

Development and Implementation of a Continuing Medical Education Program in Canada: Knowledge Translation for Renal Cell Carcinoma (KT4RCC)

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Abstract An in-person multidisciplinary continuing medical education (CME) program was designed to address previously identified knowledge gaps regarding quality indicators of care in kidney cancer. The objective of this study was to develop a CME program and determine if the program was effective for improving participant knowledge. CME programs for clinicians were delivered by local experts (uro-oncologist and medical oncologist) in four Canadian cities. Participants completed knowledge assessment tests pre-CME, immediately post-CME, and 3-month post-CME. Test questions were related to topics covered in the CME program including prognostic factors for advanced disease, surgery for advanced disease, indications for hereditary screening, systemic therapy,

and management of small renal masses. Fifty-two participants attended the CME program and completed the pre- and immediate post-CME tests. Participants attended in Ottawa (14; 27%), Toronto (13; 25%), Québec City (18; 35%), and Montréal (7; 13%) and were staff urologists (21; 40%), staff medical oncologists (9; 17%), fellows (5; 10%), residents (16; 31%), and oncology nurses (1; 2%). The mean pre-CME test score was 61% and the mean post-CME test score was 70% ($p = 0.003$). Twenty-one participants (40%) completed the 3-month post-CME test. Of those that completed the post-test, scores remained 10% higher than the pre-test (p value 0.01). Variability in test scores was observed across sites and between French and English test versions. Urologists had the largest

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specialty-specific increase in knowledge at 13.8% (SD 24.2, *p* value 0.02). The kidney cancer CME program was moderately effective in improving provider knowledge regarding quality indicators of kidney cancer care. These findings support continued use of this CME program at other sites.

Keywords Kidney cancer · Knowledge translation · Continuing medical education

Introduction

There were 6400 new diagnoses and 1850 deaths from renal cell carcinoma (RCC) in Canada in 2016, making it the sixth most common cancer in men and 11th most common in women [1]. The Kidney Cancer Research Network of Canada (KCRNC) connects researchers, practitioners, and patients/caregivers affected by kidney cancer [2]. The quality initiatives group of the KCRNC is focused on defining, evaluating, and improving quality of care for patients.

In 2013, the quality initiatives group of the KCRNC identified 23 quality-of-care indicators in kidney cancer through a process of literature review and expert consensus using a modified Delphi technique [3]. Quality indicators spanned the spectrum of kidney cancer care and included screening, diagnosis, prognosis, surgical management, metastatic disease management, and end of life care.

In 2015, a needs assessment survey was distributed to Canadian urologists and medical oncologists who provide care to patients with RCC [4]. The purpose of the survey was to identify practitioners' self-perceived knowledge gaps and learning preferences to guide continuing medical education (CME) program development [5]. Topics with high self-perceived knowledge gaps and high CME interest included prognostic factors for advanced disease, surgery for advanced disease, indications for hereditary screening, management of systemic therapy side effects, and management of small renal masses. Clinicians also reported that their preferred CME learning method was case-based, multidisciplinary, in-person group discussions led by local clinical experts [4].

The goals of CME are to improve clinician knowledge and patient care [5]. Information gained from the needs assessment survey was used to develop the kidney cancer CME program. The objective of this study was to evaluate the effectiveness of the CME program for improving clinician knowledge.

Methods

A CME program entitled “Knowledge Translation for Renal Cell Carcinoma” (KT4RCC) was developed by a multidisciplinary group of urologists, medical oncologists, nurses, and research assistants from across Canada. The program was

developed to address several self-reported clinical knowledge gaps [4]. Topics included patient prognostication, indications for surgery in patients with advanced disease, indications for hereditary screening, management of systemic therapy side effects, and management of patients with small renal masses [4].

To ensure each topic was addressed, four case-based scenarios were created that would generate discussion about the quality indicators. KT4RCC program developers were assigned to one of four cases. The CME was structured using the learning preferences that clinicians had reported in the needs assessment survey and other validated methods from the literature [6]. Between May and August 2014, groups corresponded through email and teleconference to complete a literature search in each topic area and develop a cohesive case that addressed their assigned topics. In August 2014, the four cases were collated and edited to improve consistency across cases and reduce redundancy. The KT4RCC development group met in Ottawa in September 2014 for a full-day meeting. The four cases were presented to the entire group, and detailed peer-review was performed. This feedback was used to further modify the cases. Audience response questions were embedded within the program to foster participant engagement. The finalized KT4RCC slide set was then sent for additional peer-review in September 2014. The KT4RCC program was designed in English and translated into French language, and content accuracy was assessed by bilingual urologists and medical oncologists. The program received CME accreditation by the Royal College of Physicians and Surgeons of Canada in December 2014.

Knowledge of CME participants was assessed using 10-question multiple-choice tests. Two versions of the test (test version A and B) were created (Appendix A). Each test addressed similar topic areas, but was modified to reduce the risk of sharing between participants and participant recall during the post-test. Both versions of the test were pilot-tested for consistency of content and ease of use in English and French.

Consistent with the preferences indicated in the needs assessment survey, the KT4RCC program used a multidisciplinary, interactive, case-based format led by local clinical experts (one uro-oncologist and one medical oncologist) [4]. The material was presented in either French or English based on the audience preference.

The program was pilot-tested in four Canadian cities (Toronto, Ottawa, Montréal, and Québec City). Session leaders from each city were trained via teleconference. On the evening of each KT4RCC event, participant characteristics were obtained and participants were randomized to test version A or B. The pre-test was completed by all participants and collected by study personnel prior to the start of the CME program. After the CME program, participants completed the post-test prior to leaving the venue. The post-test was the opposite version to each participant's pre-test. For example, if a participant was randomized to test “A” prior to the session,

they completed test “B” following the session. Participants were also asked to complete a knowledge retention test 3 months following the KT4RCC event via email. The 3-month test was the same version participants completed as pre-CME.

The primary outcome of this study was change in participant knowledge, assessed using test scores, from pre-test to the immediate post-test following the CME program. Secondary outcomes were knowledge retention at 3 months post-CME, and change in knowledge stratified by medical specialty (urology vs. medical oncology), level of training (attending physician vs. trainee), language (English vs. French), and location of CME delivery.

Total test score and change in test score were calculated for each participant for the pre-, post-, and 3-month post-CME tests. Overall change in test scores for pre-test vs. post-test and 3-month post-test was compared using a paired *t* test. The magnitude of changes in knowledge was determined by calculating a standardized mean difference (Cohen’s *d*) effect size [7]. To account for small sample sizes in subgroup analyses for site, specialty, and language, we used non-parametric univariate analyses (Wilcoxon signed rank test). A *p* value < 0.05 was considered statistically significant, and no adjustment was made for multiple testing. All analyses were performed using SAS 9.3.

Results

Fifty-two practitioners in four cities participated in the KT4RCC program (Ottawa (14; 27%), Toronto (13; 25%),

Québec City (18; 35%), and Montréal (7; 13%). Attendees included urologists (21; 40%), staff medical oncologists (9; 17%), fellows (5; 10%), residents (16; 31%), and oncology nurses (1; 2%). Participants completed the program in both English (24; 46%) and French (28; 54%).

All participants completed the pre- and immediate post-CME test (Table 1). Differences from the pre-test to post-test for each participant were analyzed and grouped to provide mean changes (Table 1 and Fig. 1). The mean pre-test score was 61%, and the mean post-test score was 70%. The overall mean improvement from pre-test to post-test was 9.6% (SD 22.6, *p* value 0.003). When stratified by site, Ottawa had the largest overall score increase at 20% (SD 20.0, *p* value 0.001), while Montréal scores decreased on the post-test by 10% (SD 25.8, *p* value 0.4). Urologists had the largest specialty-specific increase at 13.8% (SD 24.2, *p* value 0.02). The standardized mean difference effect size for pre-test vs. post-test scores was 0.51, which is consistent with a medium effect size for a CME intervention [6, 7].

Twenty-one participants (40%) completed the 3-month post-test (Table 2). No participants from the Montréal site completed the 3-month post-test, while the Ottawa participants had a 79% response rate. Overall, there was a 10% increase in the 3-month post-test scores compared to the pre-test score (*p* value 0.01).

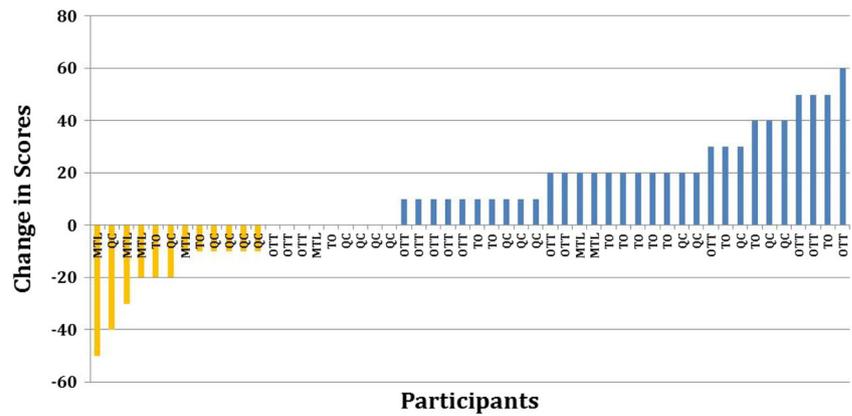
Discussion

The quality initiatives group of the Kidney Cancer Research Network of Canada aims to improve quality of care for

Table 1 Knowledge acquisition: change in scores from pre-test to immediate post-test

	Participants (<i>n</i>)	Pre-test mean (%)	Post-test mean (%)	% change (SD) pre- vs. post	<i>p</i> value
Overall	52	60.6	70.2	9.6 (22.6)	< 0.01
Overall (excluding Montreal)	45	60.4	73.1	12.7 (20.7)	< 0.01
Site					
Ottawa	14	61.4	81.4	20.0 (20.0)	< 0.01
Montréal	7	61.4	51.4	− 10.0 (25.8)	0.4
Toronto	13	55.4	71.5	16.2 (18.9)	0.02
Québec city	18	63.3	67.8	4.4 (20.6)	0.4
Specialty					
Urologist	21	60.5	74.3	13.8 (24.2)	0.02
Medical oncologist	9	70	72.2	2.2 (22.2)	0.5
Fellow	5	62	70	8.0 (19.2)	0.5
Resident	16	55	63.75	8.75 (23.1)	0.2
Oncology nurse	1	60	70	10.0	1.0
Language					
English	28	58.2	76.1	17.9 (18.9)	< 0.0001
French	24	63.3	63.3	0.0 (23.0)	0.9

Fig. 1 Improvement in individual test scores from pre-test to immediate post-test (MTL: Montréal; QC: Québec City; OTT: Ottawa; TO: Toronto)



patients with kidney cancer. In 2012, we identified quality indicators of care for kidney cancer [3]. We subsequently identified practitioner’s self-perceived knowledge gaps and interest in continuing medical education using a needs assessment survey [4]. Based on the results of these studies, priority topics were identified and a CME program was designed, entitled Knowledge Translation for Renal Cell Carcinoma (KT4RCC).

The goal of the KT4RCC program was to improve practitioner knowledge regarding topics with high knowledge gaps and high CME interest. This pilot study was designed to evaluate the effectiveness of the KT4RCC program for improving participant knowledge. We found an average improvement in participant knowledge of 10%, and 3-month post-CME scores indicate that knowledge is retained after KT4RCC participation.

Previous studies have demonstrated that patient care is frequently not aligned with evidence-based guidelines and this

may lead to variability in outcomes [6, 8, 9]. The goal of CME is to improve practitioner knowledge so that patients may receive optimal care supported by evidence with reduced variability [5]. CME has been validated as an effective way to increase practitioner knowledge, and improved knowledge may lead to improved practitioner performance and patient care [10].

Our study demonstrates an overall improvement in participant knowledge. Improvements were observed among different training levels (attending, resident, nurses) and languages (English and French). Participants at one site showed a decrease in test scores. Feedback from speakers, participants, and a study coordinator at this site revealed that the program had not proceeded as designed due to poor weather conditions on the evening of the event and logistical difficulties. Time restraints necessitated ending the KT4RCC program prior to completion of all material. Participants did not fully complete the post-test, and those that did complete the test did so under

Table 2 Knowledge retention: change in scores from pre-test to 3-month post-test

	Participants (n)	Pre-test mean (%)	3-month test mean (%)	Pre- vs. 3-month mean (SD)	p value
Overall	21	60.1	70.1	10.0 (17.6)	0.01
Site					
Ottawa	11	56.4	69.1	12.7 (19.5)	0.04
Montreal	0	61.4	–	–	–
Toronto	6	61.7	70	8.3 (14.7)	0.4
Quebec city	4	72.5	77.5	5.0 (19.1)	1.0
Specialty					
Urologist	10	64	77	13.0 (19.5)	0.05
Medical oncologist	4	72.5	75	2.5 (18.9)	1.0
Fellow	3	50	53.3	3.3 (5.8)	1.0
Resident	3	46.7	66.7	20.0 (20.0)	0.5
Oncology nurse	1	60	60	0.0	–
Language					
English	18	57.7	69.4	11.7 (17.2)	< 0.01
French	3	80	80	0.0 (20.0)	1.0

more time pressure. Hence, score results from this site are not likely to represent the effectiveness of the CME program. As this site likely used predominantly French materials, we expect that this would also account for the lack of improvement in test scores for French language.

The KT4RCC program was modified using feedback from the pilot study and updated to include the most recent published data. It was then re-accredited by the Royal College of Physicians and Surgeons. The KT4RCC program slides are freely available online, and the KT4RCC program will be presented in other Canadian cities [11].

Limitations of our study include inability to measure changes in patient outcomes as a result of our intervention. Previous studies have found that CME programs can have a large effect on practitioner knowledge, but only a marginal effect on patient outcomes [6, 10]. Furthermore, the instrument we used to assess clinician knowledge may not be an accurate reflection of knowledge since many of the topics are complex and nuances of responses may not be captured in a multiple-choice test. While the improvement in test score was significant, some of the items covered may be considered controversial, which may have limited the potential for larger increases in post-CME test scores. The proportion of respondents who completed the knowledge retention test at 3 months post-CME was suboptimal, and knowledge retention beyond 3 months was not assessed.

Conclusion

We developed a CME program to address knowledge gaps regarding quality indicators of care in kidney cancer (KT4RCC). This study showed that the KT4RCC program improved practitioner knowledge. These results support our process for CME development and the continued use of the KT4RCC program across Canada.

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Compliance with Ethical Standards The authors would like to disclose the following potential conflicts of interest:

Previous Dissemination None

Disclaimers None

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