

Title Page

Title: Choosing Wisely Canada STARS (Students and Trainees Advocating for Resource Stewardship): A Descriptive Study of a Student-Led Campaign to Advance Resource Stewardship in Medical Education

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Contributors statement:

FC, DC, AH, KB, LA and BW substantially to conception and design, or acquisition of data, or analysis and interpretation of data. FC, DC, AH, KB, BW, WL drafted the article or revised it critically for important intellectual content. BW agreed to act as guarantor of the work (ensuring that questions related to any part of the work are appropriately investigated and resolved).

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Abstract

Background: Resource stewardship is being increasingly recognized as an essential competency for physicians but medical schools are just beginning to integrate this into education. The authors describe the evaluation of Choosing Wisely Canada STARS (Students and Trainees Advocating for Resource Stewardship), a student-led campaign to advance resource stewardship education in medical schools across Canada.

Methods: The authors evaluated STARS six months after its launch, in November 2015. STARS student leaders responded to a telephone questionnaire, and Canadian medical school deans provided feedback by e-mail. The authors used a mixed-methods approach to analyze and summarize survey and e-mail response data.

Results: Twenty-seven of 33 (82%) eligible students representing all 17 medical schools responded, as well as 11 of 17 (65%) medical school deans. In 10 schools (59%), STARS students led various local activities (e.g., interest groups, campaign weeks) to raise awareness about resource stewardship among medical students and faculty. Furthermore, STARS students contributed to curriculum change (both planned and implemented) at 14 schools (82%). Thematic analysis revealed key program characteristics that facilitated success (i.e., pan-Canadian student network, local faculty champion) as well as barriers (i.e., complex processes to change curriculum, hierarchical nature of the medical school) to implementing change.

Interpretation: This student-led campaign, with support from local faculty and Choosing Wisely Canada (CWC), led to awareness-building activities and early curricula change at medical schools across Canada. Future plans will build upon the initial momentum created by STARS to sustain and spread local initiatives.

Introduction

Choosing Wisely Canada (CWC) is a campaign that promotes resource stewardship by helping physicians and patients engage in conversations about unnecessary care. Physicians’ ordering behaviours and resource use are strongly influenced by practices that they were exposed to during training (1, 2). In addition, the Royal College of Physicians and Surgeons of Canada updated its CanMEDS competency framework in 2015, and now clearly identifies resource stewardship as a key physician competency within the “Leader” role that must be addressed in residency training (3). However, given that these changes are relatively recent, many Canadian medical schools’ curricula and residency programs do not have consistent content on resource stewardship (4,5). A recent survey of medical students found agreement that physicians have a responsibility to contribute to health system stewardship and should play a more prominent role in reducing unnecessary care (6).

Given the importance of training in establishing practice habits and the gap in medical curricula, CWC established medical education as a key strategic priority. As a first step, CWC partnered with national medical student associations to release a list of “Six Things Medical Student and Trainees Should Question” to highlight the importance of integrating resource stewardship in medical education (7). Next, in November 2015, CWC launched the STARS campaign (Students and Trainees Advocating for Resource Stewardship – see Figure 1 for detailed campaign overview and Table 1 for full list of program elements) and engaged 2 medical students from each of Canada’s 17 medical schools to catalyze grassroots, student-led initiatives to advance resource stewardship in medical education at their local schools. The main objectives of this descriptive study are 1) to describe how the STARS campaign was implemented; 2) to summarize the STARS student-led Choosing Wisely initiatives; and 3) to identify systemic facilitators and barriers encountered by STARS students that could guide the improvement of the STARS campaign to optimize its impact.

Study Design and Sources of Data

This descriptive study consisted of a telephone survey of STARS students as well as an e-mail question sent to medical school deans. The survey administered to the STARS students included questions that asked them to describe the initiatives that they implemented or planned to implement at their local medical schools to promote resource stewardship. Survey questions also explored students' perceptions of facilitators of and barriers to successful implementation of their STARS initiatives, and included open-ended questions to solicit feedback on the usefulness of the different program elements (see Table 1). We pilot-tested the survey with three past CWC summer students and modified based on discussion.

We invited all STARS students to participate. Two summer students (DC and FC) administered the survey by telephone. In order to minimize bias, the summer students that collected the data were not involved in the organization of STARS. When possible, students from the same school answered the survey together on the same call (n= 19), however, some students responded individually due to scheduling issues (n=8). Interviews ranged from 30 minutes to an hour in duration. We audio-recorded the telephone conversation to ensure accuracy of data collection and entered numeric and narrative data into our study database, removing any potential identifying information. Student participants were anonymized to ensure confidentiality, and quotes are linked to de-identified School numbers (e.g., School 1).

We also emailed deans (n=17) to ask for a narrative description of the impact of STARS at their school in order to triangulate data collected from our medical student questionnaire. We anticipated that an in-depth questionnaire would result in a low response rate given how busy the deans are, and so elected to send them the following question by e-mail and asked them to provide a detailed response:

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“What impact have the STARS students had with respect to resource stewardship at your medical school?”

Descriptive Analysis

We used descriptive statistics to summarize survey results, using counts and percentages to summarize survey results. The medical school was the unit of analysis, and so where 2 students responded, we combined their responses. We analyzed the open-ended narrative responses from STARS students and deans inductively using a thematic analysis. Three study team members (FC, DC, KB) independently read interview transcripts and identified key themes regarding facilitators and barriers. The 3 study team members reached consensus on key themes through discussion. Our analysis was reflexively mindful of our own subject positions in the research context; we remained cognizant of the forces (e.g., our own genders, professional roles, and social positions) that affected our analysis of the data. In particular, three co-authors (BW, KB, WL) hold national leadership positions in Choosing Wisely Canada, and one student co-author is enrolled in a physician leadership stream in our medical school.

Results

Twenty-seven of the 33 (82%) students representing all 17 medical schools provided consent and responded to the survey. Students who didn't participate were either unavailable due to logistical reasons, or did not respond to the interview request. See Table 2 for participant characteristics. Eleven of the 17 (65%) deans or a delegate responded by email.

Summary of STARS Student-Led Initiatives

STARS students at 6 schools (35%) planned curricular changes. Planning activities included meeting with educational leaders, reviewing course materials to either highlight existing resource stewardship content or identify opportunities to integrate resource stewardship principles, and carrying out needs assessments. At 4 schools (24%), students successfully implemented curricular changes, including the introduction of resource stewardship content into small group learning sessions, lectures and clinical skills sessions.

In addition to curricular change, many students led a variety of other initiatives intended to raise awareness of, and generate interest in CWC and resource stewardship. Since STARS was designed to be grassroots and student-led, initiatives varied significantly across schools (Table 3), reflecting the personal interests of the student as well as the unique educational environment of each school. Examples of STARS student-led initiatives included creating a CWC student interest group (implemented at 2 schools (11%), and approved at 4 schools (23%)), organizing a campaign week to raising awareness about CWC and resource stewardship (4 schools (23%)), publishing newsletters or blogs about resource stewardship (3 schools (17%)), organizing special presentations on resource stewardship (6 schools (35%)), and introducing articles focused on resource stewardship in journal club discussions (2 schools (11%)). Additionally, at 8 schools (47%), students performed a needs assessment (outside of curriculum

planning activities) to determine baseline student knowledge and attitudes with regards to resource stewardship.

Medical School Deans’ Perceptions

While 11 Deans (65%) responded to our e-mail question, the nature of the responses did not provide sufficient detail to allow for rigorous thematic analysis. In several cases, deans provided a summary that they asked their STARS students to prepare. However, their responses gave the impression that they were aware of the STARS students’ contributions, and that they had a favourable view of the STARS campaign in general.

Facilitators of STARS Student-Led Initiatives

Table 4 summarizes STARS program elements and student perceptions of how these facilitated successful implementation of their STARS initiatives. Overall, program elements fell into 3 broad categories. First, there were program elements students felt were extremely helpful in facilitating their overall success. For example, students reported that the Leadership Summit itself was essential and provided the foundational knowledge and skills to create change. The summit also contributed to establishing a pan-Canadian network of STARS students. Students recounted numerous examples of connecting with each other both in person and through videoconference in order to share resources, provide peer-feedback, and, in some instances, work together to organize inter-school activities. Students also described the bi-monthly conference calls as a highly useful forum to discuss project progress and seek advice from other students and CWC leadership.

Second, some program elements, particularly those based at the local medical school, were perceived to be helpful facilitators, but were not consistently accessible or available to all students. For

example, at 10 schools, students had support from a local faculty mentor, which was critical to their overall success. They described finding like-minded faculty engaged in aligned work to be akin to finding “an ally”.

Finally, some program elements, while generally seen as ‘nice to have’, but were not perceived to be a critical facilitator of students’ overall success in implementing change at their school. For example, the Facebook group, while widely accessed by students, was seen as a nice venue to share stories and provide updates, but was not frequently used by students to seek advice from one another.

Barriers to Implementation of STARS Student-Led Initiatives

Students identified barriers to implementing STARS initiatives at their medical schools (Table 4), which we grouped into three broad categories: 1) students limited as change agents; 2) curricular change is complex; and 3) structural barriers. The multiple commitments and competing demands of medical school left some students with limited time to lead local initiatives and implement curricular change. Students also expressed difficulty recommending changes to the curriculum for upper year students when they themselves had not yet reached that stage of medical training. A few students reported that it was difficult to influence change at their schools due to the perceived hierarchical nature of medical school.

STARS students who struggled to initiate curricular change found it difficult to navigate the complexities of medical school administration. For some, advocating to incorporate resource stewardship as a new topic was seen as competing for limited curricular time. Furthermore, several schools are currently undergoing a process of curricular reform, such that the introduction of new content was not seen to be a priority.

Finally, structural barriers, which included local policies and logistical challenges also posed problems for STARS students. For example, many schools have deadlines for proposals to approve new interest groups, which had already elapsed by the time students returned from the Leadership Summit.

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Interpretation

Within a relatively short time frame, STARS students implemented a wide-range of awareness-building activities and initiated plans to integrate, and in several cases added resource stewardship content into the curriculum. These findings suggest that a national grassroots campaign that capitalizes on student advocacy and leadership can accelerate change and serve as a catalyst to address the urgent need to teach medical students about resource stewardship. STARS students clearly self-identified as leaders and the time spent learning together in-person at the leadership summit and co-creating a vision for STARS was highly beneficial and led to the establishment of a national network of STARS students. We believe that this pan-Canadian network, with CWC playing a key central coordination role, served to fuel the implementation of local initiatives by providing students with a sounding board and a forum that they could turn to for advice and support.

Educational leaders have emphasized the importance of combining culture and curriculum change to promote resource stewardship in medical education (8) . Specifically, a recent systematic review identified the “creation of a supportive environment in which...the presence of role models of delivering high-value, cost-conscious care, and a culture of high-value, cost-conscious care reinforce the desired training goals” as critical to advancing resource stewardship education (9) . The STARS campaign, which combines a bottom-up approach enabled by top-down support to catalyze change (13), encapsulates these principles and has the potential to shift the culture and initiate a conversation with faculty and students about the importance of high-value care.

Informing the Evolution of STARS

Our evaluation of STARS identified a number of challenges and has informed further refinements needed to maximize the impact of STARS and ensure its sustainability. While STARS has sowed the seeds for grassroots student leadership for resource stewardship across Canada, much work

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is still needed to translate early wins into lasting change. Given the transient nature of medical students and the inevitable transition to clinical clerkship when students generally have less time to devote to initiatives like STARS, the sustainability of the STARS campaign ultimately requires the infusion of a new cohort of student leaders to expand upon the efforts already underway and lead new initiatives.

The next cohort of student leaders recently assembled at a Leadership Summit in February 2017 that marked the official launch of the next wave of STARS. While elements that enabled success were continued, several key modifications based on the program evaluation were made. First, we dovetailed the Leadership Summit with the CWC National Meeting to expose students to the broader campaign. We also updated the Leadership Summit to include content on curriculum change because past STARS students identified challenges navigating this process. We also took a more proactive approach to identifying at least one faculty member at each school to help mentor students. Perhaps most importantly, we partnered with students to help co-design the Leadership Summit, and had several deliver presentations including past STARS students discussing lessons learned from their experiences.

Limitations

Our study has several potential limitations. Since CWC led the evaluation of STARS, students may have treated the interview like an evaluation of their individual effectiveness, rendering our findings susceptible to social desirability bias. The decision to combine student responses may have resulted in some loss of information. The self-reported nature of our data collection approach did not allow for evaluation of whether the initiatives led by students actually resulted in increased awareness or knowledge of resource stewardship principles among students at their local medical schools. Finally, the landscape nationally with respect to resource stewardship is rapidly shifting, making it difficult to know whether some of the curricular changes reported by students would have occurred independent

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of STARS. However, we believe that students' efforts at a minimum contributed to changes to the medical school curriculum.

Conclusions

By combining bottom-up student-led change with top-down support from local faculty and the national CWC campaign, STARS led to the implementation of a wide-range of awareness building activities and early curricular change at medical schools across Canada. Our approach could be used by others to promote resource stewardship in medical education. In fact, programs modeled on STARS was being launched in September 2017 in the Netherlands, and will be launched in December 2017 in the United States. Next steps include building upon the initial momentum created by STARS to sustain and spread local initiatives and evaluating the longer-term impact of curricular change on medical student knowledge, skills and attitudes.

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Box 1: STARS campaign overview

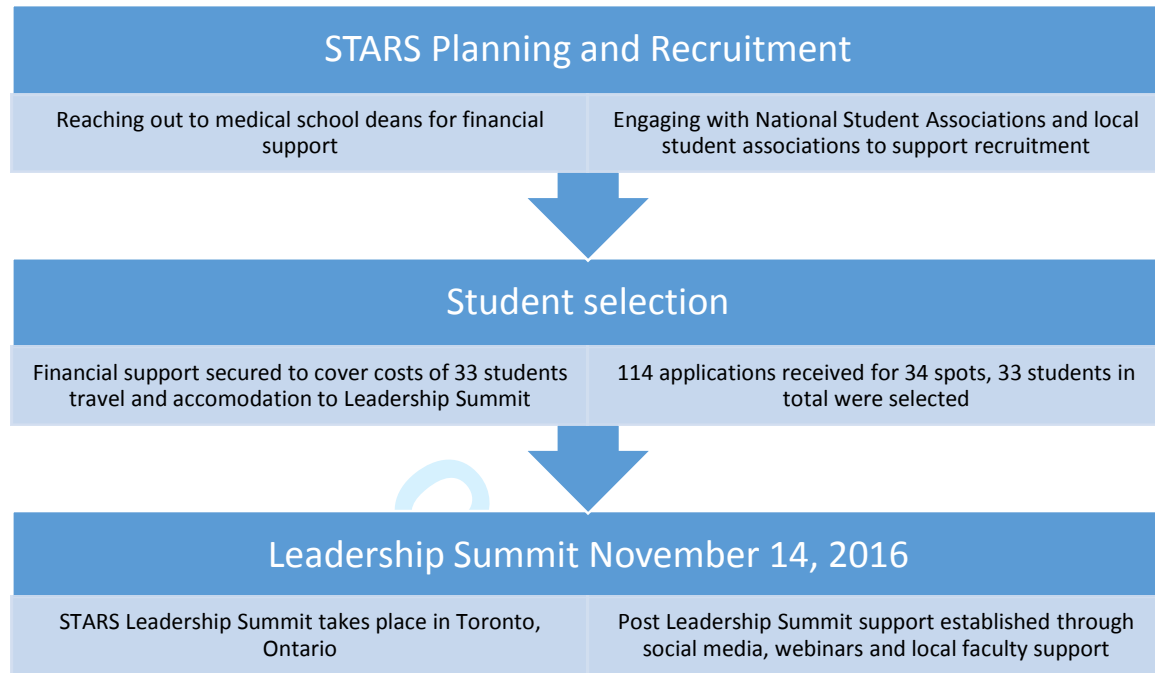
- CWC leadership communicated with the deans of all 17 medical schools to inform them about the CWC medical education strategy, and asked each of them to sponsor 2 medical students to participate in STARS.
- Students were then recruited to apply through an open call using local medical school email distribution lists and social media, facilitated by the Canadian Federation of Medical Students (CFMS) and Fédération médicale étudiante du Québec (FMEQ).
- 33 students were selected (16 medical schools sponsored 2 student leaders and 1 medical school sponsored 1 student leader) from the 114 applications received to attend a 1-day Leadership Summit hosted by CWC. Wherever possible, 1 first year and 1 second year student from each school were selected. Our rationale was that this would allow the first-year student to carry forward and facilitate sustainability of STARS initiatives at their school. Second year students also have more experience, and may have more reach within the student body.
- The deans at each of the medical schools funded for all travel-related costs for their school's students. The CFMS and FMEQ identified a student to represent each organization and participate in the summit.
- The main goals of the Leadership Summit were to introduce student leaders to core resource stewardship principles and the broader CWC campaign, and to equip them with leadership, advocacy and communication skills to launch grass-roots initiatives at their local schools to promote resource stewardship.

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- A number of additional program elements, such as cloud-based resource sharing, ongoing communication through social media and teleconferences, and identification of faculty to support STARS student-led activities supported local change efforts and fostered the establishment of a pan-Canadian network of STARS students.

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Appendix A:**Appendix B: Student Survey****A. Demographic questions:**

1. What medical school do you attend?
 - a. Memorial University of Newfoundland
 - b. Dalhousie University
 - c. Université Laval
 - d. Université de Montréal
 - e. Université de Sherbrooke
 - f. McGill University
 - g. University of Ottawa
 - h. Queen's University
 - i. University of Toronto
 - j. McMaster University
 - k. Western University
 - l. Northern Ontario School of Medicine
 - m. University of Manitoba

- n. University of Saskatchewan
- o. University of Calgary
- p. University of Alberta
- q. University of British Columbia

B. The following questions are aimed at determining whether your involvement in the STARS program resulted in any curricular changes (for example, a new lecture on resource stewardship, integrating resource stewardship into problem-based learning cases etc.) at your medical school. We realize that not all STARS students targeted curricular change at their medical school as a goal, so some of these questions may not be relevant to you.

2. Based on your efforts, what level of curricular change do you think you have achieved at your school? Please select the highest level of curricular change achieved.

<multiple choice response – mandatory>

- a. None, we **never set out** to make any curricular changes at our medical school **(skip to question 6)**
- b. None – we intended to make curricular changes but are in **planning stages** or **encountered barriers**
- c. Met with curricular leads or committees and had **preliminary conversations**
- d. Established a **plan for curricular change and confirmation** to teach resource stewardship concepts in the future
- e. **Implemented curricular change** and resource stewardship was taught formally at our medical school
- f. Resource stewardship teaching was already in the curriculum, but we implemented changes to **expand the content**
- g. No need for change - resource stewardship teaching was already fully integrated into the curriculum, so there was no opportunity for us to add anything new
- h. Other: <narrative response>

3. What specific curricular changes do you think you influenced directly through your leadership? Please provide a detailed description of **each** change.

<narrative response>

4. What supported or enabled your efforts to introduce curricular change?

<narrative response>

5. What barriers, if any, did you encounter when trying to introduce curricular change?
-prompt “did you overcome these barriers, and how?”

<narrative response>

C. The following questions are aimed at determining the activities that you initiated at your medical school as part of the STARS program. For each activity that you initiated, we would like you to provide a brief description of the activity and what you think the impact of that activity was.

6. Did you perform a needs assessment (e.g., surveys of other students, residents or faculty?)

- a. Yes
- b. No, skip to question 10

6.1. If yes, please provide a brief description of the needs assessment that you performed (and if you are willing, please send us a copy of the survey you created):

<narrative response>

6.2. What was the objective of this needs assessment?

<narrative response>

6.3. If you distributed a survey, how many respondents did you have?

<narrative response>

7. Did you initiate a CWC student interest group?

- c. Yes – the group has already been established
- d. Yes – the group has been approved but not yet established
- e. Yes – the group is in the process of being approved
- f. No, skip to question 7

6.1. If yes, please provide a brief description of what you initiated:

<narrative response>

6.2. What was the main impact of this activity?

<narrative response>

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6.3. How many students participated in or were reached by your CWC interest group activities (e.g., speakers, education events etc.)

<narrative response>

8. Did you organize a CWC campaign week (e.g., events, social media campaign)?

- g. Yes
- h. No, skip to question 8

8.1. If yes, please provide a brief description of what you organized:

<narrative response>

8.2. What was the main impact of this activity?

<narrative response>

8.3. How many students did you reach through your CWC campaign week activities?

<narrative response>

9. Did you publish anything to promote awareness about STARS or resource stewardship in a newsletter, blog or journal or students or faculty at your medical school?

- i. Yes
- j. No, skip to question 9

9.1. If yes, please provide a brief description of what you published (and send us a link to what you published):

<narrative response>

9.2. What was the main impact of this activity?

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<narrative response>

9.3. Approximately how many medical students would have received or read that publication?

<narrative response>

10. Did you organize a special presentation or lecture outside of the formal curriculum to raise awareness about STARS or resource stewardship?

k. Yes

l. No, skip to question 11

10.1. If yes, please provide a brief description of the presentation or lecture:

<narrative response>

10.2. What was the main impact of this activity?

<narrative response>

10.3. How many students attended this special presentation or lecture?

<narrative response>

11. Did you organize a journal club outside of the formal curriculum to raise awareness about STARS or resource stewardship?

m. Yes

n. No, skip to question 12

11.1. If yes, please provide a brief description of the journal club that you organized:

<narrative response>

11.2. What was the main impact of this activity?

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<narrative response>

11.3. How many students participated in this journal club?

<narrative response>

12. Were there other activities that you organized (not listed above) at your medical school to raise awareness about STARS or resource stewardship?

- o. Yes
- p. No, skip to question 13

12.1. If yes, please provide a brief description of the activity:

<narrative response>

12.2. What was the main impact of this activity?

<narrative response>

12.3. How many students participated in this activity (if relevant)?

<narrative response>

D. The following questions are aimed at determining whether specific elements of the STARS program were helpful in supporting you to achieve your goals. Please use the following 5-point scale to rate each of the STARS program elements:

1 = not helpful at all; 2 = minimally helpful; 3=somewhat helpful; 4=helpful; 5=critical to my success; not applicable (unable to comment because I did not utilize this resource)

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13. STARS leadership summit

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13.1 In what way(s) did you find the STARS leadership summit to be helpful? Please provide specific examples if possible.

<narrative response>

13.2 Were there any ways in which the STARS leadership summit was not helpful? Please provide specific examples if possible.

<narrative response>

14. STARS shared Google Doc

1	2	3	4	5	N/A (did not use)
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14.1 In what way(s) did you find the STARS shared Google Doc to be helpful? Please provide specific examples if possible.

<narrative response>

14.2 Why didn't you use the Google Doc, why? or If you did not find the Google Doc helpful, why? Please provide specific details.

<narrative response>

15. STARS Facebook group

1	2	3	4	5	N/A (did not use)
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15.1 In what way(s) did you find the STARS Facebook Group to be helpful? Please provide specific examples if possible.

<narrative response>

15.2 Why didn't you visit the STARS Facebook Group? or If you did not find the STARS Facebook Group helpful, why? Please provide specific details.

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<narrative response>

16. STARS community of practice (i.e., seeking advice from other STARS students, sharing resources)

1	2	3	4	5	N/A (did not engage)
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16.1 In what way(s) did you find the STARS student community of practice to be helpful? Please provide specific examples if possible.

<narrative response>

16.2 Why didn't you interact with the STARS community of practice? or If you did not find interactions with the STARS community of practice helpful, why? Please provide specific details.

<narrative response>

17. Impromptu meetings with CWC leaders and/or other STARS student leaders at provincial / national meetings (i.e. Canadian Conference on Medical Education)

1	2	3	4	5	N/A (did not meet)
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17.1 In what way(s) did you find impromptu meetings with CWC leaders and/or other STARS student leaders at provincial / national meetings to be helpful? Please provide specific examples if possible.

<narrative response>

17.2 If you attended an impromptu meeting and did not find it to be helpful, why? Please provide specific details.

<narrative response>

18. Conference calls with CWC leaders and other STARS student leaders

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1	2	3	4	5	N/A (did not attend call)
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18.1 In what way(s) did you find the conference calls to be helpful? Please provide specific examples if possible.

<narrative response>

18.2 Why didn't you attend the conference calls? *or* If you did not find the conference calls helpful, why? Please provide specific details.

<narrative response>

19. Local faculty mentor

1	2	3	4	5	N/A (did not have a mentor)
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19.1 In what way(s) did your local faculty mentor help you? Please provide specific examples if possible.

<narrative response>

19.2 If you did not have a local faculty mentor, why? *or* If you did not find having a local faculty mentor helpful, why? Please provide specific details.

<narrative response>

20. Local team of other students and/or residents (other than the other STARS student leader)

1	2	3	4	5	N/A (did not interact with others)
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20.1 In what way(s) did this local team of students and/or residents help you? Please provide specific examples if possible.

<narrative response>

20.2 If you did not have a local team of students and/or other residents working with you, why? or If you did not find interacting and/or working with a local team of other students and/or residents helpful, why? Please provide specific details.

<narrative response>

21. Medical school leadership (e.g., Dean, department chairs etc.)

1	2	3	4	5	N/A (did not interact)
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21.1 In what way(s) did the medical school leadership help you? Please provide specific examples if possible.

<narrative response>

21.2 If you did not interact with your medical school leadership, why? If you did not find your medical school leadership helpful, why? Please provide specific examples if possible.

<narrative response>

22. National or provincial student associations (i.e., CFMS or FMEQ).

1	2	3	4	5
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22.1 In what way(s) did the national or provincial student association (CFMS or FMEQ help you? Please provide specific examples if possible.

<narrative response>

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22.2 If you did not interact with the national or provincial student associations, why? *or* If you did not find the interactions with the national or provincial student associations helpful, why? Please provide specific examples if possible.

<narrative response>

E. The following questions are aimed at determining factors that enabled your success, as well as barriers that you faced in trying to initiate change at your medical school.

23. Were you able to secure any external support, funding, resources or other infrastructure to support your STARS activities?

<narrative response>

24. Overall, were there barriers that you encountered that limited your ability to achieve your goals as part of the STARS program? Please provide details.

- "If so, how did you overcome these barriers?"

<narrative response>

25. Have you identified students to carry on STARS program at your school? Can you provide their name and contact information?

26. Do you have any additional suggestions or comments about how to improve the STARS program?

<narrative response>

27. In what way has the STARS program influenced you personally?

< narrative response>

Probe: can you provide an example?

<ask each student specifically>

Appendix C: Dean Survey

Email sent by Dr. Wendy Levinson to each Medical School dean :

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Dear [Dean NAME],

Hope that all is well and that you are enjoying the beautiful Northern summer!

In the fall of 2015, you kindly agreed to sponsor two students, [student NAME] and [student NAME] to participate in the Choosing Wisely Canada STARS (Students and Trainees Advocating for Resource Stewardship) program.

Following the STARS Leadership Summit in November 2015, [student names] have been working on resource stewardship advocacy efforts locally. To evaluate the STARS program, we would like to solicit your feedback on the impact to date.

I would be very grateful if you (or a delegate of your choosing) could respond via email by July 22, 2016 to the following question:

What impact have the STARS students had with respect to resource stewardship at your medical school? If you are able to provide specific details, we would greatly appreciate it.

Please let us know if you would be willing to have your response summarized anonymously as part of our research study evaluating the impact of the STARS program. In other words, the data will be presented for publication in aggregate, such that your responses cannot be linked back to you. If you prefer that we exclude your response from the study, we would still appreciate your feedback as this information would still be extremely valuable to us to help guide our future efforts.

Thank you again for your support of Choosing Wisely Canada and STARS.

All best. Yours, Wendy

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Table 1: STARS Program Key Elements

STARS Program Elements	Description
Capacity Building Activities and Resources	
STARS Leadership Summit	One-day meeting bringing together 2 student representative from each medical school that equipped STARS students with knowledge about resource stewardship, as well as leadership, advocacy and communication skills to support implementation of local student-led Choosing Wisely initiatives
List of Things Medical Students & Trainees Should Question, released November 14, 2015	A Choosing Wisely list for medical education endorsed by CFMS and FMEQ, and made available to all STARS students through the CWC website
Community Building Activities and Resources	
Conference Calls	Bi-monthly teleconferences to provide STARS students with a forum to share ideas and ask the national student community for advice related to their initiatives.
Facebook Group	A private Facebook group to allow STARS students to stay in contact with each other and share resources related to their initiatives. Students could also post photos of STARS events at their schools to showcase their initiatives and successes to other STARS students.
Google Shared Document	A shared Google Doc created by one of the STARS students to provide students with a summary of ongoing STARS activities at each school across Canada. Students updated this document with their planned and completed initiatives, resources, and tips for success and lessons learned.
Collaboration through STARS Community of Practice	Outside of the conference calls, Facebook group and Google doc, some STARS students worked collaboratively with students from other schools on common initiatives. These included 1-on-1 interactions, or group interactions via videoconference (i.e., group Skype calls).
National Medical Student Organizations (CFMS, FMEQ)	Integration of CWC principles into FMEQ Charter, approval and publication of a CFMS Choosing Wisely Position Paper, and engagement of CFMS and FMEQ liaison representatives to provide ongoing endorsement of the STARS program and student initiatives.
School-Based Activities and Resources	
Other Medical Students	Local medical students recruited by the STARS students to help plan and implement the local STARS initiatives.
Faculty Mentor / Advisor	Faculty mentor / advisor to mentor STARS students locally and support their change efforts. Some students were able to identify a faculty mentor themselves. For those students without a faculty mentors, CWC reached out to our network of CWC clinical leads to identify faculty who could support student efforts locally.
Medical School Leadership	The Deans and Department Chairs at each medical school provided support to STARS students attempting to navigate the process of curricular change.

Table 2. Participant Characteristics

Student Characteristics		n = 27
Gender	Male	10
	Female	17
Year of Medical School	2017	1

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<u>Graduation</u>	<u>2018</u>	<u>12</u>
	<u>2019</u>	<u>14</u>

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Table 23: STARS student led initiatives

Initiative	# (%)	Description
Curriculum Change		
Changes Planned	6 (35%)	Students embarked on planning curricular changes through a variety of different activities, including reaching out to educational leaders (i.e., vice deans, curricular leads) and UME curriculum committees, reviewing course content to identify opportunities to integrate resource stewardship content, and carrying out formal (e.g., surveys, end-of-session feedback) and informal needs assessments (e.g., informal conversations etc.) of students to ascertain their perceptions regarding learning about resource stewardship.
Changes Implemented	4 (24%)	Curricular changes varied among schools, with some seeking to make changes to current materials, and other hoping to introduce entirely new learning activities. These changes involved the inclusion of resource stewardship education into small group learning, such as problem-based learning (PBL) and case-based learning (CBL); didactic lectures; and clinical skills sessions.
Needs Assessment		
	8 (47%)	Students performed surveys of and held informal focus groups with their classmates to determine their current level of knowledge regarding CWC and resource stewardship. These were independent from needs assessment activities tied to curriculum planning.
Interest Group		
Planned	4 (25%)	STARS interest groups were often in the planning stages because the students started their work after the November summit, and most schools require interest group proposals to be submitted by October. However, four schools have confirmed they will establish a student CWC interest group in the upcoming academic year
Implemented	2 (13%)	Two schools created an official STARS interest group. Key activities include organizing guest speaker sessions, CWC presentations, and partnering with other groups with overlapping areas of interest, such as the Students for Antimicrobial Stewardship (SAS) interest group.
Campaign Week		
Implemented	4 (24%)	Campaign week activities differed among the various schools. Most decided to hold guest speaker sessions, raise awareness through social media (blog, Facebook, Twitter), and have in-class activities such as trivia contests. A few schools in one province decided to work together on a provincial CWC campaign week
Awareness Building Activities		
Implemented	4 (24%)	Students published CWC and resource stewardship related items on social media, within student journals/newsletters and blogs, and also presented at provincial medical student conferences.
Special Presentation on Resource Stewardship		
Implemented	6 (35%)	Presentations organized by the STARS students outside of the formal curriculum included talks about CWC by physicians with first-hand experience, a half-day resource stewardship conference, and a session on how to be mindful of resources in clinical practice.

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Journal Club		
Implemented	2 (12%)	Journal clubs organized by STARS students involved the critical appraisal of research related to resource stewardship in clinical practice. One school organized a standalone activity, whereas another partnered with an existing journal club series and recommended an article related to resource stewardship for discussion.
Other Activities		
Implemented	3 (18%)	Other activities not listed above include advocacy related activities such as monthly meetings with the school Dean and Medical Society and attending lobby days.

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Table 34: Student perceptions of [facilitators and](#) the usefulness of STARS program elements

Theme	Program Element	Student Perceptions	Quote
Elements perceived to be extremely helpful in contributing to STARS students' success	STARS Leadership Summit	<p>All of the STARS students attended the Leadership Summit and the vast majority thought it was crucial to their success.</p> <ul style="list-style-type: none"> In particular, they felt that the summit set the foundation for the work they would be doing and introduced them to the concept of resource stewardship. Students also felt that the workshops on leadership, advocacy and communication were essential to developing the skills required to succeed as part of the STARS program. Some students felt that less time should have been spent on building a STARS mission statement, and more time listening to speakers and attending workshops. 	"[The leadership summit] gave structure to the group...there were a lot of workshops in the introduction by [CWC Staff] as to what the focus of the campaign was, and this was really helpful to determine what direction we wanted to go in terms of resource stewardship" (School 3)
	Conference Calls	<p>The majority of students attended bi-monthly conference calls with CWC and other STARS students.</p> <ul style="list-style-type: none"> Students felt these calls were a great way to obtain a high-level overview of activities planned at other schools and to seek advice from the larger STARS community and the central CWC team. However, some students did comment that the timing of calls during the day made it difficult to attend. Students also felt that the calls could have been structured with clearer objectives. 	"It was a good hour-long investment where you could learn a snapshot of what was going on, to tell what you were doing, and then potentially get help if you needed and I thought that was really effective". (School 4)
	Collaboration through pan-Canadian STARS network Community of Practice	<p>The majority of STARS students interacted with the larger, national, STARS community-student network and found the interaction to be very valuable.</p> <ul style="list-style-type: none"> The communityStudents would share resources, provide peer-feedback and advice to others encountering common challenges, and collaborating on inter-school activities (provincial campaign week, surveys). 	"They didn't want it just be that one conference and go off and do your own thing, they wanted to have that connection. I felt the community of practice was good" (School 8)
Elements perceived to be helpful facilitators but not	Faculty Mentor / Advisor	<p>Approximately half of the STARS students worked closely with a faculty member, and found their support to be quite helpful.</p> <ul style="list-style-type: none"> In particular, faculty members helped by providing advice and guidance, advocating for proposed changes, and connecting STARS students with local stakeholders. Students who did not interact as closely with faculty leads at their 	"Our faculty mentors have essentially pushed our curricular change. It's been great to have an ally who is an MD faculty". (School 4)

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consistently accessible or available to STARS students		<p>home institution had a desire for this support, but had challenges scheduling meetings due to faculty unavailability, or had trouble engaging an actual lead at their school.</p> <ul style="list-style-type: none"> Other students commented on the fact that they were not certain what the faculty lead's role might be in helping with their initiative. 	<p>"It's hard to find a mentor on your own...somebody...that you can ask them all these questions and bother them." (School 12)</p>
	Other Medical Students	<p>Some STARS students found it helpful to engage other interested students at their local medical school to divide the workload associated with planning and implementing the STARS initiatives.</p> <ul style="list-style-type: none"> Local medical students helped to organize and set up events, engage other classmates, and provide insight on the upper-years of medical schools for those STARS students in pre-clerkship. 	<p>"The workload of enacting curricular change is significant and having two people, one of whom entered clerkship soon after the STARS conference was a little bit difficult to make all of the changes that we want to happen so I was really happy that we were able to bring in other motivated students..." (School 4)</p>
Elements seen as 'nice to have' but not perceived to be a critical facilitator of overall STARS students' success	Facebook Group	<p>All of the STARS students were part of the Facebook group, but did not perceive that the information shared on the group advanced their local initiatives in a meaningful way.</p> <ul style="list-style-type: none"> However, students appreciated the opportunity to receive updates on other STARS initiatives, and enjoyed seeing photos of successful events. Many students thought the Facebook group was not used to its full potential because it was mostly utilized for passive information sharing and some of the information on the group had already been spread through other methods (email, conference calls, etc.). Students would have also preferred more active collaboration using the Facebook group. Furthermore, some students mentioned that they simply do not use Facebook as much as they did in the past. 	<p>"It was useful to be connected with other students, but I wish it was used for more discussion and I guess it is hard to...I think it is better for planning or if they put up resources they used I think, I know also people put up pictures of things like that. If it was used more like that, I think it would have been more useful to kind of to keep students all on the same page about what was happening across the different universities. It wasn't fully utilized." (School 1)</p>
	Google Shared Document	<p>Most students posted information related to their STARS initiatives on the shared Google doc at the beginning, but only a small percentage found it to be useful.</p> <ul style="list-style-type: none"> The main challenge was that students did not routinely update the information on the Google doc. 	<p>"I guess I can say initially it was quite nice to be able to list all the initiatives as well as faculty names as it was really organized but I don't know what happened after that; there wasn't really any follow-up."</p>

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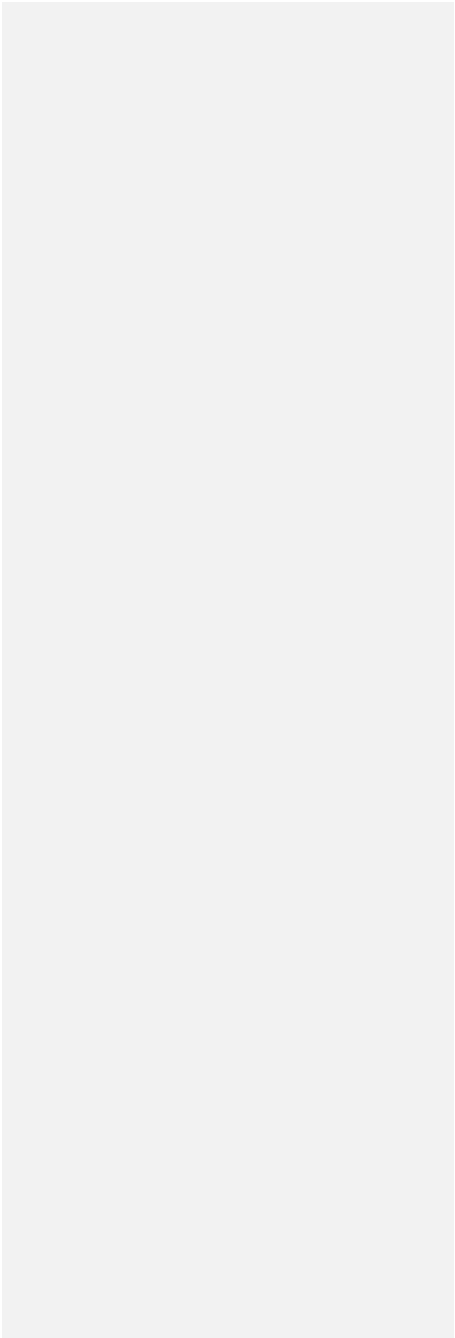


Table 4: Thematic Analysis of Barriers to Change

Theme and subtheme	Student Quotes
Students Limited as change agents	
Multiple competing priorities	"[A limitation was] our own time because we obviously have to study medicine...whilst undertaking curricular change." (School 4)
Difficult to change a curriculum that student has not yet participated in.	"Being in first year...I don't have an understanding of what school is like for third and fourth years, so personally trying to do advocacy projects for curricular change and stuff like that is difficult for me to push in third and fourth year." (School 17)
Hierarchy in medical education (Medical students at bottom)	"We are medical students and we don't have the influence required for curricular change..." (School 5)
Curricular change is complex	
Competing curricular demands	"There are a lot of different interest groups trying to get a say in the curriculum, so it is hard at this particular moment to kind of put our voices forward...we really need to vouch for why resource stewardship might be more important than [other special interest topics]" (School 5)
UME curriculum renewal/reform etc.,	"I think people are a bit annoyed when you ask for yet another change, and [our medical school] is already dealing with the accreditation issue. So there are certain things that are higher priorities for them." (School 14)
Structural Barriers	
Policies and Procedures	"The Choosing Wisely campaign and the STARS conference was after the deadline to apply to the interest group people at [our school's] medical student society...I plan on applying for actual status in the next application for interest groups." (School 14)
Logistics and Local Resources	"If you don't book your rooms for the whole year in in September or October...we weren't really able to host any events like in terms of speakers and stuff because we couldn't get a room at the school." (School 17)