Referral for genetic counselling during pregnancy: limited alertness and awareness about genetic risk factors among GPs

Cora M Aalfs, Ellen MA Smets, Hanneke CJM de Haes and Nico J Leschot


**Background.** In many countries, GPs play a key role in the referral to other medical specialists. Referral for reproductive genetic counselling during a pregnancy of women with a genetic risk factor already present before pregnancy has many disadvantages. Nevertheless, some 10–20% of the counsellees who attend a Department of Clinical Genetics for the first time are pregnant.

**Objectives.** We aimed to explore the role of the GP in referring women for genetic counselling during, instead of before a pregnancy.

**Method.** The GPs of 100 pregnant women who received genetic counselling were invited to participate in the study and asked to complete a questionnaire. The topics were: initiation and discussion of aspects of referral to the Department of Clinical Genetics; reasons for the referral during, instead of before a pregnancy; knowledge of genetic counselling; attitudes towards genetic counselling before a pregnancy; and attitudes towards abortion.

**Results.** To our surprise, 29% of the GPs indicated that they had not been involved in the referral to the Department of Clinical Genetics at all. Furthermore, the referral was initiated by the patient herself in most cases (40%) and by the GPs in 31% of the cases. Of the GPs who were involved in the referral, most of them (79%) talked to their patients to different extents about what to expect from their visit to the Department of Clinical Genetics; however, potential choices after an adverse outcome at prenatal diagnosis were discussed less often (60%). The main reason for referring the patient during, instead of before her pregnancy was because the GP was unaware of a potential risk factor before pregnancy (71%) and, consequently, never had a chance to talk about a referral before (71%). Other reasons for referral during pregnancy mentioned by the GPs were reassuring the patient about the health of her unborn child (32%) and the wish of the patient to be referred during pregnancy (31%). GPs considered their knowledge of clinical genetics to be limited (mean score 5, on a scale from 0 to 10). The majority of the GPs were in favour of genetic counselling taking place before, instead of during pregnancy, and they had no great objections to abortion.

**Conclusions.** During pregnancy, the gatekeeper function of the GP in the referral for genetic counselling is undermined. Limited alertness and awareness among GPs about genetic risk factors in their patients played a major role in this undermined function and in the less appropriate timing of referral. Neither insufficient knowledge nor barriers to acceptance explained this lack of alertness and awareness. We advocate the implementation of routine family history taking in general practice.

**Keywords.** Genetic counselling, GP, pregnancy.

---

Introduction

In many countries, GPs are the first point of contact for patients, and they have a gatekeeper role in referrals to specialists. In The Netherlands too, as stated in an agreement between the Dutch Society...
of Clinical Genetics and the Dutch health insurance companies, referral for genetic counselling to one of the eight academic centres for clinical genetics is the task of GPs exclusively. This means that every patient who wants to be referred for genetic counselling has to visit their GP first.

If questions about reproduction are part of the genetic counselling, referral should, preferably, take place before conception because reproductive genetic counselling during a pregnancy has many disadvantages. It may be too late for prenatal diagnosis, preventive measures are limited and alternative methods of reproduction have become impossible. Furthermore, regarding the woman and her partner, genetic counselling during a pregnancy may cause a lot of worry and distress. Finally, important decisions have to be made in a short period of time. Despite these disadvantages, during the last few years, ~10–20% of the counsellees with a genetic risk factor which was present before their pregnancy attended one of the eight Dutch Departments of Clinical Genetics for the first time during a pregnancy (unpublished data). In about half of these pregnant women, one of the (often multiple) reasons for referral was mental retardation in a relative; the nature of the other reasons was very diverse. Furthermore, the genetic health problem was present in the counsellee herself or a first-degree relative in most cases (70%), and in about half of the cases an elevated a priori risk of at least 10% for the unborn child was present. Women who first underwent prenatal diagnosis and who subsequently were referred by their gynaecologist to discuss the implications of an adverse outcome at this prenatal diagnosis were not included in these figures.

Clearly, both patient- and doctor-related factors play a role in the decision to attend a Department of Clinical Genetics during instead of before a pregnancy. Here we will focus on the role of the GP. The aim is to explore the role of the GP in the less appropriate timing of referral for reproductive genetic counselling.

The main question this study sought to answer was as follows:

1. What are the reasons for GPs referring women for reproductive genetic counselling to the Department of Clinical Genetics during, rather than before their pregnancy?

In addition, we asked three other questions:

2. To what extent do GPs initiate and discuss aspects of the referral of pregnant women to the Department of Clinical Genetics?

3. How do GPs view their knowledge of genetics?

4. What are the GPs’ attitudes towards genetic counselling and towards its implications?

Methods

Subjects and procedures

A letter with a brief explanation of the study and a questionnaire were sent to the GPs of 100 consecutive pregnant women, ~1 week after their first consultation at the Department of Clinical Genetics at the Academic Medical Center in Amsterdam. All women received genetic counselling for the presence of an identified significant elevated genetic or teratogenic risk factor in themselves, their partner or a close relative. The genetic risk factors were present before conception took place and their nature was very diverse (e.g. family history of Huntington syndrome, chromosomal translocation, cystic fibrosis, metabolic diseases), but a family history with mental retardation in a first- or second-degree relative was the most frequent. A detailed description of the patients’ characteristics will be published elsewhere. As a standard procedure, women have to bring a referral letter from their GP with them to the first consultation and, theoretically, therefore, all GPs were aware of the visit of their patient to the Department of Clinical Genetics. The women were asked for their consent to invite the referring GP to participate in this study. Pregnant women who were referred because of an adverse outcome at prenatal diagnosis were not enrolled in the study. GPs who did not return their questionnaire within 4 weeks received a reminder by telephone. If applicable, they were asked for their reasons for declining to participate.

The survey instrument

The questionnaire was developed in line with an extensive questionnaire for counsellees and was based on (i) clinical experience; (ii) a literature search; and (iii) in-depth interviews with five pregnant and five non-pregnant women who had made an appointment for reproductive genetic counselling, in order to explore their reasons for coming to the Clinical Genetic Centre. The results of the associated study on counsellees will be published elsewhere.

The GPs’ questionnaire consisted of seven sections:

(i) age and sex of the GP;
(ii) initiation of the referral (one multiple choice question: ‘Who initiated the referral to the Department of Clinical Genetics?’);
(iii) the degree to which some aspects of genetic counselling were discussed with the pregnant woman before referring her to the Department of Clinical Genetics (three multiple choice questions, see Table 2);
(iv) reasons for referring the women during, rather than before their pregnancy (12 items, measured on a 4-point Likert scale, see Table 3);
(v) knowledge of genetic counselling in general (one 11-point rating question with a scale from 0 to 10,
where 0 meant ‘strongly disagree’ and 10 meant ‘completely agree’: “I think my knowledge of genetic counselling is moderate to good”); (vi) opinions regarding genetic counselling before pregnancy (two 11-point rating questions with a scale from 0 to 10, where 0 meant strongly disagree and 10 meant completely agree: “In my opinion, genetic counselling should take place before, instead of during a pregnancy” and “Genetic counselling before a pregnancy of women with a risk factor leads to medicalization of the pregnancy”); (vii) attitudes towards abortion (two 11-point rating questions with a scale from 0 to 10, where 0 meant ‘abortion unacceptable’ and 10 meant ‘no objections to abortion at all’: “How do you feel about legal abortion in general?” and “How do you feel about legal abortion if it turned out that the unborn child of your patient was affected for the disorder for which the patient was referred?”).

The questionnaire took ~15 min to complete.

Data analysis
The survey data were entered into a SPSS database for analysis. Calculations were performed using SPSS 10.0. t-tests were used for group comparisons with approximately normally distributed variables, and chi-square tests for others.

Results
Participants
Data were collected between January 2000 and December 2001. From the 100 GPs involved, 99 could be retrieved. Thirteen GPs did not return their questionnaire (response rate 87%); one declined because he had not been involved in the referral of the patient, another because of time constraints. For 11 GPs, no specific reason for declining could be retrieved. As can be seen in Table 1, 23 GPs completed the questionnaire only partly or not at all and did not answer the main question, i.e. about the timing of referral, because they had not been involved in the referral of the patient and missed relevant information. Four other GPs returned their questionnaire blank; one indicated that he had never met this new patient in his practice, two did not know the patient at all and one indicated lack of time. Therefore, the questionnaires of 59 GPs (60%, n = 99) could be analysed completely for the main question, and the questionnaires of 16 GPs (16%, n = 99) only partly.

The mean age of the GPs was 46 (SD 7.9, range 28–60, n = 75) years, with the majority of the respondents being male (67%, n = 75).

Aspects of referral
Twenty-nine GPs (40%) reported that the referral was initiated by the patient, 23 (31%) by themselves, seven (10%) by the midwife and 14 (19%) by another physician, mainly gynaecologists (10%).

Table 2 shows that, of the GPs who were involved in the referral (n = 53), most (79%) had informed their patient to some extent about what to expect from their visit to the Department of Clinical Genetics. The possibilities of additional investigations during a pregnancy, such as amniocentesis, chorionic biopsy and ultrasound, were discussed to at least some extent by 76% of these GPs. Potential choices after an adverse outcome at prenatal diagnosis, such as continuation or termination of the pregnancy, were discussed with the pregnant women by 60% of the GPs.

Reasons for referral during pregnancy
Table 3 shows the reasons and their relative importance as stated by the GPs for referring their patients during, rather than before a pregnancy. They indicated that the main reason (of ‘great importance’ and of ‘very great importance’) for referring their patient during pregnancy was because they heard about a potential risk factor for the first time during this pregnancy (71%), they never had a chance to talk to the patient about a referral before this pregnancy (71%), the patient herself wanted to be referred only during her pregnancy (31%) and there was no special reason to refer their patient during her pregnancy (26%). Furthermore, reassuring the patient about the health of her unborn child, was of ‘great’ or

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Involved in referral (n)</th>
<th>Not involved in referral (n)</th>
<th>Other/unknown (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete for main questions</td>
<td>54</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Incomplete for main questions</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blank</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Not returned</td>
<td>1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>29</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 1 Responses of GPs to the questionnaire (n = 99)
very great importance’ to 32% of the GPs. Finally, the statement “I did not think it was necessary to refer for genetic counselling actually, but the patient herself wanted to be referred during her pregnancy” was of ‘some importance’ to 22% of the GPs and of ‘great’ or ‘very great importance’ to 14% of the GPs.

**GP knowledge of genetics**

Expressing their agreement with the statement that their knowledge about the field of genetic counselling was

‘moderate’ to ‘good’, the mean score was 5.0 (SD 2.1, range 0–9, n = 69).

**GP attitudes towards genetic counselling and its implications before pregnancy**

GPs generally agreed with the statement on reproductive genetic counselling, expressing the opinion that genetic counselling preferably should take place before, instead of during a pregnancy (mean 9.0, SD 2.2, range 0–10, n = 68). They generally did not agree with the

---

**Table 2**  
*Questionnaire responses (%) showing to what extent GPs who were involved in the referral discussed potential aspects of genetic counselling with their patients before referral (n = 53).*

<table>
<thead>
<tr>
<th>Question</th>
<th>Very extensively (%)</th>
<th>To some extent (%)</th>
<th>To a small extent (%)</th>
<th>Not at all/irrelevant (%)</th>
<th>I do not remember (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you discuss with your patient what to expect from her visit to the Department of Clinical Genetics?</td>
<td>2</td>
<td>38</td>
<td>39</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Did you talk to your patient about the potential options for further investigations during pregnancy (e.g. chorionic biopsy, amniocentesis, ultrasound)?</td>
<td>2</td>
<td>40</td>
<td>34</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Did you talk to your patient about the potential choices, in case of an adverse outcome at prenatal diagnosis (continuing the pregnancy versus abortion)?</td>
<td>4</td>
<td>34</td>
<td>22</td>
<td>36</td>
<td>4</td>
</tr>
</tbody>
</table>

---

**Table 3**  
*Reasons for referring a patient to the Department of Clinical Genetics during, instead of before pregnancy (n = 59)*

<table>
<thead>
<tr>
<th>Reason</th>
<th>Of no importance (%)</th>
<th>Of some importance (%)</th>
<th>Of great importance (%)</th>
<th>Of very great importance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General knowledge of genetics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I thought genetic counselling for this risk factor was not possible</td>
<td>78</td>
<td>15</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>I thought genetic counselling for this risk factor was possible</td>
<td>93</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>only during pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I did not think genetic counselling for this risk factor was necessary</td>
<td>86</td>
<td>5</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>at an earlier stage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of risk factor of the patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I heard about a potential risk factor for the first time during this pregnancy</td>
<td>22</td>
<td>7</td>
<td>13</td>
<td>58</td>
</tr>
<tr>
<td>I never had a chance to talk to the patient about referral</td>
<td>19</td>
<td>10</td>
<td>19</td>
<td>52</td>
</tr>
<tr>
<td>for genetic counselling before this pregnancy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wish of the patient</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The patient wanted to be referred only during her pregnancy</td>
<td>66</td>
<td>3</td>
<td>7</td>
<td>24</td>
</tr>
<tr>
<td>I did not think it was necessary to refer for genetic counselling actually, but the patient herself wanted to be referred during her pregnancy</td>
<td>64</td>
<td>22</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Other reasons</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I referred the patient for genetic counselling in order to reassure her about her child’s health</td>
<td>49</td>
<td>19</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>I did not want to worry the patient before a pregnancy</td>
<td>95</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>was actually present</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First, I wanted to wait and see if the patient got pregnant at all</td>
<td>100</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>The patient wanted to be referred before her pregnancy, but that has not been realized anymore</td>
<td>90</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>No special reason</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There was no special reason to refer this patient during her pregnancy, she could have been referred equally before or after her pregnancy</td>
<td>71</td>
<td>3</td>
<td>10</td>
<td>16</td>
</tr>
</tbody>
</table>
statement that genetic counselling before pregnancy leads to medicalization of the pregnancy (mean 3.8, SD 3.2, range 0–10, n = 68).

The GPs expressed no strong objections to abortion in general (mean score 7.6, SD 1.6, range 2–10, n = 71). Asking the same question, but now concerning objections to abortion in the specific situation of the patient they referred, the mean score was the same (7.6, SD 2.3, range 1–10, n = 65).

Differences between GPs considering involvement in and initiation of referral
There were no significant differences between GPs who were involved (n = 54) and those who were not involved (n = 21) in the referral for reproductive genetic counselling, regarding age, sex, knowledge of genetics, attitudes towards genetic counselling before pregnancy and attitudes towards abortion. A comparison between GPs who initiated (n = 23) and those who did not initiate (n = 50) the referral showed significant differences for two of these variables, in an unexpected way. GPs who initiated the referral indicated that they had less knowledge of genetics than those who did not initiate the referral (t = –2.9, df = 65, P < 0.01, effect size SMD 0.8). Furthermore, GPs who initiated the referral had a significantly lower score on their attitudes towards abortion in general than the GPs who did not initiate the referral (t = –3.1, df = 67, P < 0.01, effect size SMD 0.8).

Discussion

Limited alertness and awareness of reproductive genetic risk factors
GPs are supposed to play an important role in the referral for reproductive counselling, which preferably should take place before conception. In this study, we tried to identify aspects of this role of the GP which may lead to a less appropriate timing of referral. Despite a high response rate, no more than 68% of the returned questionnaires could be analysed for the main research question. This was due to the fact that, to our surprise, at least 29% of the GPs had not been involved in the referral of their patient to the Department of Clinical Genetics at all. In daily practice, patients and other professional medical workers directly contacted the Department of Clinical Genetics, without asking for a referral from their GP before the consultation. Thus, in a substantial portion of the cases, referral took place without the GP’s knowledge, undermining his so-called gatekeeper role.

Furthermore, some caution is needed when drawing conclusions from the findings, given that they were based on the data of only 59 GPs. Moreover, some items rely on recall of a specific consultation which occurred some time previously.

The main reason for referring their patient for reproductive genetic counselling during pregnancy, as indicated by the GPs themselves, was the fact that they did not know about a potential risk factor before this pregnancy and they, therefore, did not have a chance to talk to their patient about referral at an earlier date. Limited awareness and alertness among GPs about genetic and teratogenic risk factors in their patients have been noticed before.\(^7\)\(^-\)\(^10\) In a Dutch survey, fewer than half of the GPs reported asking for data about risk indicators during pregnancy, such as congenital disorders in offspring or in other relatives. Moreover, only about half of these GPs stated that they ‘nearly always’ gave information if they knew about a potential risk factor (next of kin with congenital disorders, medication use and advanced maternal age) in patients.\(^10\) In a follow-up, 10 years later, there was no significant improvement in the efforts to collect data about risk factors for having a child with a congenital disorder, nor in giving genetic counselling if risk indicators were known.\(^11\)

In another survey of 89 GPs on pre-conception counselling, 53% gave pre-conception advice only after questions about this topic were raised by the women themselves, and 25% of the GPs asked for risk factors when a woman mentioned her wish to have a child.\(^8\) Not only GPs, but also non-geneticist medical specialists appear to pay limited attention to genetic counselling. In a paediatric surgical unit, 40% of parents who gave birth to a child with a major congenital anomaly said that they had not been informed about the possibility of genetic counselling.\(^12\)

Other factors which influenced the timing of the referral, as indicated by the GPs, were reassurance of the patient about the health of her unborn child and the apparent wish of the patient herself to be referred during pregnancy. The factor reassurance, probably, is also reflected by the fact that although several aspects of the genetic counselling were discussed by most GPs, consequences of prenatal diagnosis after an adverse outcome were discussed in only 60% of the cases. Furthermore, reassurance about the health of her unborn child has been found before to be the reason mentioned most often for undergoing prenatal screening by women themselves.\(^13\) Clearly, the patient, who may be more anxious about the health of her future child during pregnancy, also influences the timing of the referral. Although it is impossible to prevent a certain level of anxiety during pregnancy, pre-conceptual reassurance about additional genetic or teratogenic risk factors may reduce the fears of pregnant women. Further studies are under way to investigate these patient-related factors.

Reasons for limited genetic alertness and awareness
It can be anticipated that limited knowledge of clinical genetics among GPs may lead to limited awareness of the implications of genetic risks on reproduction.\(^14\)\(^-\)\(^16\) Most Mendelian genetic disorders are rare and will never
occurs in the daily practice of an individual GP, which may explain a lack of interest in genetic issues. It has been shown that most primary care physicians do not see genetics as important, because of the perceived rarity of genetic conditions in general practice. Furthermore, the field of genetics develops quickly and education in this field demands ongoing efforts. Indeed, the GPs in our study, as in many other studies, considered their knowledge of genetic counselling as very moderate. However, this limited self-perceived knowledge did not seem to play a major role in the less appropriate timing of referral, as indicated by the finding that knowledge items were hardly endorsed (Table 3).

Secondly, barriers to acceptance of certain aspects of genetic counselling, for example the limited therapeutic and preventive measures, could be another cause of less appropriate timing of referral. In the study of Kumar and Gantley, GPs identified this ‘therapeutic gap’ as a reason for not raising the issue of a genetic risk in the context of common diseases. The limited therapeutic measures could play a role especially in reproductive genetic counselling, where genetic disorders can be perceived as unpreventable, with an abortion as the only possible option during a pregnancy. In our study, however, GPs had no strong objections to abortion, neither in general nor in the case of a specific patient. In this respect, there were no differences, or unexpected differences, between the GPs considering the involvement in and the initiation of referral. One may assume, therefore, that negative attitudes towards abortion were not an important reason for the limited involvement in and limited initiation of referral for reproductive genetic counselling. Furthermore, the GPs indicated that they were in favour of reproductive genetic counselling before, rather than during pregnancy and that they did not worry about the risk of medicalization of the pregnancy if genetic counselling took place before pregnancy.

In our study, neither insufficient knowledge nor barriers to acceptance among GPs seem to explain the fact that GPs were not informed about a potential genetic risk factor in their patients before referral. More probably, in the daily practice of the busy GP, the patient comes with a chief complaint and the GP concentrates on the management of the disease, leaving no room for discussion of issues unrelated to this complaint. In general, non-geneticist clinicians appear to concentrate on the management of diseases, overlooking the need for genetic counselling and the consequences for other family members. Secondly, it has been shown that family history taking by the GP is uncommon in daily practice. However, the medical family history is an important tool for initial genetic assessment and, in general, GPs consider taking a family history as part of their role.

Furthermore, it has been shown that most of the time, family history taking is valued by the GP as an aid to the immediate care of a patient. Clearly, drawing a family pedigree in detail and considering its relevance for the patient is a difficult, time-consuming and ongoing need for preventive care.

The future
Beyond dispute, varied and ongoing education programmes for GPs are important to utilize genetic medicine optimally. However, not only in The Netherlands, but also in other countries, routine educational strategies will not be sufficient if we want to achieve desired levels of knowledge and produce a change in attitude. In order to stimulate the role of the GP in genetic care, several alternatives have been suggested. For example ‘empowering a small interested cadre among primary health care providers to become local experts and teachers’, setting up a ‘molecular medicine team’, with the family physician playing a key role and being an active participant or organizing specialized out-patients’ clinics for pre-conceptional care. For the implementation of changes in genetic alertness and awareness, it is important to develop a model which incorporates a realistic role for GPs. Based on the results of our study, we think that standard pedigree analysis in the GP practice will enhance awareness of reproductive genetic risk factors in an effective manner and may prove to be a relatively simple, important step in the integration of genetic medicine into the practice of the GP. New patient visits are prime opportunities for collecting family history information. In this era of computerized medical records, gathering more data about family history should be feasible by adding a, perhaps obligatory, field about family data. Further, procedures for periodic family history updates should be constructed, although this may be more complex to carry out, and patients should be encouraged to report new information about their family history. The practice nurse, whose work is becoming more and more important in the practices of GPs all over the world, may play an important role in surveying and updating information about genetic risk factors, for example by collecting this family history information. Awareness of a identifiable genetic risk factor in a family makes it possible to discuss and offer genetic counselling to women before conception. This may give women the opportunity to consider genetic counselling and choose their preferred time of referral. Obviously, a thorough and effective cooperation in the field of clinical genetics between GPs, medical specialists, genetic counsellors and other health workers remains important, and referral guidelines can be useful.

Considering the findings in our study, which were based on a relatively small, selected group of GPs, it would be interesting to investigate the group of GPs who referred their patients for reproductive genetic counselling before pregnancy. Are there any differences between the GPs of pregnant versus non-pregnant women, especially regarding alertness to genetic risk factors? Or is the timing of the referral merely due to the women themselves?
Overall, however, we believe that, once family history taking has become a standard procedure in the practice of the GP, a major step towards enhancement of alertness and awareness of genetic risk factors among GPs has been made, and from that point on the GP is very capable of judging the relevance of these risk factors for his patients.

Acknowledgements

We would like to thank the GPs who participated in the survey, Phia Kuijten for her helpful contributions to the study, and Dick Willems (Department of General Practice, Academic Medical Center) for his comments on this paper.

References