

# Identifying a region-level 'Knowledge Translation Signature' in rectal cancer surgery – an observational pilot study

Marko Simunovic (✉ [simunovi@hhsc.ca](mailto:simunovi@hhsc.ca))

McMaster University Faculty of Health Sciences <https://orcid.org/0000-0003-2245-3468>

Christine Fahim

St. Michael's Hospital Toronto

Angela Coates

McMaster University Faculty of Health Sciences

David Urbach

University of Toronto

Craig Earle

University of Toronto

Vanja Grubac

McMaster University Faculty of Health Sciences

Melissa Brouwers

University of Ottawa

Mary Ann O'Brien

University of Toronto

Nancy Baxter

University of Toronto

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## Research article

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# Abstract

Background Knowledge translation (KT) interventions can facilitate the implementation of evidence-based practice and help close quality gaps. Across Ontario, since approximately the year 2006, numerous KT interventions have been implemented by the provincial cancer agency or by individual researchers. Ontario is divided administratively into 14 Local Health Integrated Networks (LHINs). We piloted a methodology to summarize and score at the LHIN level all KT activities implemented to improve the quality of rectal surgery (i.e., a KT Signature score).

Methods We interviewed stakeholders to identify KT interventions used in respective LHINs over years 2006 to 2014. Results were summarized into narrative and visual forms. KT experts reviewed and scored final summaries using a 20-item KT Signature Assessment Tool. Scores for each item ranged from 1 – 5. Thus scores could range from 20-100 for each LHIN.

Results There were thirty interviews. KT experts produced KT Signature scores for each LHIN that were bimodally distributed with an average score for 2 LHINs of 78 (range 73-83) and for 12 LHINs of 30.5 (range 22-38).

Conclusion Related to region level KT interventions to improve rectal cancer surgery quality, we identified two KT Signature types. Scores in 12 Ontario LHINs were low reflecting minimal efforts. Two LHINs had high scores reflecting implementation of numerous KT interventions in addition to those encouraged by the provincial cancer agency. Our methods and results require further validation. But they should be of interest to stakeholders implementing interventions designed to improve medical care at a population level.

## Background

Knowledge translation (KT) interventions in health care are meant to facilitate the implementation of evidence-based practice and help close quality gaps.<sup>1</sup> Examples of KT interventions include guidelines, audit and feedback, and use of opinion leaders. Stakeholders have suggested that KT intervention effectiveness may be enhanced through the use of 'integrated knowledge translation' (iKT); the use of theory to plan, implement and evaluate any KT strategy; and, sustained iterative approaches that allow KT efforts to be modified as barriers to practice change are recognized.<sup>2-5</sup> With iKT, the target subjects of an evidence-based intervention (e.g., front-line surgeons) are involved in all aspects of the research initiative including design, implementation and evaluation.<sup>2,3</sup> The Knowledge-to-Action (KTA) Cycle is informed by key behavioural theories (e.g., social theory) that may drive health care worker behaviour and reinforces the importance of an iterative sustained effort to close quality gaps.<sup>4,5</sup>

The province of Ontario, Canada (population 14 million) is divided into 14 Local Health Integrated Networks (LHINs).<sup>6</sup> Clinical care for patients diagnosed with rectal cancer can be challenging. Cancer Care Ontario, the governing body responsible for cancer care across the province, has used various KT

interventions to improve the quality of care received by patients diagnosed with cancer. These include use of guidelines, communities of practice, diagnostic assessment programs, and multidisciplinary cancer conferences.<sup>7-12</sup> There are reports of KT interventions used in other LHINs to improve rectal cancer surgery care in addition to those encouraged by Cancer Care Ontario.<sup>13,14</sup>

We piloted a methodology to summarize and score at the LHIN level all KT activities implemented to improve the quality of rectal surgery. This included identifying KT interventions implemented using progressive KT approaches such as integrated KT and use of theory. Our study should allow us to ascribe a 'KT signature' score for rectal cancer surgery to each of the 14 Ontario LHINs. We define 'KT signature' score as a qualitative summary and quantitative scoring of KT activities directed at a specific clinical area in a given geographic region over a specific period of time. We are unaware of previous efforts to summarize and qualify (i.e., score) KT interventions delivered in a specific geographic region.

## Methods

We used semi-structured interviews, and, the subsequent evaluation and scoring of interview results using a KT Signature tool to identify a KT Signature score for each of the 14 Ontario LHINs.

## Study Setting-Cancer Care Ontario and KT activities in Ontario

Cancer Care Ontario has over the years implemented numerous KT interventions in an effort to improve the surgical care received by patients with rectal cancer. These include use of guidelines, communities of practice, diagnostic assessment programs, and multidisciplinary cancer conferences.<sup>7-12</sup> The intention of these latter three interventions, respectively, is to have surgeons work together in a region to develop methods of optimizing care; to facilitate the timely and appropriate testing and treatment of people with cancer; and, to ensure that patients receive coordinated treatment recommendations from a range of specialists. As well, Cancer Care Ontario routinely reports on wait times for cancer surgery and occasionally executes limited audit and feedback to LHIN administrators (e.g., number of lymph nodes counted in pathology specimens). Of note, these interventions are delivered or encouraged in a top down manner; Cancer Care Ontario administrators have no mechanism to force surgeon engagement or response with any intervention, nor has there been an effort to evaluate the impact on patient care of these interventions. This is somewhat understandable since such an evaluation would be influenced by numerous confounding factors.

There are reports of stakeholders in some Ontario LHINs engaging in KT activities in addition to those encouraged by Cancer Care Ontario. For example, in year 2006, the sustained iterative Quality Improvement in Colorectal Cancer in LHIN 4 strategy(QICC-L4) was initiated in the LHIN4 region of Ontario (population 1.4 million).<sup>13</sup> The QICC-L4 incorporated iKT principles and was informed by the KTA Cycle. Briefly, front-line LHIN4 surgeons co-designed all aspects of the strategy, including the selection of

quality markers for assessment and KT interventions to optimize marker scores. There are published reports of related efforts in at least one other LHIN.<sup>14</sup>

## Study Design

Semi-structured interviews with relevant stakeholders from each of Ontario's 14 LHINs provided descriptive data on KT interventions related to improving the quality of rectal cancer surgery that had occurred from year 2006 to 2014. We used year 2006 since we were aware this was the initiation year for the QICC-L4 KT strategy described above, and that this was also the year when Cancer Care Ontario became more active in attempting to influence the quality of rectal cancer surgery through KT interventions. Interviews were not open-ended qualitative interviews; but rather followed a guide informed by the Cochrane Effective Practice and Organization of Care taxonomy and the theory-based KTA cycle. A modified Delphi process with KT experts was then used to evaluate and score KT interventions which occurred in each LHIN. For final scores experts used a 'KT Signature Assessment Tool' designed specifically for this project.

## Design of Interview Guide

A 25-page interview guide helped identify if an intervention or activity did or did not occur. (Supplemental Index I) The Cochrane Effective Practice and Organization of Care taxonomy outlined an exhaustive list of KT interventions that may have been used including: education materials (e.g., guidelines), education meetings, audit and feedback, practice demonstrations, education outreach or detailing, reminders, and, tailoring interventions.<sup>15</sup> Activities potentially provided through Cancer Care Ontario but not specifically listed in the taxonomy such as communities of practice, diagnostic assessment programs, and multidisciplinary cancer conferences were also included. Positive responses were probed further to understand the processes of intervention implementation. Probes considered the following: was the activity selected by an individual or group; what body did such individuals or groups represent; were interventions selected to address specific quality gaps; were interventions delivered at the individual surgeon, hospital or LHIN level; and, how was intervention success evaluated? There was special interest in identifying surgeon-led iKT targeting regional (e.g., LHIN-level) performance, evidence of sustained iterative approaches (e.g., data exercises that were repeated through time and not simply one-off evaluations), and, any intervention not in the a priori list.

## Participants

The Surgical Oncology Program at Cancer Care Ontario assigns a surgical oncology lead and a colorectal cancer surgery lead for each of the 14 Ontario LHINs. These leads were invited to participate under the premise that they were the most likely surgeons to be familiar with rectal cancer surgery KT initiatives in their respective LHINs. In addition, heads of general surgery at high volume hospitals (i.e., performed >10

rectal or rectosigmoid cancer procedures per year) were approached for interviews. Snowball sampling was used to identify other key informants well positioned to provide relevant information.<sup>16</sup>

## Data Collection and Organisation

In advance of interviews, participants received an introductory package that included the purpose of the study and a summary of the interview guide. The summary listed pre-identified KT interventions and relevant processes of intervention selection. A single research coordinator conducted telephone interviews. Following participant consent, the interviews were recorded and transcribed verbatim.

For each LHIN the research team summarized data on implemented KT interventions and processes of implementation into two forms. First, a narrative form summarized the following: 1) quality improvement activities at the provincial, LHIN and individual hospital level, with provincial efforts being common to all LHINs; 2) how quality gaps were identified and how interventions were selected; and, 3) the KT interventions implemented over the years in the LHIN, with further detail on processes of implementation for each intervention. Second, a KTA cycle was populated where appropriate with specific interventions and processes. For member-checking, narrative summaries and KTA Cycles for individual LHINs were mailed to the respective interview participants for review and feedback. To further establish comprehensive data gathering, respective LHIN narrative summaries and KTA Cycles were sent to other LHIN stakeholders including Cancer Care Ontario Regional Vice Presidents, Cancer Care Ontario Surgical Oncology and Colorectal Surgery leads (to the small number of such individuals who did not participate in interviews), and Chiefs of Surgery at all hospitals in each LHIN. Covering letters emphasized the importance of stakeholders reviewing summarized LHIN processes and KT activities, since these would be used to assign a KT signature to each LHIN for future quantitative analyses. Feedback and corrections were encouraged. Small clarifications were received from two LHINs and incorporated into final narrative summaries and KTA cycles.

## Outcomes and Analysis

The primary outcome for this study was to assign to each of the 14 Ontario LHINs a KT signature score that would reflect KT efforts designed to improve the quality of rectal cancer surgery at the population or region level. The study team could find no validated instruments that would allow summarizing and scoring of KT activities delivered across a large region and over an extended period of time in any clinical area. As well, there was no evidence of related previous qualitative efforts in any geographic region or in any clinical context. Therefore, a KT Signature Assessment Tool was devised. (See Additional File 1) This tool listed 20 items corresponding to processes of implementation (e.g., the use of LHIN-level data to identify quality gaps) and specific KT interventions (e.g., guidelines). For this initial attempt at assigning KT signatures, a priori it was decided that each of the resulting 20 items would be scored on a Likert scale from 1–5, where 1 and 5 represented the item or process used ‘not at all’ or ‘to a great extent’, respectively. The maximum and minimum score for each LHIN was therefore 100 (20 items x 5 = 100) and 20,

respectively. As well, it was decided a priori that individual item scores would be added for an overall LHIN score; and, scores from raters would be averaged. Experts in KT reviewed the tool and provided feedback on its design prior to use. A priori it was also decided there would be consideration of grouping LHINs with similar activity patterns and scores.

#### Assigning a KT Signature to Ontario LHINs

Four experts in knowledge translation agreed to participate in a modified Delphi process to assign KT signatures to individual LHINs using our collected data.<sup>17,18</sup> Experts were first provided with the study objectives and methods, a copy of the KT Signature Assessment Tool, and, the LHIN summaries (narrative and KTA Cycle). Face-to-face meetings were then arranged. Meetings began with a study overview, and then presentation of each LHIN summary. Primary data were also available for direct review. Following each LHIN presentation, raters independently scored activities using the KT Signature Assessment Tool. Scores were entered into a summary table and LHINs were rank-ordered according to mean overall score. Experts discussed average scores and the LHIN summaries to formulate LHIN groupings. Consensus was reached following face-to-face discussion and re-confirmed through post-meeting email.

## Results

Interviews were held between January 2014- March 2015. Two to four interviews were completed per LHIN, for a total of 30 interviews. For illustrative purposes, Figure I presents KTA cycle summaries for LHIN-A and LHIN-H, respectively.

## Ascribing LHIN-level KT Signature Scores

The KT Signature scores from our four raters for each LHIN are presented in Table I. Individual rater scores ranged from 22–91, with an overall mean quality signature score of 37 for the 14 LHINs. LHINs were rank-ordered by quality signature. There was a bimodal distribution of scores. In follow-up email communication, experts achieved consensus on two KT Signature types—'KT Signature I' consisting of LHINs A and B, and 'KT Signature II' consisting of the remaining 12 LHINs. A mean score of 78 for LHIN-A (83, rank order 1) and LHIN-B (73, rank order 2) was higher than the mean score of the remaining LHINs (mean score 30.5, range 22–38).

Related to rectal cancer surgery, LHINs A and B were the only LHINs which utilized formal processes at the LHIN level to identify quality gaps, select KT interventions, monitor knowledge use, evaluate outcomes, and, repeat such activities in an iterative fashion. These LHINs both executed interventions such as iterative audit and feedback that were in addition to those encouraged by Cancer Care Ontario. As well, 'KT Signature I' LHINs were the only LHINs that had regional surgeon champions initiating KT efforts to engage all surgeons across the LHIN in colorectal cancer improvement efforts.

Most 'KT Signature II' LHINs had some form of surgical 'communities of practice', though this ostensibly involved occasional annual educational meetings to discuss topics of interest. In one 'KT Signature II' LHIN during the nine years under review there was a single episode of audit and feedback initiated by regional surgeon champions relevant to colorectal cancer surgery. This involved the collection and reporting of data from some but not all region hospitals. Most LHINs had Multidisciplinary Cancer Conferences occurring at some of their hospital sites, and a number were implemented at the LHIN-level.

## Discussion

Interviews with key stakeholders across the province of Ontario provided information on KT interventions implemented in each of the 14 Ontario LHINs from 2006 to 2014 and designed to improve the quality of rectal cancer surgery. Using a Delphi process, KT experts reviewed the collected data and scored each of Ontario's LHINs using a KT Signature Assessment Tool. Scores resulted in the LHINs being divided into two groups. The two LHINs in 'KT Signature I' used numerous interventions in an iterative fashion and with active leadership and engagement of front-line surgeons. The remaining twelve LHINs in 'KT Signature II' showed minimal evidence of initiating LHIN-level interventions outside of limited interventions encouraged by Cancer Care Ontario. Of note, these latter interventions (e.g., multidisciplinary cancer conferences) were not initiated by front-line surgeons (i.e., iKT was not used) and did not use data in an iterative sustained fashion to evaluate progress (i.e., did not use some form of the KTA cycle). Community of practice events were limited to continuing education meetings, which may or may not have had a component focusing on colorectal cancer surgery, and may or may not have occurred annually.

We could find no publications outlining methods to ascribe a KT signature in a specific geographic region and for a specific aspect of clinical care. This is surprising. Health care costs account for a major portion of government budgets and occupy a great deal of policy attention, including in Ontario. Understanding improvement efforts occurring—or not occurring - among front-line clinicians in a given region should be of interest to stakeholders, and could even inform subsequent government policy. Cancer Care Ontario is charged with improving the quality of cancer care in Ontario and is recognized as an international leader in this area. The agency has an active agenda of KT-like interventions and policy initiatives designed to improve cancer services, including for patients with colorectal cancer. Yet engagement with interventions by front-line clinicians is not mandatory; nor are there ongoing evaluations of the impact of implemented interventions or strategies, or evaluations of clinician engagement with such interventions.

Ideally, individual surgeons or groups of surgeons in a hospital would pro-actively pursue KT improvement projects. But individual surgeons have limited time and expertise to pursue KT projects. It is also likely most surgeons are confident their quality of provided care is optimal; and any improvements in care will occur incrementally through new treatments introduced via journal articles or continuing education meetings. But gaps in care may be difficult to discern in a busy surgical practice, especially when rates of catastrophic complications are low and can be - correctly or incorrectly - attributed to patient factors or chance. We suggest that deliberate and effective methods are needed to ensure ongoing improvement at the population level in all fields of health care. What those methods should be

has not been clearly established. Validation of our methods and results, and the ability to ascribe a KT signature to regions in specific areas of clinical care, would be an important contribution to efforts evaluating the impact of KT strategies at a population level.

The two LHINs that scored highest on the KT Signature Tool had numerous common features. Quality improvement activities were initiated from academic hospitals by clinician-researchers with expertise in KT and quality improvement. From the beginning efforts explicitly attempted to engage all surgeons providing rectal cancer care in the respective region, and both used LHIN-level data in an iterative fashion to pursue improvement. Of interest, one region encouraged the centralization of rectal cancer surgery to academic sites, while this was not a priority of the second region. It is not guaranteed that the KT efforts in the two 'KT Signature I' LHINs have led to markedly improved outcomes versus results in the remaining 12 'KT Signature II' LHINs. It may be that Cancer Care Ontario efforts improved patient measures across the province, rendering redundant the additional KT activities implemented in the two 'KT Signature I' LHINs. Our group plans to compare key process and outcome measures for rectal cancer surgery in 'KT Signature I' versus 'KT Signature II' LHINs. These planned quantitative analyses may provide further validation for our method of ascribing a KT signature to large regions. These analyses should also provide insights on the role of iKT and KT theory on region-level quality of rectal cancer surgery, since these progressive methods appeared to have been used only in two of the 14 Ontario LHINs.

There are potential weaknesses with this study. First, the method of ascribing a KT signature score to a region has not been properly validated, including the use of focused interviews and scoring without the KT Signature Assessment Tool. However, the KT Signature Assessment Tool did have face validity since it was put together with the input of KT experts, and, was based on the Cochrane Effective Practice and Organization of Care taxonomy of interventions and the KTA cycle. As well, through a Delphi process, four KT experts consistently produced a bimodal distribution of KT Signature Scores - higher scores for 'KT Signature I' versus 'KT Signature II' LHINs, further providing some face validity for our approach. Regardless, this method of summarizing and scoring KT interventions implemented at a region level should be considered a pilot. Stakeholders from other regions are encouraged to replicate, evaluate, and refine our methods. We also plan to use the identified KT signature groupings for future quantitative analyses—this may provide construct validity for our methods. Second, we scored numerous KT interventions and processes delivered over a number of years. This precluded the use of a checklist approach to describe content for each and every intervention.<sup>19</sup> But our KT experts were aware of concepts such as the presumed superiority of iKT and iterative, sustained efforts. We are confident such relevant factors were integrated into KT Signature Tool scores. Regardless, we emphasize the need to further validate our methods and results. Finally, it is possible that in a given LHIN, interviews did not identify all relevant KT interventions. This is unlikely. Following interviews, in an effort to ensure data accuracy and to seek additional information, LHIN results were mailed to respective Chiefs of Surgery at all hospitals in the LHIN, and to other stakeholders such as Cancer Care Ontario Regional Vice Presidents. Very little additional data were forthcoming, and no additional LHIN-level interventions or relevant implementation processes were identified.

## Conclusions

Related to improving the quality of rectal cancer surgery, interviews with stakeholders across Ontario, a Delphi process with KT experts, and a novel KT Signature Assessment Tool, were used to ascribe a KT Signature score to each of the 14 Ontario LHINs. The distribution of scores was bi-modal. Two LHINs had interventions that were iterative, informed by data, and initiated by front-line surgeons while the other 12 LHINs ostensibly executed interventions that originated from Cancer Care Ontario in a top-down fashion. These two groupings will be used for future quantitative analyses. These methods and findings require validation, though they should be of interest to researchers and stakeholders attempting to summarize and score KT interventions implemented at a region level for other aspects of clinical care.

## Abbreviations

KT—knowledge translation

iKT—integrated knowledge translation

KTA cycle—knowledge to action cycle

LHIN—Local Health Integration Network

QICC-L4—Quality Improvement in Colorectal Cancer in Local Health Integration Network 4

## Declarations

### Ethics approval and consent to participate

This study was approved by the Hamilton Integrated Research Ethics Board (HIREB# 12–285).

### Consent for publication

Not applicable

### Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

### Competing interests

The authors declare that they have no competing interests

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## Authors' contributions

MS contributed to the conception and design, analysis/interpretation as well as the writing of article. CF was involved in the conception and design. AC and VG contributed to the acquisition of data. DU, MAO and CE were involved in the critical review of article as well as the writing of article. MB contributed to the conception and design. NB design, analysis/interpretation as well as the writing of article. All authors contributed to manuscript drafts and reviewed the final manuscript.

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Not applicable

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## Tables

Table 1

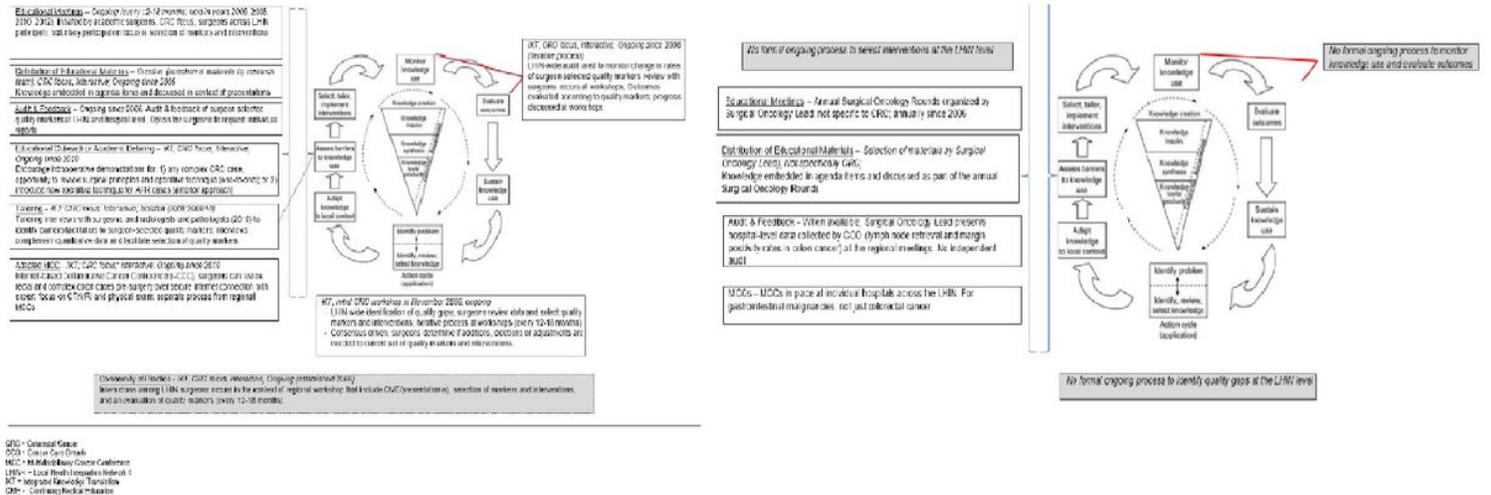
KT Signature Assessment Tool Scores among 14 Ontario LHINs in years 2006-2014

LHIN	Raters				Points range	Mean score	Rank*
	A	B	C	D			
LHIN-A	91	69	79	91	22	83	1
LHIN-B	74	76	82	60	22	73	2
LHIN-C	36	38	38	38	2	38	3
LHIN-D	35	39	34	44	10	38	3
LHIN-E	32	37	45	35	13	37	5
LHIN-F	34	34	30	41	11	35	6
LHIN-G	35	32	34	36	4	34	7
LHIN-H	31	30	30	28	3	30	8
LHIN-I	30	28	32	31	4	30	8
LHIN-J	29	28	27	27	2	28	10
LHIN-K	25	25	25	23	2	25	11
LHIN-L	25	22	25	23	3	24	13
LHIN-M	23	22	22	22	1	22	14
LHIN-N	27	25	24	25	3	25	11

\*LHIN = Local Health Integration Network

\*\*Letters are anonymized

Figures



A

B

Figure 1

Narrative summaries and KTA cycles for LHINs A and H - KT activities related to rectal cancer surgery in years 2006-2014