9% at the first post-test and to 8% at the second post-test (Table 3). The percentage fell significantly in both the short and long terms. The effect was the same at both hospitals. The significant fall for the total group of patients could only be attributed to those patients who were referred as fast-track patients (Table 3). In this group only, the percentage decreased significantly in both the short and long terms.

### Duration of total diagnostic procedure

At the pre-test, there were significant differences between the hospitals with respect to the duration of the total diagnostic procedure. For all patients, the duration of the total diagnostic procedure fell significantly in both hospitals in both the short and long terms. The interaction effect was significant in the short term: the reduction of the duration was larger in Helmond than in Eindhoven (Table 4).

For the fast-track patients, duration was significantly shorter in both the short and long terms (Table 4). This effect was the same for both hospitals. For the standard referred patients, the effects were not the same in the two hospitals. In the Eindhoven hospital, duration increased significantly in the short term only. In the Helmond hospital, the duration increased in both short and long terms.

### Process evaluation

Twelve GPs were interviewed. None of them mentioned any specific problems relating to adherence. Two of them had referred a patient within 6 weeks with no indication. One GP did not adopt the 6 weeks’ conservative management and the other cited patient pressure for referral.

The implementation coordinators phoned those GPs/practices who had used the standard-referral procedure for one or more patients. The main reasons for not using the fast-track procedure were: unawareness of the procedure, forgotten about the procedure or not wanting to obstruct the system. Furthermore, some GPs deliberately opted for a standard referral because there was no urgency or to ‘punish’ the patient for exerting pressure for a quick referral.

According to the radiologists and neurologists, limited access to MRI pushes up the duration of the total diagnostic



**Table 3** Numbers (percentage) of all patients in both hospitals with an unnecessary early referral (bold figures), broken down into patients who were referred in the fast-track or standard procedure

|                     | Pre-test       | First post-test | Adjusted odds ratio <sup>a</sup> (95 CI) | Second post-test | Adjusted odds ratio <sup>a</sup> (95% CI) |
|---------------------|----------------|-----------------|--|------------------|---|
| All patients        | <b>27 (15)</b> | <b>19 (9)</b>   | <b>0.52 (0.28–0.96)<sup>b</sup></b>      | <b>25 (8)</b>    | <b>0.48 (0.27–0.86)<sup>b</sup></b>       |
| Fast-track patients |                | 7 (6)           | 0.36 (0.15–0.86) <sup>b</sup>            | 11 (7)           | 0.43 (0.21–0.91) <sup>b</sup>             |
| Standard referrals  |                | 12 (11)         | 0.69 (0.33–1.45)                         | 14 (9)           | 0.52 (0.26–1.04)                          |

CI, confidence Interval. <sup>a</sup>Adjusted for the effect of hospital. <sup>b</sup>Significant difference compared to pre-test.

**Table 4** Total duration of the diagnostic procedure in mean days per hospital for all patients (bold figures) and at the post-tests separated for fast-track and standard referrals

|            | Pre-test  |                    | First post-test |                                | Second post-test |                                |
|------------|-----------|--------------------|-----------------|--------------------------------|------------------|--------------------------------|
|            | <i>n</i>  | Mean (SD)          | <i>n</i>        | Mean (SD)                      | <i>n</i>         | Mean (SD)                      |
| Eindhoven  | <b>72</b> | <b>44.5 (24.4)</b> | <b>95</b>       | <b>37.6 (23.7)<sup>a</sup></b> | <b>126</b>       | <b>41.8 (21.9)<sup>a</sup></b> |
| Fast track |           |                    | 38              | 17.4 (9.7) <sup>a</sup>        | 57               | 32.5 (14.4) <sup>a</sup>       |
| Standard   |           |                    | 57              | 51.2 (20.4) <sup>b</sup>       | 69               | 49.5 (24.1)                    |
| Helmond    | <b>89</b> | <b>53.7 (22.7)</b> | <b>116</b>      | <b>31.7 (26.3)<sup>a</sup></b> | <b>176</b>       | <b>47.5 (39.4)<sup>a</sup></b> |
| Fast-track |           |                    | 77              | 17.7 (12.7) <sup>a</sup>       | 102              | 24.2 (12.3) <sup>a</sup>       |
| Standard   |           |                    | 39              | 59.2 (24.6) <sup>b</sup>       | 74               | 79.7 (41.3) <sup>b</sup>       |

<sup>a</sup>Significant decrease in mean days compared with pre-test. <sup>b</sup>Significant increase in mean days compared with pre-test.

procedure, especially in summer, when staff capacity is low. Furthermore, if slots are reserved every week for fast-track patients, it is important to make sure that these patients are moved to the next free slot (standard or fast-track) when an MRI is cancelled. Otherwise they may end up with even longer waiting times than patients referred in the standard way.

### Costs of guideline implementation

The introduction of the shared care guideline took 2 years and 3 months. The costs of the actual implementation during this period amounted to 42 600 euros for both regions together. For the most part (94%) these were personnel costs. The implementation coordinators and the implementation experts together spent 334 h on implementation activities. The specialists in both hospitals and the GPs together spent 104 h on implementation activities, mainly attending meetings.

### Discussion

We can conclude that it is possible to implement a shared care guideline for LRS by introducing, at the regional level, a fast-track procedure and a trade-off between all care

providers who play an important role in the chain of care for LRS patients. This leads to a reduction in unnecessary early referrals. It appears to be feasible to redesign the care process in hospital and our results indicate that the total duration of the diagnostic procedure fell for fast-track patients. Overall, the short-term effect after 1 year persists at the 2-year follow-up. Despite the fact that duration increased between the short- and the long-term measurements, it was still significantly shorter than at the pre-test. The effects were smaller than in the Geldrop study [9]. The expected reduction to 5% unnecessary early referrals was not achieved. In addition, at the pre-test, the percentage of unnecessary early referrals was lower than expected. Nevertheless, the decrease we found was perceived as relevant by the care providers who were involved in the project.

Although GPs mainly adhered to conservative management in the first 6 weeks, only half of the patients were referred for the fast-track procedure. This means that the implementation of the shared care guideline could be improved.

Our study has several limitations. First, it is not possible to say with certainty whether GPs complied more often with the conservative management procedure as advised in the national guideline because a prospective registration study of GP practices would be needed to answer that question. As

the average GP in the Netherlands only sees one new patient with LRS each month and since GPs are reluctant to participate in time-consuming studies of this kind, we opted for the current study design [15].

Secondly, a control region would be required to state with confidence whether the effects we found were due to our implementation activities. However, in our study, the standard-referral patients can be seen as a control group. Those patients were from the same regions and they were assessed by the same neurologists. Thirdly, we did not investigate whether the reduction in the duration of the total diagnostic procedure for the fast-track patients resulted in longer waiting times for the standard-referral patients. However, this seems implausible because special places and extra time were reserved weekly for the fast-track patients.

Fourth, although the neurologists used the criteria in the national GP guideline, assessment errors are possible. Time constraints meant that neurologists were unable to participate in an inter-observer reliability study. However, analyses showed that the neurologists did not differ in assigning this outcome variable.

On the basis of the conclusions and critical reflection, we suggest implementing the shared care guideline in other regions. There is still room for improvement since only half of the patients were referred for the fast-track procedure. A prerequisite for the use of the shared care guideline is that all GPs must be aware of the trade-off and the fast-track procedure. As some GPs were not aware of the fast-track procedure, forgot or had misconceptions about obstructing the fast-track system in hospital, individual communications may help to improve adherence. This also implies that monitoring is necessary as a component of continuation activities.

Since limited access to MRI pushes up the duration of the total diagnostic procedure, special attention should be paid to staff capacity when redesigning the care process in a hospital. If special places are reserved for fast-track patients, it is important to make sure that the planning system immediately moves the patient to the next available slot regardless of whether this is a dedicated fast-track slot or a standard appointment. However, extra implementation activities will lead to higher implementation costs. In the end, it is up to hospital policymakers and managers to decide whether the effects outweigh the implementation costs.

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## References

1. Cherkin DC, Deyo RA, Loeser JD *et al.* An international comparison of back surgery rates. *Spine* 1994;**19**:1201–6.
2. Health Council of the Netherlands. *Management of the Lumbosacral Radicular Syndrome (sciatica)*. Publication no. 1999/18 (in Dutch). The Hague: Health Council, 1999.
3. Weber H. The natural history of disc herniation and the influence of intervention. *Spine* 1994;**19**:2234–8.
4. Anderson GBJ. The epidemiology of spinal disorders. In: Frymoyer JW (ed). *In the Adult Spine: Principles and Practice*. New York: Raven Press, 1997.
5. Vroomen PC, De Krom MC, Knottnerus JA. Predicting the outcomes of sciatica at short-term follow-up. *Br J Gen Pract* 2002;**52**:119–23.
6. Smeele IJM, Van den Hoogen JMM, Mens JMA *et al.* NHG guideline Lumbosacral Radicular Syndrome (in Dutch). *Huisarts Wet* 1996;**39**:78–89.
7. Mens JMA, Chavannes AW, Koes BW *et al.* NHG-guideline Lumbosacral Radicular Syndrome (first update) (in Dutch). *Huisarts Wet* 2005;**48**:171–8.
8. Stam J. Consensus in diagnosing end treatment of the lumbosacral radicular syndrome (in Dutch). *Ned Tijdschr Geneesk* 1996;**140**:2621–7.
9. Fleuren MAH, Wijkel D, Breuer J *et al.* The implementation of a shared care protocol for the management of the Lumbosacral Radicular Syndrome (in Dutch). *TSG* 2007;**85**:322–8.
10. Greenhalgh T, Robert G, Macfarlane F *et al.* Diffusion of innovations in service organizations: systematic review and recommendations. *Milbank Q* 2004;**82**:581–629.
11. Fleuren MAH, Wiefferink CH, Paulussen TGWM. Determinants of innovation within health care organizations: literature review and Delphi-study. *Int J Qual Health Care* 2004;**16**:107–23.
12. Bartholomew LK, Parcel GS, Kok G *et al.* *Planning Health Promotion Programs: An Intervention Mapping Approach*. San Francisco: Jossey-Bass, 2006.
13. Grol R, Wensing M. What drives change: barriers and incentives to achieving evidence based practice. *Med J Australia* 2004;**180**:57–60.
14. Oostenbrink JB, Boumans CAM, Koopmanschap MA *et al.* *Manual for Cost Analyses, Methods and Standard Prices for Economic Evaluations in Health Care (in Dutch)*. Amstelveen: Dutch Health Insurance Executive Board, 2004.
15. Van der Linden MW, Westert GP, De Bakker DH *et al.* *Dutch National Study of General Practice (in Dutch)*. Utrecht/Bilthoven: Nivel/RIVM, 2004.