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a cross sectional study**

Rasmussen, Sanne; Balasubramaniam, Kirubakaran; Gonge Due, Lisbet; Jarbøl, Dorte Ejg; Haastrup, Peter

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# Involvement of personal and professional relations when experiencing colorectal cancer symptoms – a cross sectional study

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**Sanne Rasmussen**, Research Unit of General Practice, Department of Public Health.

University of Southern Denmark

**Kirubakaran Balasubramaniam**, Research Unit of General Practice, Department of Public Health.

University of Southern Denmark

**Lisbet Gonge Due**, Research Unit of General Practice, Department of Public Health.

University of Southern Denmark

**Dorte Ejg Jarbøl**, Research Unit of General Practice, Department of Public Health.

University of Southern Denmark

**Peter Fentz Haastrup**, Research Unit of General Practice, Department of Public Health.

University of Southern Denmark

**Corresponding author:** Dr. Sanne Rasmussen, Research Unit of General Practice, Department of

Public Health, University of Southern Denmark, J.B Winsløws Vej 9 A, 5000 Odense C,

[sarasmussen@health.sdu.dk](mailto:sarasmussen@health.sdu.dk), telephone number: +45 6550 3087

## **Abstract**

**Objective:** As part of improving early diagnosis of colorectal cancer (CRC), knowledge about involvement of personal and professional relations, when experiencing CRC symptoms, is important.

This study aimed to analyse involvement of personal and professional relations and whether age, sex, number of symptoms and available social network are associated with involving family, non-family and professional relations among individuals experiencing CRC symptoms.

**Methods:** Some, 100 000 Danes over 20 years were randomly selected and invited to a cross-sectional survey comprising questions about involvement of relations regarding four predefined CRC symptoms (abdominal pain, rectal bleeding and change in stool texture and frequency).

**Results:** In total, 35 801 respondents over 40 years answered all relevant items and 9346 (26.1%) had experienced at least one CRC symptom in the preceding four weeks. Abdominal pain was more often than stool-related symptoms discussed with relations. Respondents >1 symptom had higher odds of reporting general practitioner (GP) contact compared to respondents with single symptoms. Age  $\geq 60$  years was associated with higher odds of GP contact and involving family relations. Spouse/partner was the most frequently involved relation. Involving a personal relation increased the odds of GP contact. Having an available social network decreased GP contact for some symptoms.

**Conclusion:** Odds of involving professional relations, e.g. the GP, were higher among individuals experiencing multiple CRC symptoms and those involving personal relations. Having an available social network was associated with lower odds of GP contact, suggesting that individuals with no available social network are more prone to use their GP.

**Key words:** Colorectal neoplasms, General Practice, Help seeking behaviour, Social support, Alarm symptoms, Signs and symptoms

## Introduction

Colorectal cancer (CRC) is frequent, especially in western countries (1). The 5-year survival rate for CRC is 90% for localized disease and 10% for disseminated disease (2). To expedite the diagnosis and improve the prognosis of CRC, referral guidelines have been applied, and patients with alarm symptoms should be referred for fast track investigation (3). According to the Danish Cancer Referral Guidelines individuals with abdominal pain, rectal bleeding, change in stool texture and frequency and/or anemia should be referred for investigation on suspicion of CRC (3). A prerequisite for referral is that individuals experiencing alarm symptoms contact the general practitioner (GP) who acts as a gatekeeper in the Danish healthcare system. However, less than half of the patients experiencing rectal bleeding present this symptom to the GP which may prolong the patient interval in the diagnostic process (4, 5).

Recognition and interpretation of symptoms are main themes in considerations about healthcare seeking, but also fear of consultation, embarrassment, worries about wasting the doctor's time and fear of being diagnosed with cancer are barriers that can keep individuals from consulting the GP (6, 7). Help-seeking behaviour is, according to the sociologist Pescosolido, socially organized into a limited repertoire of patterns rather than simplified to the decision of seeking help or not (8). Involvement of family and friends has been pinpointed as a trigger to seek healthcare (9). Seeking guidance and direction from personal relations may be an important factor to reduce patient interval but symptoms from intimate areas of the body can be embarrassing to discuss (6, 10).

Overall, there are no gender variations in reporting contact to GP when experiencing a symptom (11, 12). However, there seem to be differences in terms of involving one's personal network; men more frequently only involve their partner while women are more likely to involve both partner and others (9, 13). The association between the involvement of personal and professional relations is not previously investigated among individuals experiencing CRC symptoms, although understanding this subject is important to improve healthcare-seeking and prognosis of CRC.

Therefore, the objectives of this study were 1) to analyse the involvement of personal and professional relations among individuals experiencing CRC symptoms and 2) to investigate whether age, sex, number of symptoms and available social network are associated with involving personal and professional relations when experiencing CRC symptoms.

## **Methods**

The study is a cross-sectional nationwide study, using data from the Danish Symptom Cohort (DaSC). In Denmark, all inhabitants are registered with a unique identification number in the Danish Civil Registration System (CRS), which contains information about date of birth, gender, migration etc. Overall, 100 000 individuals aged 20 years or above were randomly selected and invited to participate (14).

The overall aim of DaSC was to collect data about self-reported symptoms in the population and to investigate help-seeking behaviour (15).

Each participant received a letter explaining the objective of the study and a personal login to a secure website giving access to an extensive digital questionnaire. Individuals without Internet access were offered to respond in a telephone interview, conducted by trained interviewers. The data collection took place from June to December 2012.

The details of the methodological framework of the questionnaire and the details of the development and pilot and field testing are specified elsewhere (15). The questionnaire contained 44 predefined symptoms; four of these were CRC symptoms (rectal bleeding, abdominal pain, change in stool texture and frequency). Individuals aged  $\geq 40$  years reporting at least one of these symptoms in the preceding four weeks, form the basis of this study. The four specific alarm symptoms and the age limit were chosen according to the Danish Cancer Referral Guidelines (3).

### *Patient and Public Involvement*

Results from previous studies were used in the development and design of the overall study of DaSC. Individuals from the general Danish population were involved in testing of the questionnaire (15). No patients or individuals from the target population were involved in the recruitment or conduct of the study. Dissemination of the results to the participants was done via a Danish webpage dedicated to the study. The participants were informed about this webpage when agreeing to participate.

#### *Questionnaire data*

To explore the self-reported symptoms, categories were phrased: *“Have you experienced any of the following bodily sensations, symptoms or discomforts within the past four weeks?”* According to the selected symptoms, the respondents were asked: *“When did you experience these for the first time?”* The time intervals selectable were: *“Less than a month ago”, “1-3 months ago”, “3-6 months ago”* and *“More than 6 months ago”*. The respondents were also asked whether they had talked to anyone concerning the reported symptom. Relations were classified in two categories; personal or professional. Two questions defined the professional relations: *“Have you contacted your general practitioner with the symptom or discomfort, in person, by phone or by e-mail?”* and *“Which of the following other healthcare professionals or therapists have you talked to regarding the symptoms or discomforts (through appointment, by telephone or by email)?”* The options were: *“Another doctor (practicing specialist, out-of-hours physician or hospital physician)”, “physiotherapist/chiropractor”, “home carer/district nurse”, “pharmacy staff”, “alternative therapist (e.g. homeopath, healer, reflexologist)”, “other”* and *“none”*. More than one option could be selected. The question regarding personal relations was phrased: *“Which of the following members of the family or social network have you talked to about the symptoms or discomforts?”* The options were: *“Spouse/partner, children, parents, colleague/classmate, friend, neighbour”, “other”* and *“none”*. More than one option could be selected.

To examine whether the respondents had an available social network four items were used: 1) *“How often are you in contact with friends, acquaintances or family that you do not live with? Contacts indicate that you are together, talking with each other on the phone, writing to each other etc.”* (Daily or almost

*daily/Once or twice a week/Once or several times a month/Less than once a month/Never/I don't know).* 2) *"If you become ill and need help with practical things, can you count on help from others? Others means people you do not live with" (Yes, definitely/Yes, maybe/No).* 3) *"Does it ever happen that you are alone, even if you want to be in the company of others?" (Yes, often/Yes, once in a while/ Yes, but rarely/No, never or Almost never).* 4) *"Do you have someone to talk to if you have problems or need support?" (Yes, often/Yes, mostly/Yes, sometimes/No, never or Almost never).* Individuals were categorised as having an "available social network" based on the following categories: Often in contact with others (*Daily or almost daily/Once or twice a week/Once or several times a month*), having available persons who can help (*Yes, definitely/Yes, maybe*), being alone when desiring to be with others (*Never or almost never/Rarely/Once in a while*) and/or having a person to talk to in case of problems (*Yes, often/Yes, mostly/Yes, sometimes*).

#### *Ethical approval*

The Regional Scientific Ethics Committee for Southern Denmark evaluated the project and concluded that the project was not notifiable and could be implemented without the permission from The Regional Scientific Ethical Committee for Southern Denmark according to Danish law. The Scientific Ethics Committee's evaluation comprised all aspects of the project including the data collection. Answering the questionnaire was completely voluntary and unpaid. The participants in the study were clearly informed that there would be no clinical follow-up and that they should contact their own GP in case of concern or worry. The project was approved by the Danish Data Protection Agency (journal number 2011-41-6651).

#### *Data analysis and statistics*

Descriptive analyses were used to examine the involvement of relations. The four symptoms were analysed separately and stratified by sex. The distribution of symptoms in two predefined age groups (age 40-59 years and age  $\geq 60$  years) and the prevalence of available social network were described.

Using multivariate logistic regression models we analysed associations between involvement of personal and professional relations and age, number of alarm symptoms, available social network and involvement

of personal relations. The Danish Cancer Referral Guidelines do not distinguish between change in stool texture and change in stool frequency, for which reason these symptoms were merged into “change in bowel patterns” for the analyses (3). In addition, the guidelines define change in bowel patterns as a CRC symptom, when it has persisted for at least four weeks, thus only experience of these symptoms for the first time more than one month earlier was included (3). The analyses were stratified by sex and adjusted for all available variables.

The professional relations were subdivided into: “the GP” and “other healthcare professionals” (other doctor, physiotherapist/chiropractor, home carer/district nurse, pharmacy staff, alternative therapist and other). Further, the personal relations were subdivided into: “family relations” (parents, spouse/partner and child) and “non-family relations” (friend, colleague, neighbour and other). All statistical tests used a confidence interval of 95%.

## Results

Of the 100 000 randomly selected individuals, 95 253 (95.3%) were eligible for the study, Figure 1. A total of 49 706 completed the questionnaire, yielding an overall response rate of 52.2%. Of the respondents, 35 801 (16 994 men and 18 807 women) were 40 years or above and had answered all relevant questions for the present study. Of these 9346 (26.1%) individuals reported at least one CRC symptom. The age group 40-59 years comprised of 10 752 women and 8 867 men and the age group  $\geq 60$  comprised of 8 055 women and 8 127 men. In total, 17 058 (90.7%) of the women and 14 859 (87.4%) of the men reported having an available social network.

Table 1 shows the descriptive results regarding involvement of personal and professional relations stratified by sex. The reporting of GP contact varied between 21.9% (change in stool texture) and 33.1% (rectal bleeding) for women and 21.3 % (change in stool texture) and 38.0% (rectal bleeding) for men. Between 14.5% (men with abdominal pain) and 38.8% (women with change in stool texture) of the respondents had involved neither personal nor professional relations regarding their symptom.



Some, 41.9% of the individuals reporting rectal bleeding did not involve any personal relations. Overall, 21.9% of the women and 18.5% of the men did not involve any personal relations regarding abdominal pain. Spouse/partner was the most frequently involved personal relation (Table 1).

Respondents with more than one CRC symptom had higher odds of reporting contact to the GP and other healthcare professionals compared to respondents with single symptoms (Tables 2-4). However, reporting multiple symptoms was not consistently associated with higher odds of involving family relations. Age  $\geq 60$  years was associated with higher odds of involving the GP with CRC symptoms, although not statistically significant for rectal bleeding. Moreover, age  $\geq 60$  years was significantly associated with involving family relations for men experiencing abdominal pain, men with rectal bleeding and change in bowel patterns for both sexes (Tables 2-4).

Having an available social network was associated with significantly lower odds of involving the GP among women reporting abdominal pain and men reporting change in bowel patterns (Tables 2 and 3).

Regarding men reporting rectal bleeding, having an available social network was associated with higher odds of involving family relations, whereas women reporting rectal bleeding were more likely to involve non-family relations (Table 4).

For all CRC symptoms the odds of involving the GP and other healthcare professionals were significantly higher for individuals who had involved personal relations. (Tables 5).

## Discussion

### *Main findings*

We analysed the involvement of personal and professional relations among 9,346 individuals from the general population experiencing CRC symptoms.

Overall, between 14.5 % and 38.8 % involved neither professional nor personal relations regarding CRC symptoms. Abdominal pain was more frequently discussed than stool-related symptoms. Regarding rectal bleeding, 40% of the respondents did not involve any personal relations, while half of the respondents did not involve any professional relations.

It was more common to involve personal than professional relations and spouse/partner was most frequently involved for all CRC symptoms. Involving a personal relation was associated with higher odds of involving the GP and other healthcare-professionals. Odds of involving professional relations when experiencing any CRCsymptom were higher among individuals experiencing multiple CRC symptoms, except for those reporting rectal bleeding. Individuals reporting abdominal pain and change in bowel patterns were less likely to contact the GP when having an available social network.

### *Discussion of findings and existing literature*

Previous studies have investigated the involvement of professional relations among individuals experiencing CRC symptoms (5, 16, 17), but little is known about involvement of personal relations. Spouse/partner was the most frequently involved relation in the present study and in line with this the qualitative study by Dabson *et al.* (18) also found that most people discuss their symptoms with their spouse. Elliott *et al.* (16) investigated management strategies for a range of symptoms and found that only 10% of the respondents discussed abdominal pain with friends and family. In contrast, we found that spouse/partner isolated was involved by more than half of the respondents with abdominal pain.

Further, Elliot *et al.* (16) found that 13.9% consulted the GP when experiencing abdominal pain, whereas we found that 28.7% of women and 34.8% of men consulted the GP with this symptom. The reasons for these disparities might be caused by the difference in the specified timeframe, where Elliott *et al.* (16) asked the respondents for symptom

experiences in the last two weeks while the time period for the present study was the preceding four weeks. Moreover, Elliott *et al.* (16) included individuals aged 18-60 years, whereas this study included an older population in which involvement of relations was more frequent among individuals aged 60 years or above. To our knowledge, it is not previously investigated how having an available social network affects help-seeking behaviour when experiencing CRC symptoms. In our study, individuals with available social network were less likely to involve the GP regarding abdominal pain and change in bowel patterns. This corresponds to Campbell and Roland (19) who outlined that patients with well-developed social networks, in general, consult the GP less frequently. Other studies found that the social network can be used for advice seeking during decision making when experiencing a symptom (20-22). Therefore, the results might indicate, that individuals without available social network involve their GP instead of personal relations when seeking advice. As hypothesized, the odds of involving professional relations when experiencing CRC symptoms were substantially higher among individuals, who had involved personal relations. The chronological order of the involvement of relations was not revealed in the questionnaire. Further research about the chronological order of the involvement of relations is thus needed before concluding on the role of personal relations in involving the GP.

### *Strengths and limitations*

The major strength of this study is the size of the study population – encompassing 37 455 individuals. Though few modern studies have reached a higher response rate our response rate of 51.8% was high compared with most previous population-based studies (23, 24). Even though our response rate was higher than other comparable studies, the rather low response rates in these types of studies can be problematic. Asking individuals from the general population to participate in a survey not specifically related to a certain disease is challenging since they do not have a special relation to the topic and hence do not feel obliged to answer. Therefore, it might be a certain group who are more responsible and dutiful that chooses to answer, creating a selection bias.

The participants were somewhat comparable to the Danish population, though the participants more often were women, married/living together, employed and had a high income and educational level (25). This potential selection bias is also a limitation of this study.

The respondents were asked if they in the past four weeks had experienced any of the four CRC symptoms and because of this relative short period, we presume that recall bias is minimized.

Data used for this survey were collected in 2012 and since then several other studies based on the data have been published. We cannot exclude that the way individuals interact and share problems with their professional and personal network has changed over the past decade. However, we still find it very important to report from this large populations-based study, as only sparse literature is available regarding symptom interpretation and healthcare-seeking /contact to personal relatives. A follow-up study is already planned to explore changes over time. The questionnaire encompassed private issues and absence of relationships with other people and loneliness may be embarrassing to acknowledge and report (26), thus having an available social network may be overestimated. Change in bowel patterns and rectal bleeding might also be embarrassing to report, which may lead to underestimating these symptoms. We sought to minimize these risks by anonymising the answers of the online questionnaire. Yet, those who responded by telephone were not anonymous, which presents a minor risk of bias. Knowing the chronological sequence of the relations involved, and the kind of contact made, would have gained an insight into the patterns of how individuals influence each other in help-seeking behaviour. As this was not revealed in the questionnaire, we can only report if a relation was involved or not.

### *Conclusions*

In this Danish population-based study we found that involvement of relations differs according to different symptom experiences. Abdominal pain was more frequently discussed with relations than symptoms related to defecation.

Half of the respondents reporting rectal bleeding did not involve any professional relation.

Involvement of professional relations increased in general, when reporting multiple CRC symptoms and when involving personal relations. Overall, both men and women often involve their spouse/partner.

Our finding that discussing CRC symptoms with personal relations may trigger healthcare-seeking indicates that future campaigns in the general population to increase timely diagnosis of CRC could include efforts to reduce the taboo of discussing bowel symptoms.

Individuals with available social network were less likely to involve the GP. Overall this suggests that discussing symptoms with personal relations can be a trigger for healthcare-seeking but individuals with no available social network are more prone to use their GP. This suggests that a strong GP-patient relation is important.

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## **Competing interest**

The authors report there are no competing interests to declare.

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## **Data availability**

The datasets generated and analysed during the current study are not publicly available due to the data protection regulations of the Danish Data Protection Agency, Statistics Denmark and the Danish Health and Medicines Authority. Access to data is strictly limited to the researchers who have obtained permission for data processing. This permission was given to the Research Unit of General Practice, Department of Public Health, University of Southern Denmark.

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**Table 1.** The proportion of individuals experiencing colorectal cancer symptoms, having an available social network and involving personal and professional relations

	Abdominal pain		Change in stool texture <sup>b</sup>		Change in stool frequency <sup>b</sup>		Rectal bleeding	
	Women n (%)	Men n (%)	Women n (%)	Men n (%)	Women n (%)	Men n (%)	Women n (%)	Men n (%)
<b>Total</b>	3 717 (100)	2 135 (100)	1 732 (100)	1 530 (100)	1 420 (100)	1 176 (100)	623 (100)	668 (100)
<b>Age (years)</b>								
40-59	2 549 (68.6)	1 265 (59.3)	1 093 (63.1)	852 (55.7)	847 (59.6)	586 (49.8)	424 (68.1)	449 (67.2)
≥ 60	1 168 (31.4)	870 (40.7)	639 (36.9)	678 (44.3)	573 (40.4)	590 (50.2)	199 (31.9)	219 (32.8)
<b>Professional relations</b>								
General practitioner	1 065 (28.7)	742 (34.8)	379 (21.9)	326 (21.3)	312 (22.0)	274 (23.3)	206 (33.1)	254 (38.0)
Another doctor	886 (23.8)	631 (29.6)	345 (19.9)	295 (19.3)	260 (18.3)	223 (19.0)	176 (28.3)	217 (32.5)
Physiotherapist/chiropractor	117 (3.1)	72 (3.4)	21 (1.2)	16 (1.0)	17 (1.2)	13 (1.1)	<5	5 (0.7)
Home help/district nurse	27 (0.7)	28 (1.3)	11 (0.6)	15 (1.0)	12 (0.8)	11 (0.9)	5 (0.8)	<5
Pharmacy staff	134 (3.6)	91 (4.3)	50 (2.9)	33 (2.2)	31 (2.2)	26 (2.2)	15 (2.4)	14 (2.1)
Alternative therapist	254 (6.8)	73 (3.4)	110 (6.4)	25 (1.6)	57 (4.0)	16 (1.4)	19 (3.0)	5 (0.7)
Other	232 (6.2)	128 (6.0)	88 (5.1)	71 (4.6)	70 (4.9)	60 (5.1)	44 (7.1)	40 (6.0)
None	2 032 (54.7)	1 080 (50.6)	1 089 (62.9)	1 000 (65.4)	925 (65.1)	771 (65.6)	326 (52.3)	334 (50.0)
<b>Personal relations</b>								
Spouse/partner	2 359 (63.5)	1 572 (73.6)	691 (39.9)	801 (52.4)	599 (42.2)	635 (54.0)	282 (45.3)	350 (52.4)
Children	779 (21.0)	319 (14.9)	174 (10.0)	91 (5.9)	158 (11.1)	73 (6.2)	81 (13.0)	32 (4.8)
Parents	357 (9.6)	132 (6.2)	67 (3.9)	27 (1.8)	54 (3.8)	18 (1.5)	43 (6.9)	23 (3.4)
Colleague/classmate	473 (12.7)	150 (7.0)	53 (3.1)	27 (1.8)	46 (3.2)	22 (1.9)	27 (4.3)	18 (2.7)
Friend	868 (23.4)	232 (10.9)	194 (11.2)	62 (4.1)	170 (12.0)	55 (4.7)	77 (12.7)	38 (5.7)
Neighbour	122 (3.3)	58 (2.7)	22 (1.3)	13 (0.8)	21 (1.5)	8 (0.7)	14 (2.2)	9 (1.3)
Other	122 (3.3)	56 (2.6)	53 (3.1)	28 (1.8)	42 (3.0)	10 (0.9)	14 (2.2)	15 (2.2)
None	815 (21.9)	394 (18.5)	860 (49.7)	658 (43.0)	663 (46.7)	489 (41.6)	261 (41.9)	280 (41.9)
<b>Overall</b>								
None <sup>a</sup>	672 (18.1)	309 (14.5)	672 (38.8)	548 (35.8)	550 (38.7)	415 (35.5)	205 (32.9)	222 (33.2)

<sup>a</sup> None were chosen when neither personal nor professional relations were involved according to the symptom

<sup>b</sup> Only individuals experiencing the symptom for the first time more than one month earlier were included



**Table 2.** Associations between involvement of personal and professional relations and age, number of alarm symptoms and having an available social network among individuals **experiencing abdominal pain**, stratified on sex.

		Involving the general practitioner		Involving other healthcare professionals <sup>a</sup>		Involving family relations <sup>b</sup>		Involving non family relations <sup>c</sup>	
		Crude OR (95% CI)	Adj. OR (95% CI) <sup>d</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>d</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>d</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>d</sup>
<b>Age (years)</b>									
<b>Women</b>	40-59	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	≥ 60	1.90(1.64-2.21)	1.84(1.58-2.14)	1.52(1.32-1.76)	1.45(1.25-1.68)	1.09(0.94-1.28)	1.10(0.95-1.29)	0.96(0.83-1.11)	0.95(0.82-1.10)
<b>Men</b>	40-59	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	≥ 60	1.79(1.50-2.15)	1.70(1.42-2.05)	1.65(1.38-1.97)	1.55(1.29-1.87)	1.46(1.18-1.80)	1.47(1.18-1.82)	0.86(0.69-1.09)	0.85(0.68-1.07)
<b>Number of alarm symptoms</b>									
<b>Women</b>	1	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	2	1.59(1.33-1.89)	1.49(1.24-1.79)	1.72(1.45-2.03)	1.65(1.38-1.96)	1.19(0.99-1.43)	1.22(1.01-1.47)	1.50(1.26-1.78)	1.51(1.27-1.79)
	3	2.06(1.65-2.57)	1.96(1.56-2.47)	2.47(1.99-3.07)	2.40(1.91-3.01)	1.29(1.01-1.65)	1.33(1.04-1.71)	1.52(1.22-1.90)	1.53(1.23-1.91)
	4	1.97(1.10-3.54)	1.93(1.04-3.57)	2.25(1.27-3.99)	2.29(1.24-4.22)	1.03(0.55-1.93)	1.11(0.59-2.10)	1.20(0.66-2.20)	1.22(0.66-2.23)
<b>Men</b>	1	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	2	1.52(1.23-1.88)	1.50(1.20-1.87)	1.81(1.47-2.24)	1.81(1.46-2.25)	1.06(0.83-1.36)	1.07(0.83-1.37)	1.32(1.01-1.72)	1.32(1.02-1.72)
	3	1.46(1.10-1.93)	1.34(1.00-1.80)	1.93(1.46-2.54)	1.81(1.35-2.41)	1.21(0.86-1.70)	1.20(0.85-1.69)	1.58(1.13-2.21)	1.59(1.14-2.23)
	4	1.95(0.98-3.86)	2.05(1.01-4.16)	2.48(1.25-4.93)	2.65(1.29-5.42)	1.42(0.58-3.47)	1.53(0.62-3.76)	1.36(0.59-3.17)	1.35(0.58-3.13)
<b>Available social network</b>									
<b>Women</b>	No	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	Yes	0.75(0.61-0.91)	0.69(0.56-0.85)	0.74(0.61-0.89)	0.65(0.53-0.80)	1.93(1.59-2.35)	1.97(1.62-2.40)	1.08(0.88-1.32)	1.10(0.90-1.36)
<b>Men</b>	No	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	Yes	0.96(0.76-1.23)	0.86(0.67-1.11)	0.87(0.69-1.10)	0.74(0.58-0.95)	2.10(1.64-2.70)	2.13(1.66-2.73)	0.97(0.72-1.31)	0.98(0.72-1.32)

<sup>a</sup>Other healthcare professionals comprise another doctor (practicing specialist, out-of-hour physician), physiotherapist/chiropractor, home help/district nurse, pharmacy staff, alternative therapist (e.g. homeopath, healer, reflexologist).

<sup>b</sup>Family relations comprise spouse/partner, parents and children. <sup>c</sup>Non-family relations represent friend, colleague/classmate, neighbour and other.

<sup>d</sup>Adjustments were made for age, number of alarm symptoms indicative of CRC, available social network and involvement of personal relations.

**Table 3.** Associations between involvement of personal and professional relations and age, number of alarm symptoms and having an available social network among individuals **experiencing change in bowel patterns<sup>a</sup>**, stratified on sex.

		Involving the general practitioner		Involving other health care professionals <sup>b</sup>		Involving family relations <sup>c</sup>		Involving non family relations <sup>d</sup>	
		Crude OR (95% CI)	Adj. OR (95% CI) <sup>e</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>e</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>e</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>e</sup>
<b>Age (years)</b>									
<b>Women</b>	40-59	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	≥ 60	2.22(1.82-2.70)	2.24(1.82-2.76)	1.45(1.21-1.73)	1.36(1.12-1.64)	1.35(1.15-1.59)	1.42(1.20-1.67)	1.16(0.93-1.45)	1.20(0.96-1.50)
<b>Men</b>	40-59	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	≥ 60	1.69(1.37-2.08)	1.52(1.22-1.90)	1.86(1.52-2.28)	1.68(1.36-2.09)	1.98(1.66-2.35)	2.12(1.78-2.53)	1.11(0.78-1.57)	1.17(0.83-1.66)
<b>Number of alarm symptoms</b>									
<b>Women</b>	1	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	2	1.41(1.12-1.78)	1.35(1.06-1.71)	1.39(1.13-1.70)	1.29(1.05-1.60)	1.30(1.09-1.55)	1.32(1.11-1.58)	1.16(0.91-1.49)	1.17(0.91-1.50)
	3	2.68(2.05-3.51)	2.62(1.97-3.48)	2.30(1.80-2.95)	2.03(1.57-2.64)	1.94(1.53-2.44)	2.04(1.61-2.58)	1.58(1.17-2.14)	1.62(1.20-2.19)
	4	3.53(1.93-6.45)	3.47(1.83-6.58)	2.63(1.46-4.74)	2.30(1.23-4.30)	1.86(1.04-3.33)	1.98(1.10-3.56)	1.45(0.69-3.06)	1.48(0.70-3.13)
<b>Men</b>	1	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	2	1.65(1.30-2.09)	1.55(1.21-1.98)	1.76(1.41-2.21)	1.70(1.34-2.15)	1.40(1.16-1.68)	1.53(1.26-1.85)	1.63(1.09-2.45)	1.65(1.10-2.48)
	3	3.24(2.40-4.37)	2.84(2.07-3.89)	2.98(2.22-4.00)	2.64(1.93-3.60)	1.94(1.47-2.56)	2.12(1.59-2.82)	2.81(1.74-4.54)	2.83(1.75-4.59)
	4	6.23(3.11-12.48)	5.78(2.78-12.00)	5.30(2.65-10.60)	5.08(2.44-10.58)	2.90(1.34-6.28)	3.60(1.65-7.90)	3.75(1.38-10.14)	3.86(1.42-10.49)
<b>Available social network</b>									
<b>Women</b>	No	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	Yes	0.84(0.64-1.11)	0.87(0.65-1.17)	0.81(0.63-1.03)	0.79(0.60-1.03)	1.22(0.97-1.54)	1.29(1.02-1.63)	1.03(0.75-1.42)	1.07(0.77-1.47)
<b>Men</b>	No	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	Yes	0.81(0.62-1.07)	0.73(0.55-0.99)	0.97(0.74-1.28)	0.89(0.66-1.20)	1.52(1.20-1.93)	1.67(1.30-2.13)	0.94(0.59-1.51)	0.99(0.62-1.60)

<sup>a</sup>Change in bowel patterns comprise the two symptoms; change in stool texture and change in stool frequency with the onset more than 1 month earlier. <sup>b</sup>Other healthcare professionals comprise another doctor (practicing specialist, out-of-hour physician), physiotherapist/chiropractor, home help/district nurse, pharmacy staff, alternative therapist (e.g. homeopath, healer, reflexologist). <sup>c</sup>Family relations comprise spouse/partner, parents and children. <sup>d</sup>Non-family relations comprise friend, colleague/classmate, neighbour and other.

<sup>e</sup>Adjustments were made for age, number of alarm symptoms, available social network and involvement of personal relations.

**Table 4.** Associations between involvement of personal and professional relations and age, number of alarm symptoms and having an available social network among individuals **experiencing rectal bleeding**, stratified on sex.

		Involving the general practitioner		Involving other health care professionals <sup>a</sup>		Involving family relations <sup>b</sup>		Involving non family relations <sup>c</sup>	
		Crude OR (95% CI)	Adj. OR (95% CI) <sup>d</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>d</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>d</sup>	Crude OR (95% CI)	Adj. OR (95% CI) <sup>d</sup>
<b>Age (years)</b>									
<b>Women</b>	40-59	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	≥ 60	1.44(1.01-2.05)	1.31(0.89-1.93)	1.23(0.87-1.74)	1.09(0.75-1.60)	1.28(0.91-1.80)	1.27(0.90-1.79)	1.32(0.85-2.03)	1.43(0.92-2.22)
<b>Men</b>	40-59	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	≥ 60	1.48(1.06-2.06)	1.10(0.76-1.58)	1.61(1.16-2.24)	1.19(0.82-1.71)	1.92(1.38-2.69)	2.00(1.42-2.81)	1.17(0.68-2.00)	1.20(0.70-2.06)
<b>Number of alarm symptoms</b>									
<b>Women</b>	1	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	2	0.76(0.51-1.12)	0.91(0.59-1.41)	0.83(0.57-1.22)	0.99(0.65-1.51)	0.68(0.47-0.98)	0.70(0.48-1.01)	1.58(0.98-2.56)	1.81(1.11-2.95)
	3	1.07(0.67-1.71)	1.15(0.69-1.92)	0.97(0.61-1.55)	1.01(0.61-1.67)	1.05(0.67-1.66)	1.07(0.68-1.69)	1.13(0.61-2.10)	1.21(0.65-2.26)
	4	0.76(0.39-1.48)	0.68(0.33-1.39)	1.30(0.70-2.42)	1.26(0.64-2.47)	1.09(0.58-2.02)	1.11(0.59-2.07)	1.56(0.72-3.38)	1.81(0.82-3.98)
<b>Men</b>	1	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	2	0.99(0.69-1.42)	1.14(0.76-1.70)	0.95(0.66-1.37)	1.08(0.72-1.63)	0.76(0.54-1.08)	0.79(0.55-1.12)	1.20(0.67-2.16)	1.23(0.68-2.21)
	3	1.52(0.93-2.47)	1.41(0.82-2.42)	1.32(0.81-2.16)	1.15(0.67-1.99)	1.21(0.74-1.99)	1.20(0.72-1.98)	0.99(0.42-2.33)	1.00(0.42-2.36)
	4	1.76(0.87-3.57)	1.56(0.72-3.38)	1.51(0.75-3.07)	1.26(0.58-2.74)	1.94(0.90-4.18)	2.10(0.96-4.59)	1.78(0.64-4.91)	1.84(0.66-5.10)
<b>Available social network</b>									
<b>Women</b>	No	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	Yes	1.26(0.75-2.11)	1.14(0.64-2.01)	1.22(0.74-2.01)	1.15(0.66-2.00)	1.11(0.70-1.78)	1.08(0.66-1.74)	2.38(1.07-5.33)	2.87(1.26-6.51)
<b>Men</b>	No	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	Yes	1.44(0.91-2.27)	1.18(0.71-1.98)	1.23(0.78-1.92)	0.93(0.56-1.56)	1.82(1.18-2.80)	2.00(1.28-3.11)	1.48(0.66-3.35)	1.55(0.68-3.53)

<sup>a</sup>Other healthcare professionals comprise another doctor (practicing specialist, out-of-hour physician), physiotherapist/chiropractor, home help/district nurse, pharmacy staff, alternative therapist (e.g. homeopath, healer, reflexologist).

<sup>b</sup>Family relations represent spouse/partner, parents and children. <sup>c</sup>Non-family relations represent friend, colleague/classmate, neighbour and other. <sup>d</sup>Adjustments were made for age, number of alarm symptoms, available social network and involvement of personal relation.

**Table 5.** Associations between involvement of the GP and other healthcare professionals and involvement of personal relations<sup>b</sup> among individuals experiencing CRC symptoms

		<b>Abdominal pain</b>		<b>Change in bowel patterns<sup>a</sup>.</b>		<b>Rectal bleeding</b>	
		Involving the general practitioner	Involving other healthcare professionals <sup>a</sup>	Involving the general practitioner	Involving other healthcare professionals <sup>a</sup>	Involving the general practitioner	Involving other healthcare professionals <sup>a</sup>
<b>Involvement of personal relations<sup>b</sup></b>		Adj. OR (95% CI) <sup>d</sup>	Adj. OR (95% CI) <sup>d</sup>	Adj. OR (95% CI) <sup>d</sup>	Adj. OR (95% CI) <sup>d</sup>	Adj. OR (95% CI) <sup>d</sup>	Adj. OR (95% CI) <sup>d</sup>
<b>Women</b>	No	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	Yes	4.24(3.34-5.39)	5.71(4.53-7.18)	3.57(2.84-4.49)	4.16(3.40-5.08)	7.20(4.66-11.13)	6.06(4.06-9.03)
<b>Men</b>	No	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)	1 (Ref)
	Yes	3.63(2.69-4.89)	4.78(3.54-6.46)	3.85(2.96-5.00)	4.17(3.25-5.36)	7.12(4.78-10.59)	8.49(5.62-12.80)

<sup>a</sup>Other healthcare professionals comprise another doctor (practicing specialist, out-of-hour physician), physiotherapist/chiropractor, home carer/district nurse, pharmacy staff, alternative therapist (e.g. homeopath, healer, reflexologist).

<sup>b</sup>Personal relations comprise spouse/partner, parents and children, friend, colleague/classmate, neighbour and other. <sup>d</sup>Adjustments were made for age, number of alarm symptoms and available social network.

**Figure 1. Flowchart of the study cohort**



