

Long-term effects of a regional care pathway for patients with rectal cancer

Jolanda C. van Hoesve · Marloes A. G. Elferink ·
Joost M. Klaase · Ewout A. Kouwenhoven ·
Pieter Paul J. B. M. Schiphorst · Sabine Siesling

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Abstract

Purpose Introducing care pathways is seen as a method to realise patient-focussed care conform evidence-based guidelines. The goal of this study is to determine the long-term effects of a regional care pathway for patients with rectal cancer.

Patients and methods Data on almost 400 patients with rectal carcinoma from three hospitals were obtained from the Netherlands Cancer Registry and the Dutch Surgical Colorectal Audit. Results on seven structure and process indicators were analysed and compared before and at two time points after implementing a regional care pathway over a total period from

2007 to 2012. To determine motivation and interpret the results, relevant professionals of the participating hospitals were interviewed.

Results After implementing the care pathway, the performance of computed tomography (CT) scans in the diagnostic phase significantly improved ($p=0.007/0.07$). The number of patients discussed in the preoperative multidisciplinary team (MDT) meeting improved significantly ($p=<0.001$), and after implementing the care pathway, 94 % of the patients were discussed. Further, a significant reduction in time between the first tumour biopsy and the MDT meeting was realised ($p=0.01$). Professionals stated that the regional care pathway has led to more clarity about the patient route and more awareness about complying with evidence-based guidelines.

Conclusions The regional care pathway provided a solid basis for uniforming care, working according evidence-based guidelines and further cooperation on regional level. For mainly the waiting and throughput times, the guidelines and norms had probably a stronger effect on the results than the care pathway.

J. C. van Hoesve · M. A. G. Elferink · S. Siesling
Department of Research, Netherlands Comprehensive Cancer
Organisation, Utrecht, The Netherlands

J. M. Klaase
Department of Surgery, Medisch Spectrum Twente,
Enschede, The Netherlands

E. A. Kouwenhoven
Department of Surgery, Ziekenhuis Groep Twente,
Almelo, The Netherlands

P. P. J. B. M. Schiphorst
Department of Internal Medicine, Streektziekenhuis Koningin
Beatrix, Winterswijk, The Netherlands

S. Siesling
Department Health Technology and Services Research, MIRA
Institute for Biomedical Technology and Technical Medicine,
University of Twente, Enschede, The Netherlands

J. C. van Hoesve (✉)
Netherlands Comprehensive Cancer Organisation, 9700
AH Groningen, The Netherlands
e-mail: j.vanhoeve@iknl.nl

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Introduction

Colorectal cancer is a common disease in the Netherlands. In 2013, more than 13,000 new patients were diagnosed of which almost 4000 with rectal cancer. The mortality rate of patients with rectal cancer was more than 1000 patients in 2013. The relative 10-year survival of patients diagnosed in 2004–2007 was 55 % [1].

Multiple specialisms take part in diagnosing and treating rectal cancer patients; therefore, a multidisciplinary coordination of all steps in the care process is necessary [2]. A care pathway, also known as clinical pathway, critical pathway, integrated care pathway or care map, is a method for patient-focussed care based on evidence-based guidelines, best practices and patient experiences by facilitating the communication and coordination within the multidisciplinary team (MDT) meeting, with patients and their relatives [3]. Through continuous improvement, care pathways aim to improve the quality of care, reduce risks, increase patient satisfaction and increase the efficiency in the use of resources [3]. Preferably, the care pathway should cover the complete route of patients from diagnosis to follow-up. Care pathways usually lead to better standardisation and more structure in health care services, resulting in better compliance with evidence-based guidelines or evidence-based medicine [4].

In order to deliver the best multidisciplinary care to cancer patients, many health care organisations apply care pathways. However, the effects of care pathways are often inconsistent [5]. The impact of clinical practice guidelines and pathways for several tumour types, including colorectal cancer, was mainly focussed on reduction of costs and length of hospital stay, minimising practice variations and maintaining patient quality of care and patient satisfaction despite a shorter length of stay [4]. Studies concerning the effects of pathways in rectal cancer are limited. In 2010, a Spanish study showed that the implementation of a clinical pathway for patients with rectal cancer reduced hospital costs and optimised the use of limited resources. [2]. Other studies focussed on the impact of limited parts of the complete rectal cancer pathway, such as referral of patients, the diagnostic process or laparoscopic surgery [6–8].

In this study, we aim to describe the long-term effects of a regional care pathway for patients with rectal cancer in three hospitals in the Netherlands. Further, we describe the motivation of professionals to participate in this project. Moreover, the experienced impact of the care pathway according relevant professionals was determined.

Patients and methods

Care pathway

In 2008, the regional care pathway for patients with rectal cancer was developed and implemented in three hospitals in the East of the Netherlands. These hospitals all refer patients to one radiotherapy centre. The radiotherapists observed variation in the diagnostic procedures and the referral of patients with rectal cancer. This was discussed with the three hospitals and the need for regional agreements on diagnosis, MDT meeting and treatment for this patient group was recognised. The development and implementation of the regional care

pathway was initiated by the Netherlands Comprehensive Cancer Organisation (IKNL). Before developing the pathway, the involved professionals formulated two joint goals. The main goal of the pathway was to deliver excellent and more uniform care for patients with rectal carcinoma. Another goal was to maintain care and treatment for these patients in the region. The introduction of the care pathway started with a regional kick off for all relevant professionals. After installing the steering group, the current situation in all hospitals was described, and joint norms were formulated about the diagnostic process, MDT meeting and waiting and throughput times. During the implementation of the care pathway, several meetings were held in the hospitals as well as on regional level in order to learn from the implementation process in other hospitals.

After implementing the care pathway, a final meeting with the members of the steering group was held in which results of the implementation were presented and an article was published in a Dutch journal for professionals working in the field of oncology [9]. While this Dutch article reported the results before and after implementing the rectal cancer pathway, the study presented in this article focusses on the long-term effects of this pathway.

Data sources

Data was derived from the Netherlands Cancer Registry (NCR) and the Dutch Surgical Colorectal Audit (DSCA). The NCR is a nationwide population-based cancer registry and is hosted by IKNL [1]. Newly diagnosed cancer patients are notified to the registry by the Dutch Pathology Network (PALGA), to which pathology departments submit their reports on histological, cytological and autopsy examinations. Additional information on patient and tumour characteristics, diagnostics and therapy is collected from hospital records by trained registry personnel of the NCR. Topography and morphology are coded according to the International Classification of Diseases for Oncology (ICD-O).

The DSCA is an audit registry including patients who underwent a resection for colorectal carcinoma and is part of the Dutch Institute for Clinical Auditing [10]. All hospitals in the Netherlands fill in data in order to get insight in their quality of the care for colorectal patients and make improvements based on these data. In the DSCA, a benchmark is available which makes it possible for medical specialists to compare the care in their own hospital with the national average.

Selection of cases

From the NCR, we selected patients with a primary rectal carcinoma who underwent surgery in the three hospitals in

the period 1 January until 31 December 2007 before introducing the care pathway (baseline measurement). After implementing the care pathway, patients with rectal cancer in the period 1 June 2008 until 31 May 2009 were selected (first post measurement). For the baseline measurement and the first post measurement, extra data, on e.g. waiting and throughput times and MDT meeting, was collected by the registry personnel of the NCR. Data for the second post measurement was collected from the DSCA, selecting patients who underwent surgery in the period 1 January until 31 January 2012, more than 3 years after implementing the care pathway. The DSCA started in 2009; therefore, it was not possible to use this data for the baseline and first post measurement.

Interviews

Because care pathways are strongly related to other quality methods, such as the introduction of evidence-based guidelines and audits based on quality criteria, it is important to determine whether the changes which were revealed were due to the implementation of the care pathway. Therefore, semi-structured interviews with professionals were held in order to determine the experienced impact of the care pathway and interpret the observed differences in the registered data. In these interviews, the professionals were also asked about their motivation to participate in the regional project, the goals before developing the pathway and the experienced (long-term) outcome after implementation. In hospitals A and C, information was received from multiple disciplines in a group interview. In hospital B, separate interviews were held because a group interview could unfortunately not be planned (Table 1). In the interviews, the participants were informed about the results of the baseline and both post measurements. Next, they were asked to interpret the data and estimate the impact of the care pathway on the results.

Prior to the interview, the participants received the questionnaire in order to prepare themselves. After the interviews were held, the summary of the interview was checked on correctness by the interviewed professionals.

Table 1 Interviewed professionals

	Hospital		
	A	B	C
Colorectal surgeon	x	x	x
Medical oncologist	x		x
Radiologist	x		x
Specialised nurse	x		x
Radiotherapist		x	

Statistical analyses

Differences in the total scores of indicators between the baseline and the post measurements were tested using the chi-square test. Analyses were performed using the software package Stata version 12.0 (StataCorp, College Station, TX). A p value <0.05 was being considered to be statistically significant.

Results

In this paragraph, the motivation to participate in the regional project as well as the goals before introducing the regional pathway and the impact on the outcome after implementation according the professionals are described. Next, the results on diagnostic procedures, MDT meeting and waiting and throughput times are reported. These quantitative results (Table 2) are completed with information from the interviews (Table 3).

Motivation and goals

The main motivation for all hospitals to participate in the project was to realise the best treatment for patients with rectal carcinoma in the region. Further, the professionals wanted to maintain the care for this patient group in the region. Next, for patients who were referred for radiotherapy, the radiotherapists observed undesirable differences in procedures, norms and treatment between hospitals. Therefore, the professionals formulated goals for developing and implementing the regional care pathway, such as uniform care and treatment, determine joint norms, reduce waiting and throughput times and work according to evidence-based guidelines. Further, there were specific goals which differed for each hospital. For example, in hospital A, implementing the evidence-based guidelines was important, and the professionals mentioned that the publication of the revised evidence-based guideline rectal carcinoma was stimulating for them to participate in the care pathway project. The professionals in hospital B observed that patients with synchronous colorectal liver metastases were not always discussed in the multidisciplinary meeting and they wanted to make agreements about this in the region in order to realise better care for these patients. In hospital C, a care pathway for patients with rectal carcinoma already existed for their hospital and they wondered how to improve and expand this on a regional level.

Estimated impact of the pathway

Overall, the interviewed professionals stated that the regional care pathway improved clarity in the route for patients and more uniformity in procedures between professionals and

Table 2 Results of NCR and DSCA data

	Period	Baseline measurement January until December 2007			First post measurement June 2008 until May 2009			Second post measurement January until December 2012			Tests, <i>p</i> value (totals)					
		A	B	C	Total	A	B	C	Total	A	B	C	Total	Period 1–2	Period 1–3	Period 2–3
Number of (operated) patients	Hospital Norm	65	41	27	133	68	55	15	138	57	41	27	125			
1. Diagnostic procedures ^a	100 %															
Chest CT scan or chest X-ray performed	100 %				57 (80 %)	51 (93 %)	15 (100 %)	123 (89 %)	55 (96 %)	40 (98 %)	27 (100 %)	122 (98 %)	0.007 ^b			
Pelvis MRI scan performed	100 %				58 (82 %)	39 (71 %)	13 (87 %)	110 (80 %)	44 (77 %)	38 (93 %)	20 (74 %)	102 (82 %)	0.70			
Abdominal CT scan or liver CT scan performed	100 %				56 (82 %)	52 (95 %)	15 (100 %)	123 (89 %)	56 (98 %)	41 (100 %)	22 (81 %)	119 (95 %)	0.07 ^b			
2. Patients discussed in multidisciplinary (MDT) meeting before surgery		18 (28 %)	12 (29 %)	18 (67 %)	48 (36 %)	47 (69 %)	47 (85 %)	109 (79 %)	51 (89 %)	40 (98 %)	27 (100 %)	118 (94 %)	<0.001 ^b	<0.001 ^b	<0.001 ^b	<0.001 ^b
3a. Time between the first positive tumour biopsy and MDT meeting (days)	≤14 days	10 (56 %)	1 (8 %)	13 (72 %)	24 (50 %)	13 (28 %)	23 (50 %)	44 (41 %)	18 (35 %)	21 (64 %)	25 (93 %)	64 (58 %)	0.28	0.37	0.01 ^b	0.44
3b. Time between MDT meeting and start of radiotherapy (days)	≤21 days	3 (18 %)	1 (9 %)	8 (47 %)	12 (27 %)	11 (28 %)	5 (16 %)	19 (23 %)	15 (32 %)	7 (29 %)	6 (24 %)	28 (29 %)	0.69	0.81	0.44	0.44

^a No data available in baseline measurement^b Significant results

Table 3 Interview results

	Hospital		
	A	B	C
Motivation, goals and results of the pathway			
1. Motivation for developing the regional care pathway for patients with rectal cancer	Realise uniform processes for all hospitals in the region and synchronise the differences in treatment. Publication of the revised evidence-based guideline stimulated the introduction of the rectal cancer pathway	Not all patients with colorectal liver metastases were discussed in a multidisciplinary meeting. Agreements with the other hospitals in the region were necessary to deliver the best treatment	A care pathway for patients with rectal cancer was already available in this hospital. Delivering uniform care and making agreements about treatment were the main reasons to participate in the regional project
2. Goals of the care pathway	<ol style="list-style-type: none"> 1. More uniformity in care and treatment between hospitals in the region 2. Decrease differences in care and treatment between professionals 3. Introduce diagnostic procedures according the evidence-based guidelines 4. Decrease waiting and throughput times 	<ol style="list-style-type: none"> 1. More uniformity in the region 2. Better care for patients with colorectal liver metastases 3. Discuss all patients in a MDT meeting 4. Agreements about liver resections 5. Working according the evidence-based guidelines 6. Better pelvis MRI scan reports 7. Give all patients radiotherapy 8. Reduce waiting and throughput times 	<ol style="list-style-type: none"> 1. Determine regional norms for waiting and throughput times 2. Faster diagnostic route 3. Uniform radiology reports
3. Experienced results of the care pathway for the hospital	<ol style="list-style-type: none"> 1. Shorter waiting and throughput times (faster diagnostic and treatment phase) 2. More uniformity in procedures between professionals and hospitals. 3. MDT meeting for discussing patients with colorectal liver metastases 	<ol style="list-style-type: none"> 1. Care and treatment, including radiotherapy, according the evidence-based guidelines 2. All patients with rectal cancer are discussed in the MDT meeting 3. A regional colorectal liver metastases MDT meeting was installed 4. MRI scan reports were standardised 5. More willingness of professionals to cooperate 	<ol style="list-style-type: none"> 1. Clarity about the route for patients until surgery due to planning ahead 2. Less interference of professionals after planning 3. Shorter waiting and throughput times 4. Patients are assigned to a case manager 5. Less dissatisfied patients
Indicators			
Diagnostic procedures			
1.1 Diagnostic procedures	Improvement in the performance of the chest CT scan/chest X-ray and the abdominal CT scan/liver CT scan was recognised. There is no logical explanation for the reduction of the pelvis MRI scans	Before the introduction of the regional care pathway, the pelvis MRI scans were done only for patients with a lower rectal carcinoma. Nowadays, the MRI scan is performed for patients with this tumour	Regional agreements were made about the diagnostic procedures. Earlier abdominal ultrasounds were made; after introducing the regional care pathway, abdominal CT scans were performed instead
1.2 Influence of the regional care pathway	Yes, this was based on the agreements about diagnostic procedures in the care pathway. In this hospital, these agreements are being monitored by a specialised nurse	Yes, influenced by the care pathway as well as other factors. By discussing patients in the MDT meeting, more thorough decisions were made about the necessary diagnostic procedures	Yes
MDT meeting			
2.1 Patients discussed in a MDT meeting	More patients were discussed in the MDT meeting, mainly because the specialised nurses coordinate and monitor the care for patients with rectal cancer	Before introducing the care pathway, some patients with less complex tumours were not discussed in the MDT meeting. Afterwards, more attention was given to discuss all patients and to perform all diagnostic procedures before the MDT meeting	As the results show, all patients were discussed in the two weekly MDT meetings before treatment. Based on the care pathway, patients with a T4 tumour were discussed in the MDT meeting for colorectal liver metastases

Table 3 (continued)

Hospital		A	B	C
2.2 Influence of the regional care pathway		Yes, but partly. This result is more influenced by national norms and DSCA registry as this provides more pressure to deliver the best treatment	Yes, influenced by the care pathway as well as the evidence-based guidelines and DSCA registry. Most pressure probably from guidelines	Yes
Waiting and throughput times				
3.1a Time between tumour biopsy and MDT meeting		An explanation for the data could be that, in time, more diagnostic procedures were performed before the MDT meeting and this takes more time. Nevertheless, planning started at the first hospital visit	This improvement is ongoing because more attention was given to reduction of time to the MDT meeting. For the gastroenterology, more policlinic hours were realised	Improvement for this item was one of the goals for introducing the hospital care pathway years ago. This goal was maintained over the years; however, the basis for planning appointments ahead was made in the hospital care pathway
3.1b Influence of the regional care pathway		Yes, agreements were described in the regional care pathway. Meanwhile, the national norms were published and implicated more time. The specialised nurse contributed to this by coordinating this process	Yes, the care pathway caused more focus on reducing waiting- and throughput times and therefore forced to attend evidence-based guidelines. So guidelines and norms also influenced these results	No
3.2a Time between MDT meeting and start of radiotherapy		More improvement is desirable. Probably there was dependency with the logistics for radiotherapy	Nowadays, a 5 × 5 scheme is given in combination with a longer waiting time to surgery. This can explain the presented data	Improvement is still necessary; however, radiotherapy is not part of the hospital and therefore little influence can be taken to change this
3.2b Influence of the regional care pathway		Yes, see 3.1b	Yes, see 3.1b	No

between hospitals was reached after implementing the care pathway. Also, the introduction of a MDT meeting for discussing patients with colorectal liver metastases was mentioned by professionals in two hospitals as a result. They experienced the profit of discussing with and learning from each other.

Furthermore, this project has led to more willingness of professionals to cooperate on regional level. This willingness is essential because in the care and treatment for patients with rectal cancer, none of the medical specialists has a leading role in the care process, emphasising the importance of a multidisciplinary approach. Below, we present the results on the indicators completed with information from the interviews with the involved professionals.

Results of the pathway

Diagnostic procedures

The regional agreement for the diagnostic procedures was as follows: perform a chest computed tomography (CT) scan or chest X-ray, a pelvis magnetic resonance imaging (MRI) scan and an abdominal CT scan or liver CT scan for every patient.

The overall proportion of patients on whom a chest CT scan or chest X-ray and an abdominal CT scan or liver CT scan was performed increased and significantly improved in the second post measurement compared to the first post measurement (chest CT scan/chest X-ray, 98 vs. 89 %, $p=0.007$; abdominal CT scan/liver CT scan, 95 vs. 89 %, $p=0.07$).

In both group interviews, it was mentioned that the actual performance of diagnostic procedures was a result of the agreements which were described in the regional care pathway. For example, in the regional pathway, an agreement was made to perform an abdominal CT scan. This had consequences for one hospital where all patients with the suspicion of rectal cancer received an abdominal ultrasound. In another hospital, a professional said that besides the care pathway, the performance of the diagnostic procedures was also influenced by other factors, such as the regional MDT meeting for patients with liver metastases which facilitates a more thorough choice for the necessary diagnostic procedures.

MDT meeting

The regional agreement for the MDT meeting was to discuss every patient in the MDT meeting before surgery.

The overall proportion of patients discussed in the MDT meeting before surgery improved significantly in both post measurements ($p<0.001$). In two hospitals, the percentage of patients increased from 28 and 29 % in the baseline measurement to, respectively, 89 and 98 % in the second post measurement. In hospital C, this percentage improved in the

first post measurement to 100 %, and in the second post measurement, it maintained 100 %.

According to the professionals, the implemented care pathway (partly) influenced the findings. Professionals of two hospitals mentioned that besides the pathway, evidence-based guidelines and profession-based norms also contributed to the improvements which were observed after implementing the care pathway. Further, the reports based on registered data from the DSCA gave insight to the performance of the care for colorectal patients. Besides, the estimated pressure of these guidelines and norms seems to be stronger than agreements in a regional care pathway. Additionally, for patients with a T4 tumour and patients with liver metastases, a new regional MDT meeting was established as spin-off of the regional pathway. In doing so, patients who need more complex treatment are discussed and expertise of professionals in the region concerning this care and treatment is united. Nowadays, also patients with oesophageal, gastric and pancreatic cancer are discussed in this meeting. In one hospital, the specialised nurse has an important role in the coordination of the care for patients with rectal cancer as well as in the planning and monitoring of discussing patients in the MDT meeting.

Waiting and throughput times

Time between first positive tumour biopsy and MDT meeting The regional agreement for the time to MDT meeting was within 14 days.

The time between the first positive tumour biopsy and MDT meeting improved in two hospitals after implementing the care pathway. Overall, there was a significant difference between the first and second post measurement (respectively, 41 and 58 %, $p=0.01$). However, in hospital C, there was a relapse in the first post measurement, but in the second post measurement, 93 % of the patients were discussed in the MDT meeting within 14 days. In hospital A, less patients were discussed within 14 days in the first post measurement comparing to the baseline measurement and little improvement was made in the second post measurement (35 %).

Time between MDT meeting and start radiotherapy The regional agreement for the time to starting radiotherapy was within 21 days, which was in accordance to the later stated national norms.

The time between the MDT meeting and starting radiotherapy improved in two hospitals. However, in hospitals A and B, respectively, 32 and 29 % of the patients started radiotherapy within 3 weeks after the MDT meeting in 2012. In hospital C, this time did not improve, and in the second post measurement, less than a quarter of all patients started radiotherapy within 3 weeks.

Based on information from the interviews, in two hospitals, the care pathway influenced the abovementioned results on

the waiting and throughput times. The professionals mentioned that more attention was given to reducing waiting and throughput times due to the agreements which were described in the care pathway. These agreements were mainly based the evidence-based guidelines and norms. According to the professionals in another hospital, the results were on one hand influenced by the norms in the regional care pathway and on the other by the role of the specialised nurse who contributed to the coordination and monitoring of the waiting and throughput times in the care process. In the third hospital, it was said that, however, the hospital visits for patients were planned ahead, and the reduction of waiting and throughput times was a result of their own individual hospital pathway years ago. The regional care pathway did not contribute to the observed results in this study. In two hospitals, the department of radiotherapy is not part of their hospital and the professionals feel they have little influence on reducing the time before starting the first radiotherapy.

Discussion

The results of this study reveal that in all three hospitals in which the regional care pathway for rectal cancer patients was implemented, significant improvements in the performance of diagnostic procedures, the MDT meeting and the waiting time to MDT meeting were observed. Parts of these improvements were maintained over a time period of more than 3 years and were clearly a result of the implementation of the pathway. Other factors like the introduction of national norms evidence-based guidelines influenced the care for rectal cancer patients during the last time period of this study to a large extent.

The main regional goals, which were formulated before introducing the care pathway, were achieved. Firstly, according to the professionals, more uniform care for patients with rectal cancer was realised. Secondly, the percentages of patients which were treated in the participating hospitals in all measurements were more than 90 % (respectively, 95, 93 and 93 %). Clearly, the care and treatment for this group of patients maintained in the region.

A previous study showed improvements in the care for breast cancer patients after implementing a regional care pathway [11]. This supports the statement that care pathways can be effective to realise improvements in cancer care, possibly for high-volume tumours as well as for low-volume tumour types.

Our study shows that, overall, long time improvement was achieved for all indicators, except for one diagnostic procedure (MRI scan) and the time between MDT meeting and starting radiotherapy. For these indicators, no significant improvements were observed. A possible explanation could be that following the guidelines in order to increase quality of care is time-consuming, because guidelines often recommend a complete diagnostic workup before patients are discussed in

the MDT meeting. Therefore, it is difficult to achieve a reduction of waiting and throughput times in the care process. Van der Geest et al. [12] analysed waiting and throughput times in colorectal care and concluded that a guidelines-based diagnostic process and multidisciplinary collaboration was associated with increased hospital delay in colorectal cancer patients. Based on this conclusion and the results in our study, we can state that evidence-based guidelines probably have an important impact on the care process for different groups of cancer patients but do not always result in shorter waiting and throughput times.

Further, improvements after the implementation of a care pathway can lead to other, not foreseen, long-term improvements as well. For example, the new regional MDT meeting was initially established in order to discuss patients with T4 rectal tumours and patients who had colorectal liver metastases. However, due to the insight that agreements and coordination can also lead to better care for other patient groups, this MDT meeting was extended, and nowadays, patients with oesophageal, gastric and pancreatic cancer are also discussed on regional level.

The strength of this study is the combination of quantitative data from the NCR and DSCA registries with qualitative data from the interviews. In the interviews, professionals were asked about the motivation to participate in the care pathway project, the goals before the introduction of the regional care pathway and the outcome afterwards. Further, the results of the quantitative analyses were verified in the interviews and professionals were asked to give explanations for the differences. Therefore, more detailed information was collected and, in our opinion, a thorough conclusion about the experienced impact of the regional care pathway could be formulated.

This study shows the importance of measuring results before and after implementing a care pathway. Caused by various reasons, a baseline measurement is often not performed. When this is missing, the results after implementation cannot be related to the situation before and the effort put in the pathway cannot be linked to the benefits achieved after implementation. Besides the importance of a baseline and post measurement, it is important to monitor the improvements over time and to evaluate the care pathway a few years after implementation in order to take actions and improve the care process or make adjustments in the care pathway.

However, inherent to the low incidence of patients with rectal cancer, the number of included patients is limited. Furthermore, a small number of indicators were used. In this study, a choice was made for relevant indicators for which data was available.

Future research on the effects of pathways can focus on evaluating the impact of a care pathway at larger scale, for example evaluating a care pathway for patients with one tumour type in more hospitals or evaluating the impact of multiple cancer pathways in one hospital. Studies in the future

could also incorporate a control group, like a group of patients in other hospitals without a care pathway.

Conclusion

Most improvements, observed after implementation of the regional care pathway for patients with rectal cancer, maintained over a time frame of 3 years. As the MDT meeting is essential for organising multidisciplinary care for patients with a rectal carcinoma, the overall improvement of the MDT meeting in time is remarkable and promising in this study. Further improvements were made in the performance of diagnostic procedures as well as the waiting time between the first tumour biopsy and the MDT meeting.

The involved professionals stated that the improvements mainly were due to the regional care pathway. In the pathway, a basis was given for agreements and norms about diagnostic procedures, MDT meeting and waiting and throughput times. Further, the care pathway resulted in more willingness of professionals to cooperate on a regional level.

Although the regional care pathway provided a solid basis for improvement in the care for patients with rectal cancer, the interviews made it clear that there were other factors besides the care pathway influencing the improvements. Clearly, evidence-based guidelines as well as national norms also influenced the outcome. As the interviewed professionals mentioned, for the waiting and throughput times, the guidelines and norms had probably a stronger effect on the results than the care pathway.

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