Chapter 8

Clinical Pathway Evaluation for Left and Sigmoid Colectomy in Abdominal Surgery

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Additional information is available at the end of the chapter

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Abstract

At the end of 2008, a new left colon clinical pathway was implemented in our hospital and set up by a multidisciplinary team, monitored by a clinical pathway coordinator. Our aim was to evaluate the quality of left and sigmoid colectomy management, to simplify the clinical pathway and to assess its impact on the patient, the medical and nursing staffs. A sample of 290 patients with benign or malignant disease requiring a laparoscopic of laparotomy left colon resection (mainly sigmoid) was included in this clinical pathway during the years 2009–2017. Our analysis focused particularly on the compliance with the protocol, the pain felt, the suture leak rate, the hospital stay, the re-hospitalization rate and redo surgery within 30 days. Our work leads to the conclusion that the introduction of a clinical pathway, when it is well prepared and brings together all the implicated persons with the same goal, is feasible with convincing results. These are directly beneficial to the patient and to the quality of its management.

Keywords: clinical pathway, left colon, laparoscopy, open colectomy, hospital stay, colon cancer

1. Introduction

A clinical pathway (CP) is an approach of multidisciplinary global management of a population with the same pathology or the same needs, aiming especially at the fast restitution of the

physical and psychological capacities of the operated patient. It involves the establishment of a coordination between all the actors concerned by the therapeutic gesture and a specific organization of care, the patient playing an active role. The patient is no longer a sick, suffering person, he becomes an actor. For this active role to be effective, the patient must understand why he comes to the hospital, fully accept the medical procedures he will undergo and cooperate to return to the initial state as quickly as possible. With the information he receives, the patient must report on himself accurately and with the help of the medical and paramedical staff, define the physical and psychological situation at the best for him.

A CP brings coherence to the various therapeutic gestures from the preparation of the patient to his entry to the hospital until the end of his care, by the healthcare team after his return to home. The consistency in care, once perceived, is a reassuring factor for the patient who is facing a challenge. The CP will allow to sequence all the steps of the patient's journey and thus favor the optimization of the role of each of the actors in the care process. It is also a way to reassure the teams.

Clinical indicator
1. Managing the pain in pre, per, postoperative period (on a numerical scale, the pain should be ≤ 3 for the first 24 hours and ≤ 2 thereafter). Pain assessed at each break and documented in the medical record. During the peroperative period, patient controlled analgesia (PCA) is not planned for laparoscopy, but planned for laparotomy.
2. Follow-up of the resumption of the transit: recovery of the gases and stools indicated in the medical file (the patient is authorized to leave the hospital without saddles)
3. Follow-up of the food tolerance: nausea, vomiting filled in the medical file. Removing the gastric tube in the recovery room.
4. Follow-up of the temperature and keeping below 38°C
5. Follow-up of the wound: clean/dirty wound mentioned in the file
Department indicator
6. Patient information: distribution of a brochure during the preoperative consultation
Team indicator
7. Quality of the medical record, satisfaction of team work
Process indicator
8. Admission of the patient on day-1 if the surgery is scheduled before 10:00 am and on day 0 if it is scheduled after 10:00 am
9. For laparoscopy: removal of bladder catheter on day 1 or after day 1 with the reason indicated in the medical file. For laparotomy: removal on day 2 or after day 2 with the reason indicated in the medical file
10. Postoperative consultation four to six weeks after discharge of the patient of the hospital
11. Postoperative blood analysis on ≤ day 2
Financial indicator
12. Blood order without transfusion

Table 1. Clinical pathway protocol in the abdominal surgery department.

This chapter describes our first CP implemented in abdominal surgery in 2009 for the management of patients undergoing a colectomy. Such pathways of care in colorectal surgery were initiated in the 1990s [1] and are still the subject of numerous publications [2–4]. Left colon resections are performed in case of infection, tumor (benign or malignant) or inflammatory diseases. The objectives of such a resection are to remove the diseased colon, restore the digestive function closest to normal and avoid a colostomy. The feasibility of laparoscopic left colon resection for colon cancer, compared to laparotomy, was demonstrated [5]. Some complex conditions such as obesity, local tumor invasion or rectal tumor localization require in 5–15% of cases a conversion from laparoscopy to laparotomy.

With a follow-up of 9 years after the start of our CP, we analyzed the compliance of the actors to the CP protocol, the rate of suture leak, readmission or redo surgery. The CP is evaluated on the basis of a series of indicators involved in the three steps of the management of the operated patient: pre-, per- and postoperative periods.

The indicators selected concern the clinical state (the follow-up of the pain felt, resumption of transit, food tolerance, temperature, wound status), the service (patient information), the team (team work satisfaction), the process (patient admission, bladder catheter removal, postoperative consultation and blood analysis) and the financial aspects (order of blood bags without transfusion, number of complications) [6] (**Table 1**). Our objective is to study, on the basis of a wide range of data collected and analyzed painstakingly the impact of the implementation of a CP for left colectomy on all the nursing staff and the patient.

2. Patients and methods

2.1. Description of the population

Between January 01, 2009 and December 31, 2017, 265 consecutive patients with a median age of 64 (range 15–88) years old, with a male/female ratio of 1/0.9 and a median body mass index (BMI) of 25 kg/m^2 (range 16–40, obese with a BMI ≥ 30 kg/m^2 representing 16% of the population), were treated in our abdominal surgery department for a resection of the left colon by laparoscopy. On the same period of time, for the same indications and by the same team, 19 patients who had undergone laparotomy for colectomy and 6 patients whose laparoscopic surgery was converted to laparotomy were also included in the CP. There are many reasons for these conversions such as colic mobilization impossible, poor visibility, adiposity or colonoscopy leading to a significant air dilation of the colon. The median age of this group of 25 patients is 65 (range 34–88) years old, with a male/female ratio of 1/1.3 and a median BMI of 28 kg/m^2 (range 18–42, obese with a BMI ≥ 30 kg/m^2 representing 40% of the population).

These resections were performed for cancer or various benign pathologies (diverticular disease, Crohn's disease, benign polyp, volvulus) (**Figures 1** and **2**). Patients with type 1 diabetes, allergic to local anesthetics, epileptic or with intestinal obstruction were not included in the CP. Over this same period, 195 patients entered the CP and then were removed for various reasons: resection more extensive than expected, too many complications or on the basis of a medical decision.

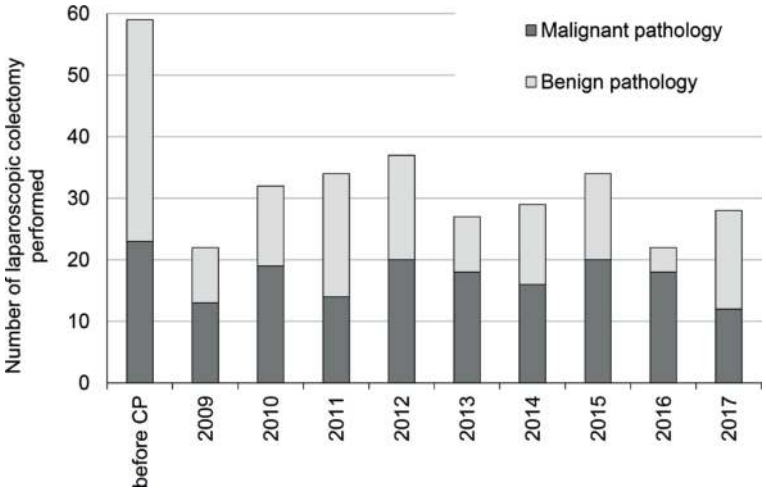

Figure 1. Number of laparoscopic surgery before (n = 59) and with the clinical pathway (CP) (n = 265).

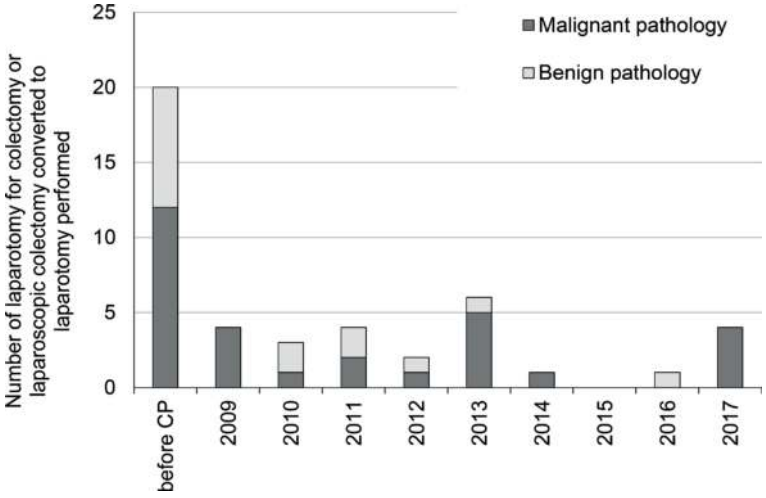

Figure 2. Number of laparotomy surgery before (n = 20) and with the clinical pathway (CP) (n = 25).

To evaluate the implementation of the CP, we compared the rate of suture leak, readmission and redo surgery and the length of stay to data obtained from consecutive series of patients who underwent resection of the left sigmoid colon between September 1, 2007 and August 31, 2008, with the same indications and by the same team but operated on in a conventional way. We chose a sufficiently recent period to avoid significant evolution in the healthcare, and sufficiently distant from the setting up of the CP to not be affected. Indeed, the therapeutic attitude of actors involved in the development of the CP protocol is inevitably affected by their

readings and thoughts, before the implementation of the CP (see the section thereafter). This development period could encourage the emergence of new attitudes such as increased patient attention or systematic documentation of the medical record. For laparoscopies, we have a group of 59 patients with a median age of 60 (15–86) years old, with a male/female ratio of 1/0.7 and a median BMI of 25 kg/m^2 (19–38, obese with a BMI ≥ 30 kg/m^2 representing 14% of the population). We have a group of 14 laparotomies and 6 conversions with a median age of 75 (49–84) years old, with a male/female ratio of 1/1.2 and a median BMI of 28 kg/m^2 (15–38, obese with a BMI ≥ 30 kg/m^2 representing 27% of the population).

2.2. Implementation of the clinical pathway

The development of the CP, 1 year before its implementation, began with the establishment of a multidisciplinary CP project group that met monthly. This group is composed of two surgeons, two anesthesiologists, two nursing heads of surgical units, a nurse within the operating room, two social workers, two dieticians and the Liege Hospital Center nurse coordinator and project manager.

After evaluating the feasibility of the study, this group has: (1) developed the CP based on the analysis of the working method in the hospital and on best practices; (2) coordinated the daily working; (3) trained healthcare teams before and with the CP; (4) sensitized and followed the patients included; (5) performed the regular evaluation of the CP; and finally (6) continuously dispatched the results. The synthesis of the management consensus developed by the CP project group, and still applicable in 2018, is detailed (**Table 2**). This protocol is added to the basic protocol (cutaneous preparation, monitoring parameters, thromboprophylaxis, …) of any patient operated on for abdominal surgery.

It seemed interesting to us to entrust the methodological aspect of the CP project to the CP nurse coordinator who is, by its specific function and motivation, the most available for the daily management of patient' needs and material constraints. This coordinator is required to have multiple contacts with each of the actors, doctors and paramedics. Placed at the center of the project, she will have a permanent overview of the CP and can propose any adjustments at any time to improve the consistency of the approach and its progression. After the establishment of the CP, the CP project group meets minimum once a year with the coordinator to examine what needs to be improved or modified. The whole CP was implemented "overnight" in each department concerned, within a single hospital.

2.3. Data management

To evaluate compliance, 12 parameters were analyzed as indicators: the time of admission of the patient, the pain assessment, the follow-up of the food tolerance, the follow-up of the temperature, the follow-up of the recovery of gases and stools, the follow-up of the wound condition, the time of the removal of the bladder catheter, the type of analgesic used, the order of blood without transfusion, the postoperative consultation and blood test. We define compliance as excellent when indicators are followed at least 80%. We carried out a simple evaluation to know if the protocol was respected, based on a YES/NO answer. When the goal is reached in consecutive years, the indicator is no longer evaluated and is noted NA for not assessed in **Table 3**.

Timing	
Day 1	Total body wash
Day 0 pre-operative	Carbohydrate loading (H-3) 2 fleet enema (H-2) Pre-operative sedation (H-1h30)
Day 0 per-operative	Intravenous fluid Antibiotic prophylaxis Preventive opioid sparing analgesic Normothermia Prevention of nausea and vomiting Lidocaine – ketamine IV TAP-block (laparotomy)
Day 0 post-operative	Avoidance of nasogastric tube TED prophylaxis Oral opioid sparing multimodal analgesia Early mobilisation out of bed Free liquids
Day 1	Free diet Early termination of IV fluid (laparoscopy) Early termination of uritary drainage (laparoscopy)
Day 2	Early termination of IV fluid (laparotomy) Early termination of uritary drainage (laparotomy)

Table 2. Clinical pathway for left colectomy.

The evaluation of the pain is carried out as of day 0 and until the discharge of the patient of the hospital, on a numerical scale of self-evaluation of 0–10 (0, no pain, 10, the maximum pain imaginable). Since the objective was to remain ≤3 for the first 24 h following the intervention, and ≤ 2 thereafter, a pain management protocol was developed by a multidisciplinary team and implemented in pre-, per- and postoperative. As the evaluation of pain has become systematic during the implementation of the CP, we have no point of comparison with patients in care before the CP.

Data are collected from paper and electronic medical records and analyzed with Microsoft Office Excel. The nonparametric Kruskal-Wallis test, performed with the statistical analysis software R was used to compare the length of stay between the "before CP" measurements and the measurements from 2009 to 2017 (all years combined), to compare the measures of all the years from 2009 to 2017 between them and to compare the length of stay between the two types of pathology—benign *versus* malignant—with each measure (before CP, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017). A result is considered statistically significant if the P value is less than or equal to 0.05 and statistically highly significant if the P value is less than or equal to 0.001.

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total number of patients	Number of patients complying with the protocol
Clinical indicators											
Analgesia – PCA not planned	77%	44%	76%	70%	70%	80%	79%	82%	71%	265	190 (72 %)
Pain assessment	95%	97%	97%	97%	100%	90%	NA	NA	NA	182	175 (96 %)
Follow-up of the recovery of the gases	91%	75%	74%	62%	89%	93%	91%	82%	86%	265	216 (82 %)
Follow-up of the recovery of the stools	91%	91%	85%	70%	96%	97%	85%	86%	93%	265	232 (88 %)
Follow-up of the food tolerance	91%	100%	100%	100%	100%	100%	94%	82%	100%	265	257 (97 %)
Follow-up of the temperature	100%	97%	94%	95%	100%	100%	97%	91%	100%	265	257 (97 %)
Follow-up of the wound	75%	91%	94%	95%	100%	100%	85%	91%	NA	235	216 (92 %)
Process indicators											
Time of patient admission	53%	68%	100%	100%	100%	100%	100%	52%	96%	193	164 (85 %)
Time of removal of the bladder catheter	91%	81%	56%	65%	96%	79%	77%	61%	73%	254	190 (75 %)
Postoperative blood analysis	100%	97%	94%	92%	85%	93%	NA	NA	NA	182	170 (93 %)
Postoperative consultation	95%	91%	91%	95%	93%	NA	NA	NA	NA	152	141 (93 %)
Financial indicators											
Order of blood without transfusion	100%	100%	97%	100%	96%	100%	NA	NA	NA	182	180 (99 %)

Table 3. Compliance with the protocol of laparoscopic left colectomy.

3. Results

3.1. Protocol compliance

With the exception of the type of analgesic used, the time of removal of the bladder catheter and the time of patient admission, protocol compliance was excellent (> 80%) for laparoscopic patients (**Table 3**), for laparotomy or laparoscopy converted to laparotomy (**Table 4**). We have enough patients in the laparoscopy group to detail compliance by year. While this varies from year to year for analgesia, the time of removal of the bladder catheter and the time of admission of the patients, it remains >80% from the outset and at the same level throughout the period analyzed (**Table 3**).

	Total number of patients	Number of patients complying with the protocol
Clinical indicators		
Analgesia – PCA planned	25	18 (72 %)
Pain assessment	19	19 (100%)
Follow-up of the recovery of the gases	25	20 (80%)
Follow-up of the recovery of the stools	25	24 (96%)
Follow-up of the food tolerance	25	23 (92%)
Follow-up of the temperature	25	25 (100%)
Follow-up of the wound	21	17 (81%)
Process indicators		
Time of patient admission, laparotomy surgery	19	6 (32%)
Time of patient admission, laparoscopy converted in laparotomy	6	3 (50 %)
Time of removal of the bladder catheter	23	10 (43%)
Postoperative blood analysis	20	20 (100%)
Postoperative consultation	19	19 (100%)
Financial indicators		
Order of blood without transfusion	20	19 (95%)

Table 4. Compliance with the protocol of laparotomy left colectomy.

3.2. Pain assessment

Analysis of the data obtained revealed that, globally, laparoscopic surgery (**Figure 3**), laparotomy or laparoscopy converted to laparotomy (**Figure 4**) remains almost painless. Postoperative pain is slightly less after laparoscopy than after laparotomy for malignant diseases. The clinical relevance of the observed differences is a moot point given the low values (the median pain is 0, 1 or 2).

3.3. The outcome

The postoperative evolution and length of stay of patients managed with the CP protocol are compared to the results of the control group. The demographic characteristics of the two groups are similar. The implementation of the CP for patient operated by laparoscopy tend to improve the quality of care since we observe a decrease in the number of patients with suture leak, the main complication of this type of surgery, from 5/59 patients (8%) before the CP to 9/265 patients (3%) with the CP (**Table 5**). Before the CP (n = 59), we accounted for 3% of readmission and 3% of redo surgery. In IC (n = 265), 19 patients (7%) were readmitted to hospital, of which 6 patients (2%) underwent redo surgery within 30 days after the resection. Suture leak, abscess, pain and hematoma are the reasons of readmission after laparoscopic left colectomy. Finally, the positive consequence of setting up the CP is the reduction of the postoperative hospital stay. The statistical analysis of the results indicates that it was reduced in a highly significant manner ($P < 0.001$) as soon as the CP was introduced (**Figure 5**).

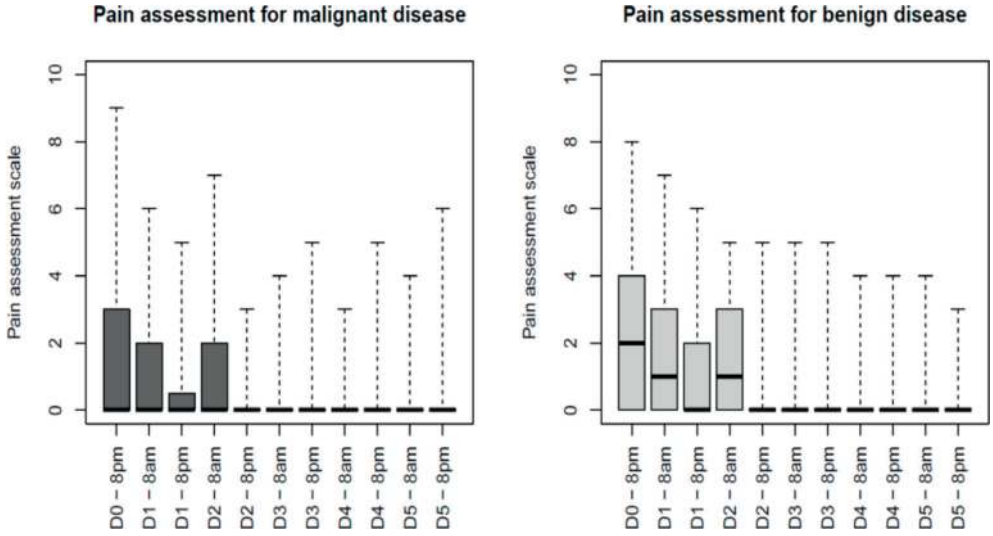

Figure 3. Pain assessment twice a day, patients operated by laparoscopy for malignant or benign pathology, included in the clinical pathway between 2009 and 2014 (n = 180). Minimum value – [lower quartile – median – upper quartile] – maximum value.

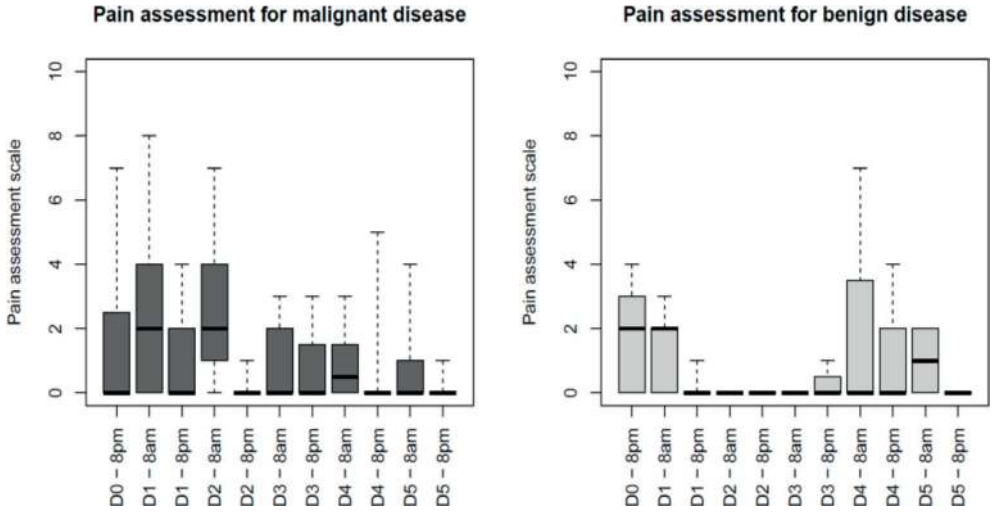

Figure 4. Pain assessment twice a day, patients operated by laparotomy for malignant or benign pathology, included in the clinical pathway between 2009 and 2014 (n = 19). Minimum value – [lower quartile – median – upper quartile] – maximum value.

The difference is observed between the measurements before CP and the measurement years 2009–2017 (all years combined). No difference was observed between the measurements from the years 2009–2017 (P = 0.853) and between the type of pathology, benign *versus* malignant, at

		Suture leak	Readmission	Redo surgery	Mean hospital stay (median, range)
Benign pathology	Before CP (n=36)	2 (6%)	2 (6%)	0%	5 days (6, 2-13)
	CP (n=115)	3 (3 %)	9 (8%)	1 (1 %)	4 days (4, 2-10)
Malignant pathology	Before CP (n=23)	3 (13%)	0%	2 (9%)	6 days (11, 3-45)
	CP (n=150)	6 (4 %)	10 (7 %)	5 (3 %)	4 days (4, 2-12)
Total	Before CP (n=59)	5 (8%)	2 (3%)	2 (3%)	5 days (8, 2-45)
	CP (n=265)	9 (3 %)	19 (7%)	6 (2 %)	4 days (4, 2-12)

Table 5. Mean hospital stay and complications within 30 days after laparoscopic left colectomy, patients managed before or during the clinical pathway (CP).

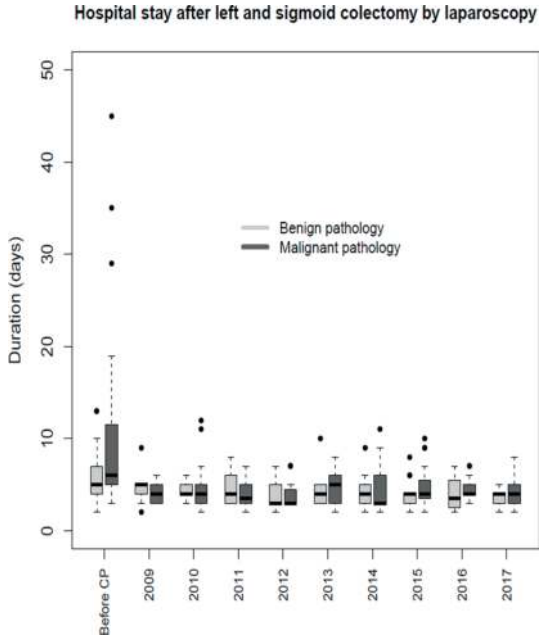

Figure 5. Box and whisker plot of the hospital stay after left (mainly sigmoid) colectomy by laparoscopy, for malignant (n = 150) or benign (n = 115) pathology, before or during the clinical pathway (CP). Minimum value – [lower quartile – median – upper quartile] –, maximum value. • outlier.

each measurement ($P > 0.05$). For malignant pathology, the median length of stay decreased by 7 days following the implementation of the CP, from 11 to 4 days (**Table 5**). For benign pathology, the median length of stay was 6 days before the CP and 4 days with the CP (**Table 5**).

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		Suture leak	Readmission	Redo surgery	Mean hospital stay (median, range)
Benign pathology	Before CP (n=8)	0%	0%	0%	11 days (12, 4-23)
	CP (n=7)	0%	0%	0%	7 days (7, 4-13)
Malignant pathology	Before CP (n=12)	1 (8%)	1 (8%)	1 (8%)	10 days (11, 7-31)
	CP (n=18)	0%	1 (6%)	0%	7 days (7, 3-15)
Total	Before CP (n=20)	1 (5%)	1 (5%)	1 (5%)	10 days (12, 4-31)
	CP (n=25)	0%	1 (4%)	0%	7 days (7, 3-15)

Table 6. Mean hospital stay and complications within 30 days after laparotomy left colectomy, patients managed before or during the clinical pathway (CP).

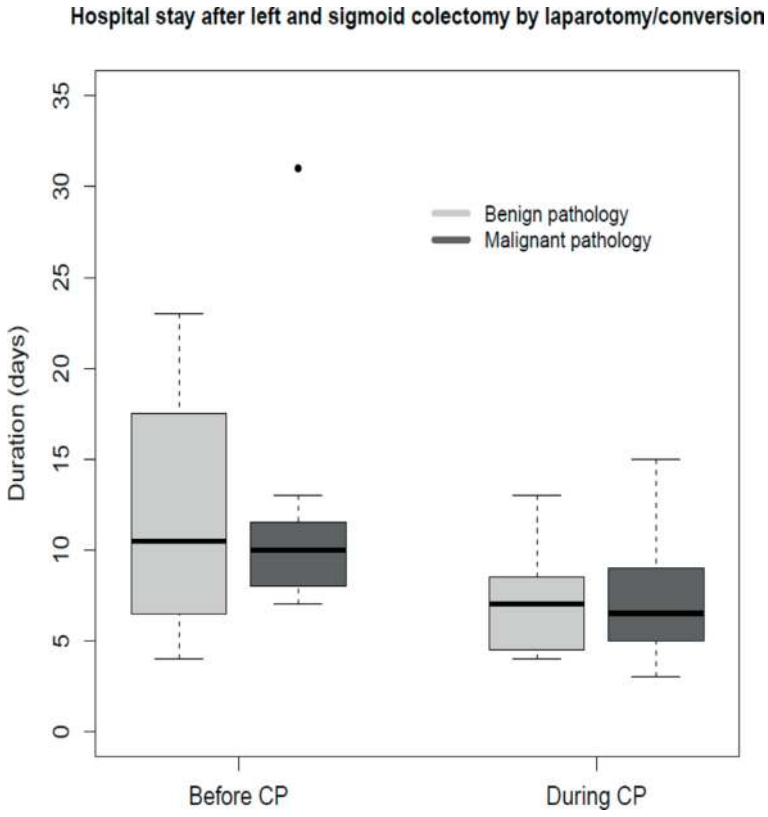

Figure 6. Box and whisker plot of the hospital stay after left (mainly sigmoid) colectomy by laparotomy, or by laparoscopy converted in laparotomy, for malignant (n = 18) or benign (n = 7) pathology, before or during the clinical pathway (CP). Minimum value – [lower quartile – median – upper quartile] – maximum value • outlier.

After the analysis of the group of 25 patients who underwent laparotomy for colectomy or complicated laparoscopic colectomy that required conversion to laparotomy, we note that the implementation of the CP did not affect the rates of suture leak, readmission or redo surgery within 30 days after the surgery. These rates were low before the CP (5% for each of the three studied parameters) and remained between 0 and 4% (**Table 6**). Flow of the lower part of the scar and fall with fracture of the right tibia are the reasons of readmission after laparotomy left colectomy. When we compare the length of hospital stay for this type of surgery before and with the CP, benign and malignant pathologies combined, we find that it decreased significantly ($P < 0.01$) with a median of 12 days of hospitalization before CP and 7 days with the CP (**Table 6** and **Figure 6**). No significant difference was observed between benign and malignant pathologies before the introduction of the CP ($P = 0.786$) or with the CP ($P = 1.000$). There are too few data per year to make effective comparisons.

No patients died within 30 days after the colectomy for the whole population including both control group (n = 63) and group in the CP (n = 290).

4. Discussion

This chapter describes the creation and implementation of a new protocol for colectomy of the left colon, mainly sigmoid, by abdominal surgeons at the Liege Hospital Center to improve the quality of care, the efficiency of health services and to reduce the variability of unjustified practices. This CP provides a healthcare pathway for laparoscopies, laparotomies and conversions from laparoscopy to laparotomy, supported for the same type of pathology, by the same team. A total of 290 resections were performed with the CP during 9 years, 265 laparoscopies procedures, 6 laparoscopies that required conversion to laparotomy and 19 laparotomies. This 2% of conversion rate is low compared to that described in the literature which is 5–15% [7, 8].

Through the precise codification of therapeutic gestures (**Table 1**), patient care and multidisciplinary teamwork have been improved. Medical, nursing and paramedical personnel appreciated the standardization of procedures, precise instructions, improvement of the quality of the patient's file, enhancement of multidisciplinary respect and collaboration. Although the recommendations show that a CP has a beneficial effect on patient management, its implementation in daily practice and its maintenance over time encounter certain difficulties due to the problems of effective coordination of the actors or the individualism of some. Procedures related to the organization of healthcare can cause significant resistance due to the impression that a margin of autonomy is being removed. The implementation of an IC also requires a change of mentality at the level of the patient, the medical and nursing staff, a modification of the habits rooted solidly in the practice of the various traditions, often based on nonupdated knowledge. Thus, although the protocol provides for the admission of patients on the day of the surgery if it is scheduled after 10:00 am, 68% of the patients operated on by laparotomy were admitted to the hospital the day before the surgical intervention even if it is scheduled after 10:00 am (**Table 4**). This additional time in the hospital before surgery could help to prepare him carefully to what awaits him, review with him the goal to achieve, avoid or

reduce anxiety and emotional stress. Some patients would also be admitted sooner if the bowel preparation is too long.

It should be noted that the CP is not against the therapeutic freedom: it is an ideal pathway, not an obligation and always adapted to the patient. In this regard, a low compliance with the protocol is noted for the time of removal of the bladder catheter. For fear of having to re-catheterize the patient, the removal of the catheter was delayed on day 2 (instead of day 1 planned by the CP protocol) for 57% of the patient operated by laparoscopic surgery and on day 4 (instead of day 2) for 25% of patients operated by laparotomy/conversion. Although the presence of the tubes hampers the mobilization and the autonomy of the patient, this conscious transgression of the CP protocol aims for the well-being of the patient. It is the same for analgesia. Based on a medical decision, a patient controlled analgesia (PCA) was put for 28% of the patients operated by laparoscopy (**Table 3**), whereas the protocol does not predict it, and on the contrary, a PCA was not used for 28% of the patients operated by laparotomy (**Table 4**), whereas PCA is provided by the CP protocol.

For the majority of the criteria analyzed, compliance is not always excellent, varies from one year to another, or gradually improves (**Table 3**). This is explained by the fact that the medical and nursing staff does not always have the reflex to document the care in the medical file or has simply given up the follow-up of the CP protocol. Compliance with the CP protocol is also based on the excellent collaboration that existed within the department of abdominal surgery between doctors and healthcare staff before the implementation of this one. Establishing a collaboration between teams is like putting oil in the wheels. To implement a CP is to improve the quality of the oil already present in the wheels. Finally, the compliance to the protocol the "left colectomy CP" is also explained by the fact that it enjoys support from the management of the hospital, with the benefits that this implies, as explained by a team from Milan [9]. At Liege Hospital Center, CP are part of the " AZIMUT " strategic plan, in the " patient orientation and clinical efficiency " axis, which aims to redefine the configuration of the network and the offer of care offered to patients. Although complex, the study of the compliance with the CP protocol is an important point for us, which gives us information on the level of agreement between the recommendations of the CP and the practice, on the effectiveness of the CP. It is rarely presented in studies assessing the impact of a CP implementation [10].

By rethinking the management of patients and introducing a CP specific to laparoscopic left colectomy, we have shown that the quality of care is increased, without affecting the rate of complications which remains low compared to those published in the literature [4, 8, 11–14], and the hospital stay is significantly reduced (**Tables 5** and **6**). A limitation of our study is that the comparison group is a historical group and not a synchronous group, which should encourage caution in the final conclusions. Nevertheless, similar results have been published regarding laparoscopic colorectal surgery [4]. Various studies of laparoscopic left colon resection for diverticular disease described a median hospital stay of 7 days, with 4% of redo surgery (8 patients/205) [11], or an average hospital stay of 9 days, with 3% of suture leak and 2% of redo surgery [12]. For the malignant pathology, a mean hospital stay of 8 days [13] or a median hospital stay of 5 days with 12% of readmission and less than 2% of redo surgery were described [14]. Finally, for both types of pathology after left colectomy by laparoscopic

surgery, we observe an average length of stay of 4 days, 7% of readmission and 2% of redo surgery, compared to 6 days, 6% of readmission and 6% of redo surgery in the literature [8]. Following a laparotomy or a laparoscopy converted in laparotomy, we observe an average length of stay of 7 days. This is comparable or even shorter than the results presented in the literature [7, 13]. Note that hospitalization is longer after laparotomy than laparoscopy (**Tables 5** and **6**). This may be related to ileus, possible postoperative pain and less significant overall morbidity for patients operated by laparoscopy [7, 15].

This new CP was developed and implemented by this multidisciplinary team and monitored by the CP coordinator. This would be the best "cocktail" to change perioperative habits [16]. The CP coordinator ensures that the program runs smoothly, with optimal patient supervision, especially during the preoperative period. The CP coordinator organizes a continuous evaluation of the CP and the results are systematically communicated to the different people involved. This regular and effective evaluation of care practices is essential because doctors and paramedics change, old habits identified as penalizing the CP come back easily, advances in medicine must be taken into account. If the value of the CP relies on the different actors and on the quality of the established protocol, it is clear that the expected success depends largely on the compliance of the patients to this kind of care. This involves focusing of the efforts of the healthcare team on the patient preparation and conditioning. He must sense that he is the main actor of the success of his therapy. In concrete terms, the patient receives a personalized message, a roadmap where the procedure is explained. He must be able to ensure his course. As soon as he gets back to his room after the surgery, he knows what to eat and how much to avoid nausea, if he wishes he can drink water, sit on the edge of the bed, on a chair or do few steps. In addition, we care in a continuous process of improvement based on patient feedback and assessments.

Our study shows that it is possible to implement a CP in a surgical department with convincing results as soon as it is put in place. This work was made possible only after a careful study of the different steps of the CP from the reception of the patient to the hospital, through the anesthesia and surgery department, the social worker, the general practitioner, the home care nurse and after having adapted all the logistic, psychological and economic factors to the reality of the field to finally obtain a process of original care, which meets the unanimity of the actors. Asking the purpose of the CP is frequent. One should not give the impression that it is imposed to the team. Moreover, the CP was set up overnight. This particularity was made possible thanks to the positive dynamics and devotion of the care providers and patients, thanks to a long, precise and complete preparation so that each actor knew precisely the role he had to assume and knowing his position in all steps listed in the CP. Previous studies have shown that the implementation time of such a program often takes much longer [16, 17].

5. Conclusion

Implemented in 2009, this CP brings coherence to all the management of left colon resection. The essential points of the CP are a good information to the patient who is the driving force of the

process, a CP protocol meticulously created by all the actors and validated in multidisciplinary way, a regular follow-up by the CP coordinator and … the abandonment of a series of dogmas that turns out useless. Compliance with the project was remarkably high as soon as it started and remained constant for the next 9 years. The data systematically recorded shows that CP improves quality of care, promotes patient involvement, coordination and multidisciplinary collaboration. In addition, without increasing the number of complications and taking into account the risks associated with this type of surgery, there is a significant reduction in the length of stay. This analysis is part of the quality control at the base of any improvement in the overall care of patients. Each actors, patient and caregiver, have the will to make quality and to keep improving it.

Abbreviations

PCA	patient controlled analgesia
CP	clinical pathway
BMI	body mass index

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