A randomized controlled trial of hospital-based case management in cancer care: a general practitioner perspective

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Background. Case management (CM) models based on experienced nurses are increasingly used to improve coordination and continuity of care for patients with complex health care needs. Anyway, little is known about the effects of hospital-based CM in cancer care.

Aim. To analyse the effects of hospital-based CM on (i) GPs’ evaluation of information from the hospital and collaboration with the hospital staff and (ii) patients’ contacts with GPs during daytime and out of hours.

Design. A randomized controlled trial allocated 280 colorectal cancer patients 1:1 to either a control group or CM intervention.

Setting. Patients were recruited at a Danish surgical department.

Methods. An ad hoc piloted questionnaire was sent to all patients’ GPs 30 weeks after patients’ recruitment and the responses from the two groups of GPs were compared. Registry data on patients’ contacts with general practice during daytime and out of hours were collected 9 months after recruitment and the data from the two groups were compared quarterly.

Results. CM was associated with an overall tendency towards more positive GP evaluations, which for 3 of 20 items reached statistical significance. Statistically significantly fewer GPs of CM patients reported contacting the hospital. CM did not affect the number of patient contacts with the GPs during the daytime, but CM patients showed a tendency towards more contacts to the out-of-hours GP services than non-CM patients.

Conclusions. CM was appreciated by the GPs and reduced their need for subsequent hospital contact. CM increased the number of patient contacts to the out-of-hours GP services.

Keywords. Cancer care/oncology, case management, continuity of care, multidisciplinary care, primary care, quality of care.

Introduction

In the year following a cancer diagnosis, the patient has on average ten contacts to the GP of which roughly half are related to the cancer.\textsuperscript{1} Delayed and inadequate information transfer and inadequate communication between hospitals and GPs are common and result in suboptimal GP consultations\textsuperscript{1-3} and, possibly, an adverse effect on patient care.\textsuperscript{4,5} Research has found that cancer patients are less likely to receive the recommended care for chronic conditions and sufficient preventive care than age-matched non-cancer patients,\textsuperscript{6} which may be so because their confidence in their GPs’ competencies has declined in the course of their treatment in the secondary health care sector.\textsuperscript{7,8}

Case management (CM) is often advocated as a method that may improve coordination and continuity of care for patients having complex care needs. Although CM models diverge as to their setting, intervention content and outcomes studied, almost all models are based on similar principles and definitions.\textsuperscript{9} CM is generally conducted by nurses trained to work as case managers. Within cancer care, one proposed model is based on case managers situated in the hospitals, who are members of the multidisciplinary team (MDT), full-time dedicated to take on the following tasks: care pathway surveillance; make outreach telephone calls...
to patients to proactively identify and tackle barriers for optimal care and well-being: transfer medical and non-medical patient-specific information to relevant health professionals; and take on the role as easily accessible hospital-based health professionals.10,11

In Denmark, it was recently statutorily decided that hospitals are to engage case managers to improve the care pathways for patients suffering from cancer or heart disease.12 Anyway, little is known about the effects of hospital-based CM in cancer care and especially the implications for general practice are unknown.

In 2009–11, we conducted a randomized controlled trial (RCT) of hospital-based CM for patients suffering from colorectal cancer (CRC). The questions relevant for primary care were (i). Did the enhanced information to the GPs improve the GPs’ evaluations of intersectoral collaboration and information received from the hospital?; (ii). Would CM pave the way for the patients to the GPs?; and (iii). Would the outreach telephone contacts and the easy access to the hospital-based case manager reduce patients’ use of the out-of-hours GP services?

Methods

Design
An RCT allocating CRC patients to either the control group or the CM intervention group.

Setting
The Danish health care system is tax-financed with free access to GPs, out-of-hours GP services and public hospitals. Ninety-eight per cent of all Danes are listed with a local general practice, and the GP acts as gatekeeper to the rest of the health care system.13 The GPs in turn (rota-system) undertake the out-of-hours GP services.

The setting of this RCT was Surgical Department P, Aarhus University Hospital, Denmark. The surgeons at the Department P perform surgery for all stages of CRC, and patients suffering from recurrent and/or locally advanced CRC are referred to the Department P from all parts of Denmark.

Participants
During the inclusion period from 11 March 2009 to 29 December 2010, all patients at Department P were assessed for inclusion. We included patients with a diagnosis of CRC or ‘a highly probable diagnosis of CRC’ who were to undergo further investigation or treatment at Department P. Exclusion criteria were participation in another study (see Discussion), poor Danish language skills or apparent cognitive dysfunction.

Control—Usual care
Control group patients received usual treatment and care. As statutorily prescribed for patients treated in hospitals, patients were informed that a named health professional at Department P would function as their ‘contact person’ during diagnostics and treatment.14 As usual, when a patient was diagnosed with cancer, the hospital informed the GP about the diagnosis by means of a brief electronic ambulatory note, whereas more detailed information about stage of the cancer, its treatment, etc. was communicated via electronic discharge summaries sent after surgery and after oncological treatment.

Intervention—CM
The manual-based CM intervention was conducted as a supplement to usual treatment and care by two experienced and specially trained nurses, the case managers, working at Department P and being members of the MDT. The case managers undertook needs assessment at initiation of CM and at any transition in care setting where Department P was involved; a one-page needs assessment checklist, which had been developed based on available instruments, was used. As long as Department P was primarily responsible for the patient’s care, the case manager telephoned the patient to systematically assess and facilitate the patient’s bio-psycho-social well-being and ensure that the patient was duly informed about the diagnosis, treatment plans, etc. These outreach contacts took place at least every fortnight and continued until 4 weeks after the patient had completed CRC treatment.

Important CM tasks were to keep the GP informed about the patient’s medical and non-medical status and, if needs within the GP’s remit were identified, encourage the patient to take contact to the GP. An electronic summary message was sent to the GP after the case manager’s initial meeting with the patient and in relation to every transition in care setting where Department P was involved. The information in the summary messages was supplementary to the information sent by the hospital surgeons (see ‘Usual care’) and summarized three elements: problems and needs identified plus initiated and proposed initiatives, planned health care and the patient’s knowledge about his or her situation. All summary messages included detailed information about the CM service and contact details.

For most patients, the initial meeting and the needs assessment took place before therapy was planned. The amount of active CM was decided by the length of the care pathway that was decided by the treatment offer. There was no formal time at which patients could no longer exercise their option to contact the case manager. As a consequence, the case manager had on average 9.7 face-to-face or telephone contacts with each patient and/or the carers (median: 8, interquartile range, IQR: 5–13), corresponding to an average of 170 minutes of contact (median: 130; IQR: 85–215). On average, the case manager sent each GP 2.3 summary messages (median: 2; IQR: 2–3).
Sample size
The primary outcomes of the RCT that were used for the sample size calculations were patient-reported health related quality of life and eight patient evaluation items (published elsewhere). The calculation based on the global health status subscale of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 indicated a need to minimally include 140 patients in each group (1:1 allocation, 90% power, two-sided significance level of 5%, a minimum relevant clinical difference = 10 units, and 15% drop-out).

Recruitment, randomization and blinding
The two nurses engaged as case managers undertook recruitment in turn. Eligible patients were approached at their first visit to the Department P after CRC was diagnosed or according to a surgeon was ‘highly probable’. Patients returning the consent form and the baseline questionnaire were randomized by an independent secretary using the minimisation technique15 and the SiMin software.16 To ensure comparable groups in terms of characteristics possibly associated with the outcomes, the following stratification factors were used: gender (male/female), cancer type (rectal cancer/colon cancer) and age (<65 years/65–79 years/>79 years). A random factor of 1:4 was used (i.e. allocation included 20% randomness).

The individual patient’s allocation status was known by the patient and the case managers, but blinded to the researchers. A label in the patients’ medical records informed health care professionals at Department P about which patients were allocated to CM. The GPs were not informed about that their patients took part in a trial. The cover letter of the GP questionnaire (see below) informed that the patient had approved that a questionnaire was sent to the GP.

Outcome measures
The GPs’ evaluations of care were explored using an ad hoc piloted 20-item questionnaire. The first 18 items addressed three aspects: patient-specific information from the hospital, the course of treatment (Table 2) and deficiencies in patient-specific information (Table 3). Moreover, the GP was asked whether he or she had contacted the hospital on his or her own initiative; if ‘yes’, the GP was asked to respond to two items evaluating the contact(s).

The questionnaire including a pre-stamped envelope was posted 30 weeks after the patient’s recruitment, if necessary with a reminder including a new questionnaire 3 weeks later. The GP was paid a consultation fee for answering the questionnaire.

Data on the patients’ contacts with their GPs and out-of-hours GP services in the time span from 3 months before to 9 months after the day of inclusion were collected through the Danish National Health Service Register.13 The following GP contacts were included in the analyses: Normal consultation, planned preventive consultation, conversational therapy, telephone consultation, e-mail consultation, home visit and outreach visit. The following out-of-hours GP services contacts were included in the analyses: Consultation, home visit and telephone consultation not followed by a consultation/home visit.

Analyses
The GPs’ answers to individual items were dichotomized and analysed using a generalized linear model (GLM) with log link for the binomial family and robust variance, taking into account the potential cluster effect due to the fact that some GPs answered questionnaires on more than one patient. Group differences in responses are presented as prevalence proportion ratios (PPRs).17

The patients’ contacts with their GPs and out-of-hours GP services were divided into periods of 90 days. These periods and the total follow-up period (270 days) were analysed using two methods: (i) number of contacts were compared using a negative binomial regression model which handles the dependent structure of contacts at the individual level,18 censoring caused by patient death was included in the model; (ii) the proportions of patients with at least one contact were compared using a GLM with log link for the binomial family and robust variance,17 and differences are presented as PPRs.

All statistical analyses were conducted according to intention-to-treat using Stata version 11.2 (Stata Corporation, Texas, USA). Statistical significance was set to 0.05 or less (two-sided).

Ethics
The Danish Data Protection Agency approved the creation of a research database and the RCT was indexed at www.clinicaltrials.gov with registration ID number NCT00845247.

According to the Danish Research Ethics Committee System,19 the trial was not a biomedical intervention and did not need the ethics committee’s approval.

Results
The a priori sample size of 280 patients was included. Reasons for non-participation and the numbers of patients included in the analyses appear in Figure 1. Table 1 shows that the two groups were comparable at baseline.

GPs’ evaluations
In both groups, 114 (81%) GPs returned a completed questionnaire. Tables 2 and 3 show that use of CM was associated with an overall tendency towards more ‘positive’ GP evaluations, which for 3 of 20 questionnaire items reached statistical significance. Table 3 also shows
a post hoc summary measure of the seven items on information deficiencies. Fewer CM GPs than non-CM GPs had missed any type of patient-specific information from the hospital.

Fewer CM GPs than non-CM GPs reported having contacted the hospital regarding their patients’ care (PPR = 0.41; 95% CI 0.22–0.80; \( P = 0.008 \)), but no differences were observed for the two items addressing the ‘quality’ of the contacts (data not presented).

**Table 4** shows that no differences were observed between the groups as to daytime GP contacts. Both types of analyses of out-of-hours GP contacts indicated more contacts among CM patients than among non-CM patients. In the total follow-up period, the ratio of proportions of at least one contact with the out-of-hours services was 1.49 (95% CI 1.07–2.07; \( P = 0.019 \)). The corresponding result in the period from day 181 and 270 was 2.34 (95% CI 1.16–4.71; \( P = 0.018 \)).

**Patient contacts with the GPs and the out-of-hours GP services**

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**Discussion**

**Summary**

We found a tendency towards more positive GP evaluations in the CM group than in the non-CM group; three items regarding information from the hospital (psychological effects of the cancer, social effects of the cancer and information given to the patient by the specialists) and one summary measure of information deficiencies differed statistically significantly and favoured the CM group. Statistically significantly fewer GPs in the CM group than in the non-CM group reported contacting the hospital.
We found no difference between the two groups in terms of number of patient contacts with the GPs. Paradoxically, the CM group showed a tendency towards more contacts to the out-of-hours GP services than the non-CM group.

Strengths and limitations
Importantly, the CM activities took place as described in the manual. It was a strength that the choice of cancer type lends itself particularly well to study the effectiveness of CM for three reasons: First, multiple departments and specialists are often involved in CRC patients’ treatment. Second, the typical CRC patient is 71 years old and suffers from multimorbidity that may complicate treatment and heighten demands for coordination of care.21 Third, colon and rectal cancer patients are facing comparable problems and needs in terms of psychosocial support and general information.22,23

It was a major strength that information regarding GP contacts was obtained from the Danish National Health Service Register whose data completeness is assumed to be very high because GPs’ reimbursement is connected with notification to this system.13 Thus, despite the relatively poor statistical strength of the contact analyses, we argue that the tendency of increased patient contacts to the out-of-hour services is an important finding.

The use of an ad hoc developed GP questionnaire was necessary because no existing, validated instrument suited our purposes.

All analyses presented in this paper were planned a priori but the sample size calculations of the RCT were based on the primary outcomes of the RCT, the patient-reported outcomes. As a consequence, many of the presented analyses suffer from low statistical precision and wide CIs. Moreover, the general use of $P \leq 0.05$ as the level of statistical significance could be questioned as multiple comparisons are presented;

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Characteristics of patients in the control group and the CM intervention group (CM group)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control group ($N = 140$)</td>
</tr>
<tr>
<td><strong>Mean age (SD)</strong></td>
<td>66.2 (11.7)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>47 (33.6%)</td>
</tr>
<tr>
<td>Male</td>
<td>93 (66.4%)</td>
</tr>
<tr>
<td><strong>Disease</strong></td>
<td></td>
</tr>
<tr>
<td>Colon cancer</td>
<td>72 (51.4%)</td>
</tr>
<tr>
<td>Primary</td>
<td>62</td>
</tr>
<tr>
<td>Recurrent</td>
<td>10</td>
</tr>
<tr>
<td>Rectal cancer</td>
<td>64 (45.7%)</td>
</tr>
<tr>
<td>Primary</td>
<td>47</td>
</tr>
<tr>
<td>Recurrent</td>
<td>17</td>
</tr>
<tr>
<td>Other cancer*</td>
<td>2 (1.4%)</td>
</tr>
<tr>
<td>Not cancer*</td>
<td>2 (1.4%)</td>
</tr>
<tr>
<td><strong>Surgery</strong></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>16 (11.4%)</td>
</tr>
<tr>
<td>Yes</td>
<td>124 (88.6%)</td>
</tr>
<tr>
<td>Endoscopic surgery</td>
<td>10</td>
</tr>
<tr>
<td>Laparoscopic surgery</td>
<td>20</td>
</tr>
<tr>
<td>Laparotomy</td>
<td>94</td>
</tr>
<tr>
<td><strong>One or more chronic disease</strong></td>
<td></td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>41 (29.3%)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>19 (13.6%)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>16 (11.4%)</td>
</tr>
<tr>
<td>Musculoskeletal</td>
<td>21 (15.0%)</td>
</tr>
</tbody>
</table>

Data are numbers (%) if not otherwise stated.

*Information found in medical records and hospital registers.

*Eight patients were falsely thought to suffer from CRC at the time of inclusion.

*Reported by patients in the baseline questionnaire.

*The categories marked with italic are part of the variable above.
A prevalence proportion ratio (PPR) >1 indicates that more GPs of CM patients agreed the item. Figure refer to the number of GPs (%) who agreed the item ('Strongly agree' and 'Agree'). ‘Don’t know / N.A.’ and missing answers omitted.

Items were answered using the following response options: ‘Strongly agree’, ‘Agree’, ‘Disagree’, ‘Strongly disagree’ and ‘Don’t know/N.A.’

~values to importantly, even if we had adjusted the P-values to counteract the problem of type one error, we would still have reported the tendencies summarized above.

**Generalizability**

Non-participants and participants differed statistically significantly in terms of cancer type and age. Among non-participants, 210 of 252 (83%) suffered from rectal cancer versus 130 of 280 (46%) among participants (chi-square, \( P < 0.001 \)). The mean age of the non-participants was 68.6 (12.40) years versus 66.3 (11.4) years for the participants (Student’s t-test, \( P = 0.026 \)). The primary reason for these differences was that another research project had recruited most patients suffering from primary non-metastatic rectal cancer, which we were therefore not allowed to include in the present RCT. Importantly, the described communication problems between specialists and GPs probably apply to cancer patients in general, for which reason the above differences do not limit the generalizability of the GP evaluations. Further, we have no reason to believe that the reasons for contacting daytime GPs and out-of-hours GP services should differ between colon cancer patients and rectal cancer patients.

**Comparison with existing literature**

In relation to cancer care, we have found one RCT testing a CM-like intervention that compared GPs’ ‘satisfaction with care’, but no difference between groups was reported.\(^ {24} \) To our knowledge, no previous CM trial has analysed cancer patients’ use of their GP or out-of-hours GP services, but three CM-like trials have analysed readmission rates and lengths of hospitalization without reporting any differences between groups.\(^ {24-26} \)

‘Shared care’ is a concept closely related to CM. Generally, shared care is about sharing the responsibility and coordination of care between two or more health care providers in different settings or locations with the use of existing resources.\(^ {27} \) A Danish RCT of shared care between an oncology department and GPs, which was based on enhanced discharge letters, clearly stated communication channels and patient empowerment found statistically significantly higher GP evaluations of the information in the discharge letter and of the intersectoral cooperation.\(^ {28} \)

A Swedish qualitative study of the effect of an ‘extended information routine’ from the specialists to the GPs concluded that extended information (copies of the hospital medical records) increased the
GPs’ knowledge about diseases and treatments and appeared to improve their possibilities to determine patients’ need for support.29

**Implications for practice and research**

The tendency of improved GP-experienced information in the CM group was anticipated, but an important finding. The finding that fewer GPs reported contacting the hospital may be caused by a reduced need owing to the enhanced information transfer. Contrary to our hypothesis, the CM patients did not pay more visits to their GPs than control group patients. The reasons for no difference between the two groups as to the numbers of daytime GP contacts may be that the patients either did not have any unmet needs, that the CM intervention did not pave the way for the patients to the GPs’ offices, or that it did, in fact, change the patients’ reasons for contacting the GPs. Thus, the number of GP contacts for psychosocial and information reasons may have been reduced, whereas contacts for chronic care conditions and initiation of rehabilitation may have increased but these changes evened out as to the total number of contacts. Noteworthy is the fact that CM patients did not see their GPs less and the post-recruitment IR of daytime GP contacts were almost 15 in both groups; a finding that underpins the GP’s ‘key worker’ position with regard to care of comorbidities, prescriptions, work exemptions, etc. Paradoxically, we saw a higher number of out-of-hours GP contacts among CM patients than among controls. The mechanism might be that CM made patients more aware of symptoms and feelings that they immediately wanted to report to health professionals. Patients’ reasons for contacting the out-of-hour GP services are not yet compulsorily coded, but, if they had been registered, this could possibly have helped explain the findings. In addition, interviews with the patients could have explored whether CM influenced patients’ coping strategies and their preferences for contacting health professionals.

In conclusion, it is possible for hospital-based case managers to improve GP evaluations of the information from the hospital.28,29 Improved GP evaluations could possibly be achieved by other, cheaper methods than CM, e.g. by changing specialists’ attitudes to the importance of smooth knowledge transfer and collaboration. If hospital-based CM is to be routinely implemented, derived consequences such as its apparent tendency to increase patient contacts to the out-of-hour GP services should be further investigated.

**Acknowledgements**

The authors wish to thank all patients and staff at Surgical Department P, Aarhus University Hospital, Aarhus, Denmark and all the GPs who filled in the questionnaires. We also wish to thank Information Officer Hanne Beyer for creating research databases.

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**Table 3** GPs’ evaluation of deficiencies in the patient-specific information

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Item</th>
<th>Control group (N = 114)</th>
<th>CM group (N = 114)</th>
<th>PPR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP’s evaluation of deficiencies in the patient-specific information</td>
<td>I have missed information from the hospital about …</td>
<td>15 (13.16)</td>
<td>11 (10.19)</td>
<td>0.77 (0.37–1.61)</td>
</tr>
<tr>
<td></td>
<td>… the intended course of treatment.</td>
<td>22 (19.47)</td>
<td>19 (17.43)</td>
<td>0.90 (0.51–1.56)</td>
</tr>
<tr>
<td></td>
<td>… where the patient was in the course of treatment.</td>
<td>13 (12.87)</td>
<td>17 (17.89)</td>
<td>1.39 (0.71–2.71)</td>
</tr>
<tr>
<td></td>
<td>… changes in the prescribed medicine to the patient.</td>
<td>36 (32.14)</td>
<td>20 (19.61)</td>
<td>0.61 (0.38–0.98)*</td>
</tr>
<tr>
<td></td>
<td>… information given to the patient by the specialists.</td>
<td>31 (29.52)</td>
<td>19 (20.00)</td>
<td>0.68 (0.41–1.12)</td>
</tr>
<tr>
<td></td>
<td>… the patient’s identified problems and needs.</td>
<td>34 (34.34)</td>
<td>25 (26.88)</td>
<td>0.78 (0.51–1.21)</td>
</tr>
<tr>
<td></td>
<td>… suggested initiatives for general practice to implement.</td>
<td>30 (29.13)</td>
<td>17 (17.35)</td>
<td>0.60 (0.35–1.01)</td>
</tr>
<tr>
<td></td>
<td>… the hospital’s expectations to who should attend to and coordinate the different parts of treatment and rehabilitation.</td>
<td>67 (58.77)</td>
<td>49 (44.95)</td>
<td>0.76 (0.59–0.99)**</td>
</tr>
</tbody>
</table>

*Items were answered using the following response options: ‘To a large extent,’ ‘To some extent,’ ‘To a small extent,’ ‘Not at all,’ and ‘Don’t know/N.A.’.

A prevalence proportion ratio (PPR) < 1 indicates that less GPs of CM patients agreed the item.

*p P = 0.042, **P = 0.043.
Declaration

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Ethical approval: None required, see Ethics section for further information.

Conflict of interest: The authors declare that they have no competing interests.

Supplementary material

Supplementary material is available at Family Practice online.

References

1. Mikkelsen TH. Cancer rehabilitation in Denmark - with particular focus on the present and future role of general practice
Is hospital-based case management helpful for GPs?


