

An Internet-Based Collaborative Cancer Conference for Rectal Cancer Influenced Surgeon Treatment Recommendations

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ABSTRACT

Introduction. In many jurisdictions geographic and resource constraints are barriers to multidisciplinary cancer conference review of all patients undergoing cancer surgery. We piloted an internet-based collaborative cancer conference (I-CCC) for rectal cancer to overcome these barriers in the LHIN4 region of Ontario (population 1.4 million).

Methods. Surgeons practicing at one of 10 LHIN4 hospitals were invited to participate in I-CCC reviews. A secure internet audio and visual link facilitated review of cross-sectional images and case details. Before review, referring surgeons detailed initial treatment plans. Main treatment options included preoperative radiation, straight to surgery, and plan uncertain. Changes were noted following I-CCC review from initial to final treatment plan. Major changes included: redirect patient to preoperative radiation from straight to surgery or plan uncertain; and redirect patient to straight to surgery from preoperative radiation or plan uncertain. Minor changes included: change type of neoadjuvant therapy; request additional tests (e.g., pelvic MRI); or formal MCC review.

Results. From November 2010 to May 2012, 20 surgeons (7 academic and 13 community) submitted 57 rectal cancer cases for I-CCC review. After I-CCC review, 30 of 57 (53 %) cases had treatment plan changes: 17 major and 13 minor. No patient or tumour factors predicted for treatment plan change.

Conclusions. An I-CCC for rectal cancer in a large geographic region was feasible and influenced surgeon treatment recommendations in 53 % of cases. Because no factor predicted for treatment plan change, it is likely prudent that all rectal cancer patients undergo some form of collaborative review.

Multidisciplinary cancer conferences (MCCs) involve relevant specialists from a number of disciplines and are designed to produce an optimal treatment plan for a patient who will soon undergo some form of cancer treatment. MCCs have been shown to improve adherence to clinical practice guidelines and influence patient care decision-making.^{1–5} A systematic review of 37 studies indicated that MCC discussion changed pre-MCC patient treatment plans in 2–52 % of cases.⁶ Numerous agencies recommend MCCs for all patients with cancer, including the Commission on Cancer (CoC) and the National Comprehensive Cancer Network (NCCN).^{7–9}

Cancer Care Ontario (CCO) is the agency responsible for the quality of cancer care in the province of Ontario, Canada (population 14 million). In 2006, CCO produced a guideline after a systematic review, detailing the expected methods of MCCs in Ontario. For example, for a patient with rectal cancer, specialists expected to be present at a presurgery MCC include surgeons, radiologists, medical oncologists, radiation oncologists, and pathologists.¹⁰ Such expertise is valued, because current standards of care for many cancers require optimal cross-sectional imaging assessment (e.g., CT or MRI) and the potential use of preoperative radiation and chemotherapy. However, despite the guideline and changes, such as financial incentives for physicians participating in MCCs, a recent report indicated that a minority of Ontario cancer patients undergo MCC review—before after surgery.^{11,12}

In Ontario and other jurisdictions, geographic distance and the limited numbers of radiation and medical oncologists are likely key barriers precluding MCC review of all patients being planning for prevalent cancer surgeries (e.g., breast and colorectal). The majority of such surgeries are provided in nonacademic centers close to where patients reside, whereas nearly all radiation oncologists and most medical oncologists are sited in academic centers.¹³ As well, many such patients will not be candidates for neoadjuvant treatments due to their tumour stage, whereas patients who are candidates for neoadjuvant treatments, and the surgeons treating such patients, expect rapid preoperative oncologic assessment and treatment. Thus, in a given jurisdiction, preoperative MCCs for all patients as envisaged in most guidelines would likely place a burden on patients and their surgeons (patients and surgeons must wait for oncologic direction prior to providing treatment plans), and involved oncologists (greatly increases number of patients assessed).

We piloted an internet-based collaborative cancer conference (I-CCC) for patients with rectal cancer in the LHIN4 region of Ontario (population 1.4 million) that may address these barriers and concerns. Rectal cancer is a useful site to test new models of MCCs.¹⁴ Previously, rectal cancer outcomes have not consistently been shown to be improved after MCC discussion.^{15–19} In Ontario, following consultation and review of tests and imaging, surgeons are usually the ones individually recommending that a patient go straight to surgery versus visit a cancer centre for consideration of preoperative radiation. We tested the feasibility of an I-CCC applied at a population level (i.e., LHIN4) and measured rates of change in initial treatment recommendations following I-CCC review.

METHODS

Setting

In the LHIN4 region of Ontario during the period of this study, there were 47 surgeons who performed rectal cancer surgery, sited at 3 academic and 7 community hospitals. During the course of our study, all radiation therapy and most chemotherapy was provided at the regional Juravinski Cancer Center. This cancer center and hospitals are affiliated with McMaster University. Every year in LHIN4, approximately 400 patients are diagnosed with rectal cancer, and approximately 250 patients undergo rectal cancer surgery.

Development and Processes of the I-CCC

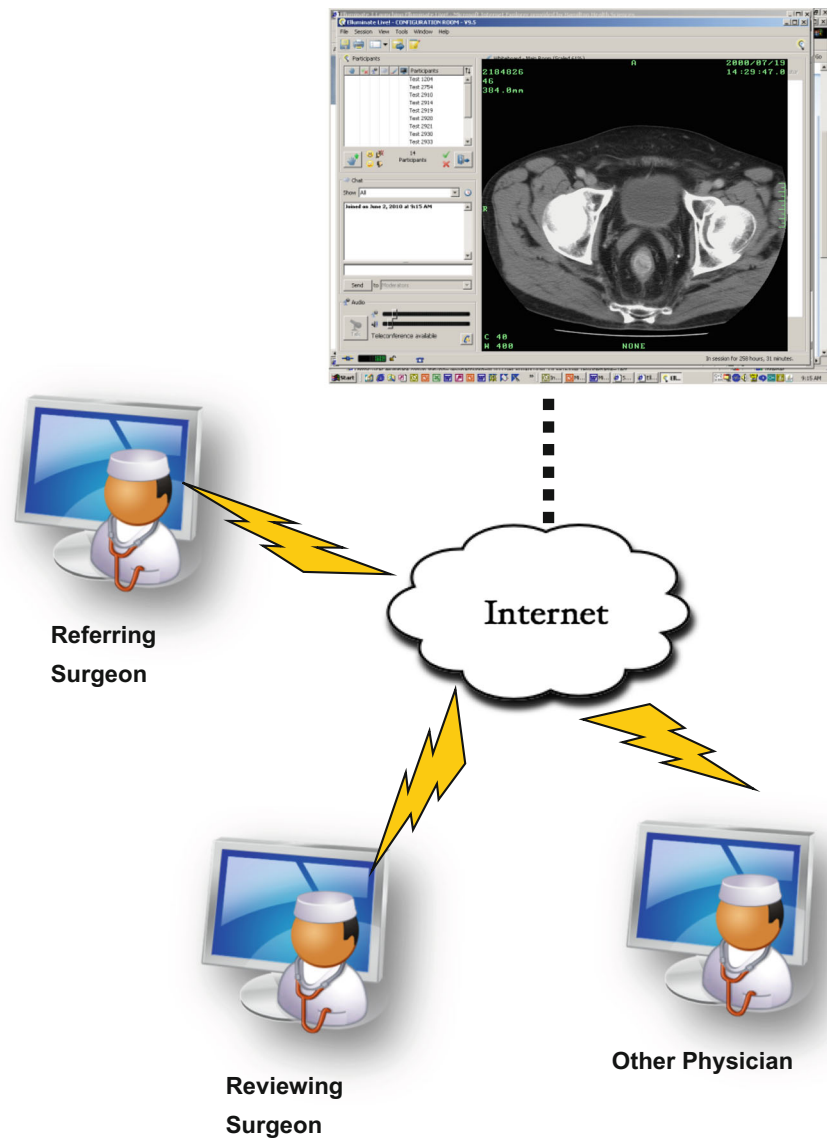
Four academic surgeons (3 colorectal and 1 surgical oncologist) and research staff initiated the I-CCC in July 2010. These surgeons were affiliated with the Juravinski

Cancer Center and acted as the expert reviewers for this I-CCC pilot. The pilot was nested in a wider LHIN4 quality improvement project, and participation by surgeons in the I-CCC was voluntary.²⁰ We used a Blackboard Collaborate Web Conferencing platform (version 12) to connect individuals for I-CCC sessions. The McMaster Institute for Innovation and Excellence in Teaching and Learning supports this platform ostensibly for learning activities. This is supported by Windows XP/Vista/7, Mac OS 10.6, 10.7, 10.8 operating systems, and requires JAVA on Mac/PC/Unix systems. Each participant's computer required internet access at 28.8 kbps speed or above and a sound card with microphone and headphones.

Participating surgeons would notify the research team of a patient case for I-CCC review. Research staff would be given access to the computer that would be used for the review to ensure appropriate software was installed. Once systems were operational and prior to I-CCC review, referring physicians completed a web-based patient information sheet. The information sheet recorded demographic and key physical examination findings, and initial treatment plans (Appendix 1). Data recorded for each patient included: age, sex, tumour size (cm), distance from anal verge (cm), location (anterior, posterior, lateral, circumferential), fixation (mobile, tethered, fixed), enlarged lymph nodes on imaging, status of the circumferential radial margin, and potential basis for suspicion of a positive radial margin (e.g., physical exam or cross-sectional imaging). Initial treatment plan options included straight to surgery, straight to radiation, or plan uncertain. Before I-CCC review support staff ensured availability of imaging studies (CT, MRI) through OneView (Centricity, GE Healthcare—a repository of diagnostic images for LHIN4 patients), or that images on CD were sent to the research office. I-CCC sessions were scheduled at the convenience of the referring surgeons. Audio discussion and visual assessment occurred over a password protected secure internet link (Fig. 1).

The I-CCC discussion occurred between the reviewing surgeon and referring surgeon. A radiologist participated as needed. The main focus of the reviews was on tumour stage: whether the patient has a stage II or III tumour, and the potential involvement by tumour of the circumferential radial margin, based on imaging and physical examination. These factors largely determine whether a patient should or should not receive some form of preoperative radiation therapy.⁹ After I-CCC review, a final treatment plan was agreed to by the referring and reviewing surgeon. Options included: straight to surgery; straight to radiation; change type of neoadjuvant therapy; further investigation (e.g., MRI, PET); or referral to Juravinski Cancer Center for formal MCC review by a surgeon, radiation oncologist, and medical oncologist.

FIG. 1 Example of online interactive patient case review with Elluminate Live!



Outcome Measures

There were two primary outcome measures. First, we tested feasibility of the I-CCC as demonstrated by participation rates of LHIN4 surgeons. Second, we measured rates of major and minor change in referring surgeon “initial” to “final” treatment plan. A priori we defined major and minor changes, with the former versus the latter more likely to have a clinically important impact on patient outcomes. Major changes included: redirect patient to “preoperative radiation” from “straight to surgery” or “uncertain plan”; and redirect patient to “straight to surgery” from “preoperative radiation” or “uncertain plan.” Minor changes included: request formal MCC review; change type of neoadjuvant therapy; request additional tests (e.g., pelvic MRI or PET

scan); or encourage change in surgery (e.g., abdominoperineal resection versus anterior resection).

Statistical Analysis and Ethics

Patient data were analyzed based on cases with versus without a major or minor treatment plan change. Categorical measures were reported as frequencies and continuous measures as medians with standard deviations. Comparisons between groups were completed using Wilcoxon rank-sum and Chi square or Fisher's exact tests where appropriate. We used SAS v9.3 (Cary, NC) and a significance level of $p < 0.05$. Comparison variables were obtained from the pre-I-CCC forms completed by referring surgeons. Patient factors included age and sex. Tumour factors included size (cm),

TABLE 1 Patient and tumour information by treatment change

Variable	Overall	No treatment change	Treatment change	<i>p</i> value
Age (years), median (range)	57	27 (47.4 %)	30 (52.6 %)	
Sex (male, %)	64 (31–85)	65 (31–85)	64 (36–85)	0.67
Stage	35 (66.0 %)	14 (58.3 %)	21 (72.4 %)	0.38
I	11 (21.6 %)	4 (17.4 %)	7 (25.0 %)	
II	14 (27.5 %)	6 (26.1 %)	8 (28.6 %)	0.78
III	16 (31.4 %)	9 (39.1 %)	7 (25.0 %)	
IV	10 (19.6 %)	4 (17.4 %)	6 (21.4 %)	
Distance from anal verge (cm)				
≤8	25 (51.0 %)	14 (58.3 %)	11 (44.0 %)	0.40
>8	24 (49.0 %)	10 (41.7 %)	14 (56.0 %)	
Tumour size				
≤5 cm	31 (67.4 %)	21 (87.5 %)	10 (45.5 %)	0.004
>5 cm	15 (32.6 %)	3 (12.5 %)	12 (54.5 %)	
Tumour fixation				
Mobile	15	7	8	0.98
Tethered or fixed	16	8	8	
Uncertain	26	12	14	
Enlarged lymph nodes				0.51
No	19	11	8	
Yes	15	7	8	
Uncertain	23	9	14	
Suspected + CRM				
No	21	10	11	1.00
Yes	21	10	11	
Uncertain	15	7	8	

Data presented for each patient was surgeon-reported. Tumour distance from anal verge and size were based on endoscopic measurements and are reported as less than or greater than the median. Tumour fixation was based on digital rectal examination. Enlarged lymph nodes and suspected positive circumferential radial margin (CRM) was based on cross-sectional imaging (CT or MRI)

TABLE 2 Final treatment plan following I-CCC review and by change or no change from initial treatment plan

	<i>n</i> = 57	Straight to surgery	Radiation therapy	Referral to JCC MCC	More investigations or change in surgery type
No change in treatment plan	27	12	15	0	0
Change in treatment plan	30	12 ^a	5 ^a	5 ^b	8 ^b

^a Major change from initial treatment plan

^b Minor change from initial treatment plan

distance from anal verge (cm), anterior position (yes or no), fixation (yes or no), positive circumferential radial margin (yes or no), and enlarged mesorectal lymph nodes (yes or no).

We used a logistic regression model to determine which patient or tumour factors were predictive of after I-CCC treatment change. We included factors that were relatively objective and thus less dependent on interpretation from the referring surgeon, including patient age and sex and tumour stage, location from anal verge (dichotomous, ≤8 cm or >8 cm because median distance was 8 cm), and

size (dichotomous, ≤5 cm or >5 cm because median size was 5 cm). Ethics approval was obtained through the Hamilton Health Sciences Research Ethics Board.

RESULTS

From July 2010 to May 2012, 20 surgeons (7 academic and 13 community) submitted 57 rectal cancer cases for prospective I-CCC review. Table 1 provides patient and tumour information differentiated by treatment change

versus no treatment change. The median age of patients was 64 ± 13 years, and 66 % were male. On univariable analysis, only a larger tumour size predicted for a treatment plan change ($p = 0.004$).

During the period of our study, 47 surgeons provided rectal cancer surgery in LHIN4. Twenty of the 47 surgeons (43 %) participated in the I-CCC. Whereas the 57 cases in our study represent approximately only 12 % of rectal cancer cases performed in the region during this study period, the 20 participating surgeons performed 63 % of all rectal cancer cases in the LHIN. The percentage of initial treatment plans for preoperative radiation, straight to surgery, or uncertain was 42, 35, and 23 %, respectively. After I-CCC review, 30 of 57 cases (53 %) had treatment plan changes: 17 major and 13 minor (Table 2). For 8 major changes, recommendations for 3 patients were redirect to radiation from surgery and for 5 patients redirect to surgery from radiation. Nine major changes from uncertain plan included 7 patients recommended to surgery and 2 patients recommended to radiation. For the 13 cases with minor changes, 5 cases were recommended to formal MCC review at the Juravinski Cancer Center; 7 cases were recommended to further investigation, and 1 case was recommended for change in surgery type. Using logistic regression and key chosen variables (age, tumour location from anal verge, stage, tumour size, and gender), no patient or tumour variable was predictive of major or minor treatment change (Table 3).

DISCUSSION

Multidisciplinary preoperative review for patients undergoing cancer surgery should result in optimal treatment planning. This may be especially important for disease sites, such as rectal cancer, where treatment modalities vary greatly depending on factors, such as tumour stage or mesorectal margin status. Unfortunately in

many jurisdictions, current geographic and resource constraints preclude timely reviews for all patients. We piloted at a population-level an I-CCC to address these barriers. The I-CCC differed in three key ways from traditional MCCs. First, the I-CCC used a web conferencing platform to leverage the ubiquity of the internet versus traditional MCC face-to-face or teleconference communication. Second, the I-CCC did not occur at a preset time but was at the convenience of the referring surgeon. Third, the number of specialists required was pared down to the referring surgeon and at least one surgeon with expertise in the treatment of patients with rectal cancer, including familiarity with the review of pelvic cross-sectional imaging. A radiologist was available as needed.

Thirteen community and seven academic surgeons from the LHIN4 region of Ontario (population 1.4 million) participated in at least one I-CCC. During the period of the study, these surgeons provided 63 % of rectal cancer surgery in LHIN4. A recent systematic review reported that MCC review changed treatment recommendations in 2–52 % of patient cases.⁶ Our current results are in the upper part of this range. Following I-CCC review, there were changes from initial to final treatment recommendation in 30 of 57 cases (53 %). Our multivariable analysis demonstrated that there was no particular patient or tumour factor that predicted a treatment change recommendation. Taken together, these results support two important concepts. First, an I-CCC at the population level, that leverages the ubiquity and capabilities of the internet, is feasible. Second, all patients planned for rectal cancer surgery should undergo prospective preoperative review in a formal or modified MCC setting.

The relationship of our I-CCC and the formal Juravinski Cancer Centre (JCC) MCC deserves further comment. During the time of this study, individual patients could be assessed at the JCC concurrently by a radiation oncologist, medical oncologist, and one of our four reviewing surgeons. We considered this a formal MCC. Only 5 of 57 patients (9 %) following I-CCC review were subsequently referred for formal MCC review. For these cases, the involved surgeons decided that a complete review would require combining the physical exam with direct input from medical and radiation oncology. Thus the I-CCC triaged a small minority of patients to a formal MCC. This finding, if replicated or supported by further research, suggests a modified MCC (i.e., an I-CCC) with formal MCC backup can be an effective arrangement that ensures the expert prospective preoperative review of concurrent cancer patients and the appropriate rationing of limited MCC resources.

There are limitations with this study. First, participants in the I-CCC were largely limited to surgeons: a referring and reviewing surgeon, respectively. But reviewing

TABLE 3 Odds of change in initial treatment plan by patient and tumour factors

Variable	OR (95 % CI)	<i>p</i> value
Age >65 (years)	1.15 (0.30–4.4)	0.85
Gender female	0.51 (0.11–2.32)	0.39
Tumour height >8 cm	1.28 (0.30–5.41)	0.74
Stage		
II	0.47 (0.06–4.00)	0.73
III	0.38 (0.06–2.49)	
IV	0.35 (0.04–3.07)	
Tumour size >5 cm	1.770 (0.499–6.284)	0.07

Comparator groups include age ≤ 65 , male gender, tumour height ≤ 8 cm, stage I tumour, tumour size ≤ 5 cm

surgeons had extensive experience in the treatment of rectal cancer and were comfortable reviewing pelvic cross-sectional imaging for local staging and surgical margin assessment. An expert radiologist was available as needed. It is unclear if a radiation or medical oncologist, or pathologist participating in the I-CCC reviews, would have resulted in different treatment recommendations. There is no empirical evidence informing the required constituent specialists for MCCs.²¹ Also, individual rectal cancer case peer-to-peer discussions (e.g., surgeon-to-surgeon or medical oncologist-to-medical oncologist) may result in different perspectives and comments versus one specialist (e.g., surgeon) in the presence of numerous contrasting specialists (e.g., nonsurgeons). The exact role of each member of the MCC team in rectal cancer and other cancers is unclear and deserves further research.

An additional limitation is our small sample size. The 57 I-CCC reviews represent only 12 % of all cases done in LHIN4 during the 22-month study period, but the 20 surgeons who participated in at least one I-CCC performed 63 % of all rectal surgery in LHIN4. Thus, I-CCC reviews may have provided confidence to surgeons to press forward with treatment recommendations without additional I-CCC reviews. Surgeons also may only have requested reviews for cases they considered more challenging. However, our inability to identify a patient or tumour factor that can predict a treatment change recommendation indicates that

I-CCC reviews should be provided for all patients. Our group is currently comparing cases in LHIN4 among I-CCC review participating and nonparticipating surgeons, and for participating surgeon cases, cases with and without I-CCC review.

A third weakness of our study is that patient and tumour factors were provided by the referring surgeons. However, although this may have influenced our analyses on factors predictive of treatment recommendation change, it would not influence our observation of high rates of treatment recommendation change following I-CCC review. Finally, we are uncertain whether final treatment recommendations were followed, similar to studies assessing the impact of MCCs.

CONCLUSIONS

An I-CCC for rectal cancer in a large geographic region was feasible and changed surgeon treatment recommendations in 53 % of cases. Because no factor predicted treatment plan change, it is likely prudent that all rectal cancer patients undergo some form of collaborative review.

APPENDIX 1

See Fig. 2.

FIG. 2 I-CCC patient case facilitator sheet

MacLive Multidisciplinary Web Conferencing Patient Case Study Form	
Please complete this brief on-line referral form prior to your upcoming MacLive conference with Dr. Simunovic.	
The information provided will be discussed along with your patient's CT scan.	
If you have any difficulties with this form, please contact Vanja Grubac, Research Assistant for Dr. Marko Simunovic, at (905) 527-4322 ext.	
0% <input type="text"/> 100%	
Administrative information	
1: * Name of referring surgeon:	
Dr. <input type="text"/>	
2: Patient's age: <input type="text"/>	
Only numbers may be entered in this field	
3: * Patient's sex:	
<input type="radio"/> Female	
<input type="radio"/> Male	
Summary of Physical Exam	
D1A: Approximate tumour size:	
<input type="text"/> cm	
Only numbers may be entered in this field	
? If size is unknown, please leave blank.	
1: Tumour height from anal verge by finger or rigid scope:	
<input type="text"/> cm	
Only numbers may be entered in this field	
? If this distance is unknown, please leave blank.	
2: Tumour location:	
Check any that apply	
<input type="checkbox"/> Anterior	
<input type="checkbox"/> Posterior	
<input type="checkbox"/> Right lateral	
<input type="checkbox"/> Left lateral	
3: Relative to the pubo rectalis sling:	
Choose one of the following answers	
<input type="radio"/> Tumour is at or below the top of the pubo rectalis sling	
<input type="radio"/> Distance exists between the tumour and top of the pubo rectalis sling	
<input checked="" type="radio"/> No answer	
3A: Relative to the prostate:	
Choose one of the following answers	
<input type="radio"/> Tumor is above the prostate	
<input type="radio"/> Distal tumor edge is at the level of some portion of the prostate	
<input checked="" type="radio"/> No answer	
4: Tumour fixation - any part of the tumour:	
Choose one of the following answers	
<input type="radio"/> Fixed	
<input type="radio"/> Tethered	
<input type="radio"/> Mobile	
<input checked="" type="radio"/> No answer	
5: * Regional lymph nodes likely positive for cancer?	
Choose one of the following answers	
<input type="radio"/> Yes	
<input type="radio"/> No	
<input type="radio"/> Uncertain	
6: * Do you suspect circumferential radial margin (CRM) involvement?	
Choose one of the following answers	
<input checked="" type="radio"/> Yes	
<input type="radio"/> No	
<input type="radio"/> Uncertain	
6-1: * If YES, you suspect CRM involvement based on:	
Check any that apply	
<input type="checkbox"/> Direct extension of tumour	
<input type="checkbox"/> Enlarged lymph node	
<input type="checkbox"/> Other: <input type="text"/>	
6-2: If YES, you suspect CRM involvement based on:	
Check any that apply	
<input type="checkbox"/> Physical exam	
<input type="checkbox"/> CT scan	
<input type="checkbox"/> MRI	
<input type="checkbox"/> Other: <input type="text"/>	
7: * Does your current treatment plan include pre-operative radiation?	
Choose one of the following answers	
<input checked="" type="radio"/> Yes	
<input type="radio"/> No	
<input type="radio"/> Uncertain	
7-1: * If yes, decision to radiate based on:	
Check any that apply	
<input type="checkbox"/> Compromised mesorectal margin	
<input type="checkbox"/> T3 or node positive category	
<input type="checkbox"/> Other: <input type="text"/>	
<< Previous Submit	
[Exit and clear survey]	

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